

100 Introduction to Theatre. Class meets 6 hours

There are many ways of approaching the art of the theatre and different sections of this class can be expected to take different paths, following the particular interests and curiosities of the members of the group. Common to all sections, however, will be the assumption that the theatre is everywhere and always a living art. In the theatre, human beings communicate with one another by sights and sounds; plays exist to be seen and heard. The practical work which goes on in all theatre classes emphasizes this fact. The student can expect that some of the traditional concepts of the theatre will be critically examined, for example; the notion of the theatre as a collaborative venture to which various specialists, playwright, actor, director and designer, contribute their skills. The study of various possible relationships between a play and an audience falls within the scope of the class, as does the re-examination in theatrical terms of plays which have become literary heirlooms. The chief aim of the class is to enable students to discover the theatre, to exercise their curiosity in a creative environment and to decide whether they wish to take more advanced classes in the subject.

There is no prescribed textbook and no formal prerequisite for the class. Individual instructors will recommend outside readings where appropriate.

250 The Classic Theatres and their Origins Class meets 4 hours

This class begins by examining the possible origins of the theatre in prehistoric times. It then considers what we know of the scripts, theatre buildings, acting and general staging conventions of Greek, Roman and Eastern theatres. In addition to this exploration of original performance conditions, which will include practical work, students will be asked to consider the philosophical and social implications of these theatres and their relevance to contemporary societies. Particular areas of emphasis will be determined by the students and instructor.

Prerequisite: Theatre 100.

270 Design in the Theatre. Class meets 6 hours

This class is specifically concerned with visual aspects of the theatre. Its terms of reference include any visual stimulus in the environment that may affect the theatrical event. Everything in the theatre that is seen, from its basic architecture to the organization of bodies in space at a particular moment, has been subject to a process of design. Areas of particular study, to be determined by the students and instructor, may be drawn from scenic, lighting, costume, and architectural design. Students will be expected to devote time to the practical exploration of questions and problems as well as the theoretical discussion of them. Thus they will be given an opportunity to develop their visual awareness of theatres and what happens in them.

Prerequisite: Theatre 100.

350 The Theatre from the Renaissance to the Nineteenth Century. Class meets 4 hours

This class examines the theatre forms which evolved during the processes of secularization and mechanization which dominated the Western world from the early Renaissance to the nineteenth century, with its primary focus on the theatre in Europe. The development of the theatre in North America and Asia may also be included. Areas of particular study may focus upon the actor, playwright, audience or upon the physical structure of the theatre. The practical exploration of the theatre of this period will be directed towards realizing the possibilities of different theatrical conventions.

360 The Playwright in the Theatre (formerly 480). Class meets 6 hours

This class is concerned with the creation of theatrical events, usually, but not necessarily, on the basis of a formal written script. It does not deal with the printed or spoken word exclusively but rather with the total language of the theatre, as incorporated into a script. It may further involve a study of the playwright's sources for a theatrical event, a structural analysis of existing scripts and practical explorations of the ways in which a script can be prepared.

380 The Actor in the Theatre. Class meets 6 hours

This class examines the nature of acting. Students will be given an opportunity to explore the function of the actor in the theatre, his relationship to other theatre artists, and his several possible relationships to the audience. The scope of the class includes such topics as the externalization of character, the concept of impersonation, analysis of a particular role, improvisational techniques, particular theories of acting, and the study of specific forms or styles of acting, both historical and contemporary. Areas of special emphasis will be determined by the students and instructor.

450 The Modern Theatre. Class meets 4 hours

The modern theatre has been characterized by successive bursts of creative energy and experiment. This class gives students an opportunity to study these developments in detail, and to examine several important theatrical theories. Their implementation in particular plays and in theatrical practice will also be examined.

460 Theories of Play Production (formerly 370). Class meets 6 hours

The procedures that lead to theatrical events are analysed in detail in this class. Depending on the interests of the students in the group, specific theories are explored so that their practicality may be tested in experimental conditions. Principles implicit in theories of the past are examined and their relevance to the theatre of today is evaluated. Students are encouraged to forward and test new theories for the theatre of tomorrow. Those taking this class are expected to have a firm understanding of the theatre as it exists in performance.

470 Special Topics

This class allows the student to explore in detail particular areas of the theatre which are of special interest, with the guidance of members of the faculty. Frequency and length of meetings will be decided to meet the needs of the particular topic or project under study.

490 Dramatic Theory and the Aesthetics of the Theatre. Class meets 3 hours

All the arts face a profound problem in the attempt to establish criteria which will enable creative activity to be evaluated. This class sets out to tackle that problem as far as the theatre is concerned. 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. Practical work will form a part of the work of the group when it becomes necessary to test theories in practice.

Drama in Education

The department of theatre is also responsible for Education 11, a class offered in the B.Ed. programme to help future teachers to understand how drama can encourage the imaginative development of children in elementary and secondary schools. The class is not available to undergraduate students.

Graduate Studies

Graduate studies in theatre are not at present available at Dalhousie. Members of the department will be glad to help students with advice about opportunities for graduate study at other universities.



**CALENDAR
1971-1972**

University of King's College
FOUNDED A.D. 1789

HALIFAX, NOVA SCOTIA
183rd SESSION

'71	January							February							March							April									
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First Year Students

1. Complete application for admission forms.
2. Application for admission should be supported by:
 - (a) An official record of Junior and Senior Matriculation standing.
 - (b) High School Record-Transcript.
 - (c) An official transcript from previous college or university if a transfer student.
3. When the application is approved (King's students will also receive a notice of acceptance from Dalhousie University, with other forms to be completed and returned to the Registrar, Dalhousie University, Halifax, N.S.) a registration form will be sent from King's to be completed and returned to the Registrar, King's College.
4. During the appropriate registration period specified in the Almanac King's Arts and Science students will go *first* to Dalhousie and *second* to the Registrar's office at King's to:
 - (a) submit approved selection of subjects
 - (b) complete registration forms
 - (c) pay fees. (Resident students will be assigned rooms).

Second, Third and Fourth Year Students

1. Provisional residence applications and re-

gistration for the 1971-72 term must be completed at the Registrar's Office before 15 May, 1971, and the required fee paid. Students who are required to withdraw during the summer must do so before 30 August, 1971 or forfeit the deposit. The deposit will be credited to the year's account for those who return.

2. King's students will be required to complete and return forms to the Registrar, Dalhousie University, which will be sent during the summer months.

3. During the appropriate registration period specified in the Almanac, King's Arts and Science students will go *first* to Dalhousie and *second* to the Registrar's office at King's to:

- (a) submit approved selection of studies
- (b) complete registration forms
- (c) pay fees. (Resident students will be assigned rooms.)

Early Admission

Candidates for admission are advised to apply early in the year in which they intend to come to college. Available certificates should be forwarded with the initial application for admission.



The Haliburton Room

July, 1971

Thursday, 15

Last day for receiving applications for Fall supplemental examinations in Arts and Science. Fee must accompany application for examination. If a late application is accepted, an additional fee of \$2.00 per day (maximum \$5.00) must be paid. The late fee applies between July 15 and 31. No applications will be considered after July 31, and no refund of fee will be paid after this date.

August, 1971

Tuesday, 10

Supplemental examinations begin in Arts and Science.

Saturday, 14

Last day for receiving applications for admission to Faculty of Arts and Science.

September, 1971

Tuesday, 8

Supplemental examinations begin in Divinity.

Monday, 13

Registration, and payment of fees, for NEW students (FULL TIME) in the School of Divinity.

Tuesday, 14

Registration, and payment of fees, for RETURNING students (FULL TIME) in the School of Divinity.

Tuesday, 14

Registration, and payment of fees, for NEW full-time students in Arts and Science.

Surnames

M-O 8:30 a.m.-12:00 noon
P-Z 1:30 p.m.- 5:00 p.m.

Wednesday, 15

Registration, and payment of fees, continues for NEW full-time students in Arts and Science.

Surnames:

A-E 8:30 a.m.-12:00 noon
F-L 1:30 p.m.- 5:00 p.m.

Wednesday, 15

Classes begin in DIVINITY.

Thursday, 16

Registration, and payment of fees for RETURNING full-time students in Arts and Science.

Surnames:

M-Z 8:30 a.m.-12:00 noon
A-L 1:30 p.m.- 5:00 p.m.

Saturday, 18

9:00 a.m.-12:00 noon. Registration for ALL Part-Time and Special Students in Arts and Science. All students who wish to study part-time (one or two classes) in the Faculty of Arts and Science, must have been registered at Dalhousie-King's previously, or must have completed an application for admission to the University. Late registration fee payable after this date for students in Arts and Science.

Sunday, 19

University Church Service with Academic Procession - Chapel at 5:30 p.m.

Monday, 20

8:30 a.m. Classes begin in Arts and Science.

Monday, 27

First day for change of course or class in Arts and Science.

October, 1971

Monday, 4

Last day for withdrawing from courses in the School of Divinity.

Monday, 11

Thanksgiving Day. No classes.

Tuesday, 12

Last day for change of course or class in Arts and Science. Fee of \$1.00 for changing course or class after this date. For refund of fees after this date see "Fees" schedule. Last day for withdrawal from classes in Arts and Science that terminate at Christmas. After this date all classes that terminate at Christmas, in which a student remains registered, will be counted towards a students' programme for the academic year.

November, 1971

Thursday, 11

Remembrance Day. No classes.

December, 1971

Thursday, 9

Last day of classes in Arts and Science.

Friday, 10

Examinations begin in Arts and Science.

Friday, 17

Last day of classes in Divinity.

Saturday, 18

12:30 p.m. Christmas vacation begins.

January, 1972

Monday, 3

Classes resume in Arts and Science.

Wednesday, 5

Classes resume in Divinity.

Friday, 21

Last day for withdrawing from courses in the School of Divinity.

Friday, 28

Last day for withdrawal from classes in Arts and Science without penalty. After this date all classes in which a student remains registered will be counted towards a students' programme for the academic year.

February, 1972

Friday, 4

Menro Day. No classes.

Saturday, 5

Dalhousie Winter Carnival. No classes.

Monday, 28

Study break.

March, 1972

Study break for Divinity students. Dates to be announced.

Monday, 6

Classes resume in Arts and Science.

Friday, 31

Good Friday. No classes.

April, 1972

Friday, 7

Last day of lectures for students in Arts and Science.

Wednesday, 12

Examinations begin for Arts and Science.

Friday, 14

Last day of classes for Divinity students, last day of term.

May, 1972

Sunday, 7

11:00 a.m. Baccalaureate Service (King's).

Wednesday, 10

Encaenia Day - King's Convocation - Arts and Science and Divinity.

Thursday, 11

Dalhousie University Convocation.

Friday, 12

Regular session ends.

Office Hours

Week days (Monday-Friday), 9:00 a.m.-5:00 p.m.
June, July, August (Monday-Friday), 9:00 a.m.-4:30 p.m.

Patron

The Most Reverend the Lord Archbishop of
Canterbury and Primate of All England.

Visitor

The Right Reverend the Lord Bishop of Nova
Scotia.

President and Vice-Chancellor

J. Graham Morgan, B.A. (Nott.), M.A. (McM.),
D.Phil. (Oxon.), 6360 Coburg Rd., Halifax,
N.S.

Board of Governors

The Rt. Rev. W. W. Davis, B.A., B.D., D.D.,
D.C.L., (Chairman), 5732 College Street,
Halifax, N.S.

The Most Rev. A. H. O'Neil, M.A., B.D., D.D.,
LL.D., (Vice-Chairman), 791 Brunswick Street,
Fredericton, N.B.

The Rt. Rev. G. F. Arnold, M.A., B.D., D.D.,
Suffragan Bishop of Nova Scotia, 5732 College
Street, Halifax, N.S.

Dr. J. Graham Morgan, B.A., M.A., D.Phil.,
6360 Coburg Rd., Halifax, N.S. (President).

Professor H. S. Granter, B.A., A.M., (Vice-
President).

T. R. Francis, Esq., (Treasurer), 1074 Wellin-
gton St., Halifax, N.S.

Diocese of Fredericton

The Ven. A. E. L. Caulfeild, B.A., L.S.T., D.D.,
Trinity Church, 115 Charlotte St., Saint John,
N.B. (1975).

H. V. Frear, Esq., 116 Princess St., Saint John,
N.B. (1975).

The Rev. B. Champion, M.A., Rothesay, N.B.
(1973).

The Rev. R. B. Stockall, L.Th., 770 McEvoy
St., Fredericton, N.B. (1973).

The Rev. W. E. Hart, B.A., L.Th., R.R. No. 1,
Bloomfield Station, N.B. (1973).

The Ven. Raymond H. Murphy, B.Th., 426
King Ave., Bathurst, N.B. (1975).

Diocese of Nova Scotia

His Honour Judge J. E. Hudson, B.A., LL.B.,
D.C.L., Family Court, P.O. Box 1473, Halifax
North P.O., Halifax, N.S. (1973).

The Venerable H. B. Wainwright, B.A., L.Th.,
3077 George Dauphinee Avenue, Halifax, N.S.
(1973).

E. W. Balcom, D.C.L., Port Dufferin, N.S.
(1972).

Lt. Colonel J. A. Hebb, Bridgewater, N.S.
(1972).

Rev. Canon L. F. Hatfield, M.A., D.D., 54
Wentworth St., Dartmouth, N.S. (1972).

Rev. W. A. Trueman, B.A., B.S.Litt., The
Rectory, Wolfville, N.S. (1973).

Alumni Association

His Honour Judge J. E. Crowe, LL.B., P.O. Box
67, Truro, N.S. (1972).

Rev. D. F. L. Trivett, B.A., L.Th., B.D., 1665
Oxford St., Halifax, (1972).

J. G. Leefe, B.A., B.Ed., M.A., Box 126,
Liverpool, N.S. (1972).

Michael A. Saunders, B.A., 55 Magazine St.,
Apt. 710, Saint John, N.B., (1972).

Arthur J. Andrew, B.A., M.A., D.C.L., 10 The
Driveway, Apt. 310, Ottawa, Ontario 2K2 1C7,
(1973).

Mrs. J. E. Cochran, B.A., B.Ed., 26 Oakhill
Drive, Sherwood Park, Halifax, N.S. (1973).

Rev. E. G. Harris, B.A., B.S.Litt., B.D., 21
Lynn Drive, Dartmouth, N.S. (1973).

Mr. R. V. Swetnam, 6897 Tupper Grove,
Halifax, N.S. (1973).

Faculty Representatives

The Rev. Professor R. J. R. Stokoe, B.Sc., B.A.,
Dip.Th., Th.M., 6189 Regina Terrace, Halifax,
N.S.

Professor J. P. Atherton, M.A., 277 Purcell's
Cove Rd., Boulderwood, Halifax, N.S.

Professor R. MacGregor Dawson, M.A., B.Litt.,
1590 Walnut St., Halifax, N.S.

Professor C. M. Ouellette, B.A. M.A., 35 Evans
Ave., Halifax, N.S.

Student Union Representatives

Douglas Ruck,
**Beverly Greenlaw, Jr., Anne Harris, Judith
MacPhee.**

Co-opted Members

G. R. K. Lynch, B.A., LL.B., Room 210, 5600
Sackville St., Halifax, N.S. (1973).

R. G. Smith, Esq., P.O. Box 2130, Halifax, N.S.
(1973).

The Very Rev. E. B. N. Cochran, B.A., L.Th.,
D.D., 5732 College St., Halifax, N.S. (1972).

Ralph Creighton, Esq., Royal Bank of Canada,
Saint John, N.B. (1974).

Executive Committee

The Bishop of Nova Scotia
The Archbishop of Fredericton

The President
The Vice-President

The Treasurer

The Rt. Rev. G. F. Arnold

The Very Rev. H. L. Nutter

The Rev. Prof. R. J. R. Stokoe

The Ven. A. E. L. Caulfeild

E. W. Balcom

G. R. K. Lynch

R. G. Smith

Douglas Ruck

R. V. A. Swetnam

H. V. Frear

*Representatives on Dalhousie University
Board of Governors*

G. R. K. Lynch

R. G. Smith

*Representatives on the Governing Body
of King's College School*

The Very Rev. E. B. N. Cochran

Prof. J. P. Atherton

Governors Emeriti

D. S. Fisher, D.C.L., Rectory Lane, Sackville,
N.B.

The Rev. Dr. D. F. Forrester, "Corstorphine",
Weymouth, N.S.

H. Ray Milner, Q.C., D.Cn.L., D.C.L., LL.D.,
Edmonton, Alberta.

Secretary to the Board of Governors

Miss E. D. Horlock, M.A., 6411 South St. Apt.
32, Halifax, N.S.

Officers of Administration

President
J. Graham Morgan, B.A. (Nott.), M.A. (McM.),
D.Phil. (Oxon.),

Vice-President
H. S. Granter, B.A. (Dal.), A.M. (Harvard).

Dean of Divinity
The Reverend J. B. Hibbitts, M.A. (Dal.),
B.S.Litt. (Vind.), S.T.M. (Gen. Theol. Sem.,
N.Y.), D.Phil. (Oxon.),

Registrar
Mrs. G. S. Clark

Bursar
Miss Allison Conrod
Librarian
Mrs. J. E. Lane, B.A.
Executive Secretary Alumni Association
Mrs. J. Desrosiers
Dean of Residence
David Jones, B.A.
Dean of Women
Mrs. Ena Gwen Jones, R.N.

Officers of Convocation

Vice-Chancellor
J. Graham Morgan, B.A. (Nott.), M.A. (McM.),
D.Phil. (Oxon.).
Clerk
The Rev. R. D. Crouse, M.A. (Harv.), M.Th.
(Trinity).

Chancellors of the University

The Very Rev. Edwin Gilpin, D.D., D.C.L.,
1891-1897.
Edward Jarvis Hodgson, D.C.L., 1897-1911.
Sir Charles J. Townshend, D.C.L., 1912-1922.
The Most Rev. John MacKenley, D.D.,
1937-1943.
Hon. Ray Lawson, O.B.E., LL.D., D.Cn.L.,
D.C.L., 1948-1956.
Lionel Avard Forsyth, Q.C., D.C.L.,
1956-1958.
H. Ray Milner, Q.C., D.Cn.L., D.C.L., LL.D.,
1958-1963.
Robert H. Morris, M.C., B.A., M.D., F.A.C.S.,
1964-1969.

*Presidents and Vice-Presidents of the
University*

The Rev. Dr. William Cochran, 1789-1807.
The Rev. Thomas Cox, 1804-1805.
The Rev. Dr. George McCawley, 1836-1875.
The Rev. Dr. John Dart, 1875-1885.
The Rev. Dr. Isaac Brock, 1885-1889.
The Rev. Dr. Charles Willets, 1889-1904.
Dr. Ian Hannah, 1905-
The Rev. Dr. C. J. Boulden, 1905-1909.
The Rev. Dr. T. M. Powell, 1909-1914.
The Rev. Dr. T. S. Boyle, 1916-1924.
The Rev. Dr. A. H. Moore, 1924-1937.
The Rev. Dr. A. Stanley Walker, 1937-1953.
The Rev. Dr. H. L. Puxley, 1954-1963.
Dr. H. D. Smith, 1963-1969.
Dr. F. Hilton Page, (Acting), 1969-1970.

King's Faculty of Arts and Science (1971-72)

J. P. Atherton, M.A. (Oxon.),
Associate Professor of Classics, 277 Purcell's
Cove Rd., Boulderwood, N.S.

R. MacGregor Dawson, M.A. (Tor.), B.Litt. (Oxon.),
Associate Professor of English, 1590 Walnut
St., Halifax, N.S.

H. S. Granter, B.A. (Dal.), A.M. (Harvard),
Professor of History, 1171 Cartaret St., Halifax,
N.S.

Ernest Lloyd Heighton, B.Sc., M.A. (Dal.),
Assistant Professor of Mathematics, 6270
Jubilee Rd., Halifax, N.S.

**J. G. Morgan, B.A. (Nott.), M.A. (McM.),
D.Phil. (Oxon.),**
Associate Professor of Sociology and Anthropol-
ogy, 6360 Coburg Rd., Halifax, N.S.

Conrad M. Ouellette, B.A. (Maine), M.A. (Clark),
Assistant Professor of Economics, 35 Evans
Ave., Halifax, N.S.

F. Hilton Page, M.A. (Tor.), D.D. (Pine Hill),
Professor of Philosophy, 1135 Rockcliffe St.,
Halifax, N.S.

**J. Stolzman, B.A. (Oreg.), M.S. (Fla. St. Univ.),
Ph.D. (Oreg.),**
Assistant Professor of Sociology, 6889
Quinpool Rd., Halifax, N.S.

Faculty of Divinity (1971-72)

The Rev. Canon J. H. Graven, M.A., L.Th.,
Graduate of Department of Religion and
Psychiatry, Menninger Foundation, Topeka,
Kansas, Alexandra Special Lecturer in Pastoral
Ministry (Director of Parish Field Work), 8 Parkhill
Dr., Jollimore, Halifax Co., N.S.

The Rev. J. B. Hibbitts, M.A., (Dal.), B.S.Litt. (Vind.), S.T.M. (Gen. Theol. Sem., N.Y.), D.Phil. (Oxon.),
Dean of Divinity and Professor of Biblical
Studies, 1625 Preston St., Halifax, N.S.

The Rev. F. G. Krieger, B.A. (Hobart), B.D. (Epis. Theol. Sch.),
Professor of Systematic Theology.

**J. G. Morgan, B.A. (Nott.), M.A. (McM.),
D.Phil. (Oxon.),**
President, 6360 Coburg Road, Halifax, N.S.

The Rev. R. J. R. Stokoe, B.Sc., B.A., Dip.Th. (Durh.), Th.M. (Crozer),
Certified Chaplain Supervisor, Professor of
Pastoralia, and Secretary to the Faculty, 6189
Regina Terrace, Halifax, N.S.

Special Lecturers

Peter W. Harris, B.A. (Vind.),
Church Music, 34 Evans Ave., Halifax, N.S.

Mrs. S. A. Kryszek, L.G.S.M.,
Speech Arts, 411 Embassy Towers, Spring
Garden Road, Halifax, N.S.

Associates in Supervised Pastoral Education (1971-72)

**The Rev. Canon F. M. French, B.A. (Vind.),
M.A. (Dal.), LL.D. (St. Mary's),**
Rector of the Parish of St. Mark's, Halifax, N.S.

**The Rev. L. Avery Kempton, B.A., B.D.,
S.T.M.,**
Chaplain at the Victoria General Hospital,
Halifax, N.S. and certified Acting Chaplain
Supervisor.

The Rev. E. T. McKnight, B.A., B.D., (Acadia),
Chaplain at the Nova Scotia Hospital, Dart-
mouth, N.S. and certified Chaplain Supervisor.

The Rev. Professor C. J. Taylor, B.A., B.D. (Acadia), S.T.M. (Andover Newton), D.D. (Vind.),
Professor of Clinical Pastoral Education at
Acadia University, Wolfville, N.S. and certified
Chaplain Supervisor.

The Rev. H. H. Taylor, B.A., B.D. (Acadia),
The Institute of Pastoral Training, King's
College, Halifax, N.S. and certified Chaplain
Supervisor.

The Rev. K. H. Tufts, B.A., L.Th. (Vind.),
Chaplain at the Victoria General Hospital,
Halifax, N.S.

The history of higher education in Canada began in 1789 with the founding at Windsor, Nova Scotia, of the University of King's College. At the time of its establishment it was the only foundation of that name in existence. Although there had been a King's College, New York, chartered by George II in 1754, it did not survive the end of the colonial period in America and its re-organization in 1784 under the name of Columbia College was undertaken on an entirely different plan. The Loyalist political and religious principles upon which the New York seminary had been founded migrated, along with the Loyalists themselves, to Eastern Canada, and in 1802 a Royal Charter was granted by George III proclaiming King's College, Windsor, "The Mother of an University for the education and instruction of youth and students in Arts, to continue forever and to be called King's College."

Since that time, King's has maintained in Canada certain of the Oxford traditions. In 1920, when the original buildings were destroyed by fire, the University moved to Halifax, where, with the assistance of the Carnegie Corporation, new buildings were eventually erected on the campus of Dalhousie University. In 1930 it entered into partnership with Dalhousie which, with a Royal Charter dating from 1820, is the third of Canada's senior universities. This novel arrangement, by which the English and Scottish University traditions were united, is upheld by a special agreement under which the two have maintained joint faculties of Arts and Science, so that undergraduates of King's read for the B.A. and B.Sc. of Dalhousie. King's has left her own degree-granting powers in abeyance in these faculties and now gives degrees in theology by examination, together with honorary degrees in Divinity and Laws.

In May 1941, the King's College buildings were taken over by the Royal Canadian Navy as an Officer's Training Establishment, and during the next four years, until May 1945, nearly 3100 officers were trained for sea duty with the R.C.N. The students and academic staff of King's carried on during this period through the kindness of Dalhousie University and Pine Hill Divinity Hall.

King's College is residential, on the Oxford and Cambridge pattern, and, in addition to the day students who live out, 125 men and 100 women can be accommodated in residence. Dinner in Commons Hall is formal with Latin

grace; the wearing of academic dress is required of all members of the College *in statu pupillari* and the emphasis is everywhere upon the corporate life. The inestimable benefits of life in a small residential college are, in England at least, an accepted part of the "Oxbridge" tradition, but this is certainly not so in North America, where universities have in general followed either the German policy of having no residential facilities at all, or the English provincial plan of housing a proportion of the student body in "halls of residence" entirely separated from the university itself. The corporate life in King's thus emerges as something rare on the North American continent, since it is designed to educate "the whole man" and not simply to train him for specific examinations.

In addition to its athletic activities, the College runs a Debating Society, known as the "Quintilian", and a Dramatic Society which stages two plays each year. Daily services are held in the Chapel for those who wish to participate; although the College is an Anglican foundation and incorporates a School of Divinity for the training of Anglican clergy, there is no denominational bar aimed at the exclusion of non-Anglicans from membership of the College, either as lecturers or students. Members of Faculty may themselves be resident and function in the traditional manner as "dons" for the staircases (i.e. "bays"). The bays are named Chapel Bay, Middle Bay, Radical Bay, North Pole Bay, Cochran Bay, and The Angel's Roost. Alexandra Hall is the residence for women.

Now that there are many large overcrowded universities which find it difficult if not impossible to concentrate upon anything not strictly connected with a student's graduation at the earliest possible time, there is all the more reason for the encouragement of the small residential university wherein the future leaders of society may be educated towards the acceptance of social and moral responsibility. The education of such people must be conducted on an individual, not a mass, basis.

King's tries to be a miniature of the Christian ideal of the larger community. It is this, rather than any of the more superficial observances, which links King's with the older universities of Britain and makes it unusual in Canada.

Constitution

The Board of Governors is the Supreme Governing Body of the University. It consists of the Bishops of the Diocese of Nova Scotia and

Fredericton, the President of the University, the Vice-President, the Treasurer, two members elected by each Faculty, together with eight members elected by the Alumni Association, four members by the Student Union, six by each of the Synods of Nova Scotia and Fredericton, and not more than eight co-opted members. The Governors have the management of the funds and property of the College, and the power of appointment of the President, professors and officials. The Board appoints an Executive Committee.

Convocation consists of the Chancellor and the Vice-Chancellor, together with all Bachelors of Divinity and Masters and Doctors of the University; Members of the Board of Governors and of the Faculty of Arts and Science who hold the degree of Master or Doctor from any recognized University; members of the Faculty of Divinity; Fellows of the University and Bachelors of the University of five years' standing who are recognized by the Clerk of Convocation. All degrees are conferred by Convocation.

The Faculties consist of the members of the teaching staff on the King's Foundation in the Faculty of Arts and Science under the Agreement of Association with Dalhousie University and the members of the teaching staff in the School of Divinity.

Faculties

Faculty of Arts and Science

The University of King's College having entered an association with Dalhousie University, the students registered in Arts and Science attend classes jointly with Dalhousie students. These classes are given by Dalhousie professors or by professors on the King's Foundation, depending on the course taken. *The students of both institutions follow the same curriculum, take the same examinations, and must attain the same academic standard.*

Faculty of Divinity

The school of Divinity is under the surveillance of the Divinity School Council which is responsible to the Board of Governors, but much of its work is done in the Atlantic School of Theology under the direction of the Board of Governors and the Senate of that school, on both of which bodies the University of King's College has substantial representation. Degrees and diplomas in Theology are awarded to candidates fulfilling the necessary academic requirements, regardless of religious denomination or sex. Students are also prepared to meet ordination requirements in the Anglican Church of Canada. The Course of Study for these candidates is subject to the Bishops in the Dioceses of Nova Scotia and Fredericton.

Affiliated Institutions

The Atlantic Summer School of Advanced Business Administration was founded in 1952. The Institute of Pastoral Training was founded in 1955.

Exemptions Granted to King's College by Other Institutions

The University of Oxford exempts from Responsions an undergraduate in Arts of this University who has passed in the subjects of the second or a higher year. A Bachelor of Arts with Honours is further exempted from four terms of residence. The Trustees of Rhodes Scholarships exempt from the qualifying examination candidates who are exempt from Responsions by the University of Oxford.

Chapel

Regular worship is an integral part of the facilities afforded by the University. All students are invited to attend the services in the College Chapel.

Sunday Services:

The times of these services are announced at the beginning of each session.

The service on Wednesday evening is a College Corporate communion.

While the Book of Common Prayer is used in the services in the Chapel, students of all denominations are welcome and encouraged to attend.

The Rev. D. F. L. Trivett, Campus Chaplain, is available to all students and conducts discussion groups for students and faculty.

General Discipline

The maintenance of discipline is in the hands of the College Board which is composed of the President, the Dean of Residence, the Dean of Women, three students: President of the Students' Union, Chairman of the Men's Residence Council, Women's House President, two professors on the King's Foundation chosen annually by the Faculty, one member of the Faculty of Divinity chosen annually by the Faculty. The students exercise a large measure of self-government in maintaining good order and discipline in the residences. Students conducting themselves in an unbecoming manner, within the precincts of the college, may be fined, suspended or expelled. When a student is expelled from residence there is no return of fees.

In keeping with the traditions of the College, students are expected to wear gowns when

attending chapel, when seated for formal meals, and when calling upon the President of the University. Gowns may be obtained from the Dean of Women.

Students are expected to attend lectures and laboratories regularly and punctually and to perform all exercises assigned by the Faculty.

Rules governing residence life are contained in the "Regulations" handbook. Students will be expected to sign a statement acknowledging receipt of the "Regulations" of the University and a statement of their acceptance of these "Regulations".

Deans in the Bays, the Dean of Men, the Dean of Women, the Registrar, the Bursar, the Faculty and the President are willing to help, counsel, and advise any student at any time, and will act as much as is within their power in the best interest of the students and the College.

King's College Library

King's College Library was founded in 1789. Just after the Royal charter was granted to the College in 1802, Bishop Inglis sent his son to England with £250 to begin the purchase of books. The library grew steadily during the 19th century and was probably one of the best libraries in English-speaking Canada of the time. There were various benefactors over the years, chief of whom was Thomas Beamish Akins. From Mr. Akins the library received most of its rare collection of some 40 incunabula (books printed before 1500, that is, during the first fifty years since the invention of printing with movable type). This is a remarkable number of these very rare books to be found in such a small library.

King's Library is very rich in the field of English literature. Much of the credit for the development in this field must go to the late Professor Burns Martin. The Professor Burns Martin Memorial Fund continues to aid the library's growth in this area.

With the help of the William Inglis Morse Endowment for Canadiana, this important area of study is growing steadily as more and more works are being published about our country.

The largest proportion of books, however, is found in the field of Theology. This collection is large and comprehensive and constantly kept up to date. The John Haskell Laing Memorial Bequest helps with the purchase of books in this field.

Book purchases in the general field are aided by memorial funds to the following persons: the Hon. William Johnston Almon, Frances Hannah Haskell, James Stuart Martell, and Thomas Henry Hunt (Alumni Memorial).

The library is open Monday to Friday from 9.00 a.m. to 5.00 p.m., and 7.00 p.m. to 10.45 p.m. On Saturdays the hours are 9.00 a.m. to 12.00 noon. On Sundays 2-5 p.m. For part of the session the reading room will be open on Saturday from 2.00 to 5.00 p.m.

The student loan period for all books except those on reserve is one week.

Fines will be charged for overdue books at the rate of twenty-five cents a day for seven day books.

Students are given the privilege of borrowing books for the summer.

Degrees and Courses

The degrees of Doctor of Divinity and Doctor of Civil Law, may be conferred *honoris causa* in recognition of eminent literary, scientific, professional or public service.

The dignity and honour of Fellow may be conferred by the vote of Convocation upon any friend of the University for noteworthy services rendered on its behalf.

Convocation confers the degrees in course of Doctor of Divinity and Bachelor of Divinity and Associate of Theology (on recommendation of the Board of Examiners of the General Synod of the Anglican Church of Canada), Bachelor of Sacred Letters, Bachelor of Sacred Theology and Master of Sacred Theology. Courses are prescribed for the diplomas: Licentiate in Theology, Testamur, Associate of King's College, (Nova Scotia).

Pre-professional work in Arts and Science by students intending to enter one of the Dalhousie professional schools may be taken as a student of King's College.

Other Courses

Master of Arts and Master of Science

In accordance with the Terms of Association, a graduate cannot take a Master's degree while enrolled at King's, but the attention of undergraduates is especially drawn to the standing and conditions needed in their courses before being admitted to work for a Master's degree.

Dean of Residence

Mr. David Jones

Dean of Women

Mrs. Ena Gwen Jones

Dons

Mr. Bruce Archibald

Mr. Mark DeWolf

Mr. Gary Faulkner

Professor John F. Godfrey

Mr. Drake Peterson

Residence life at the University is *encouraged for all students* because the community life there enjoyed forms an essential part of the student's education. Exceptions will be made in the case of a student wishing to reside in a home or lodging outside the university.

Male students live in the men's bays (Chapel, Middle, Radical, North Pole and Cochran), each housing 22-26 men, under the supervision of the Dean of Residence. Female students live in Alexandra Hall, a residence accommodating 100 women, under the supervision of the Dean of Women.

All rooms are furnished with bed, dresser, desk and chairs. *Students are required to provide their own bedding and towels*, and to attend to their own laundry arrangements. Coin-operated washing and drying equipment is provided in both men's and women's residences.

Single and double rooms are available to both men and women, priority for single rooms being given to students in their senior year.

The residences have been designed to provide for the comfort and convenience of the students, *and to facilitate study*. In the men's residence, two students occupy a suite of two rooms (bedroom and study). The men's common room and lounge is open to residents of all bays, as is the Haliburton Room, a gathering place for all students and the site of many student activities.

The women's residence was built in 1962 and is modern in every respect. It contains, besides

the rooms in which female students live, a library, reading rooms, lounges, a service elevator and ample storage space.

Both residences are designed so that it is not necessary to go outside for meals and extra-curricular activities.

Meals are prepared and served to all resident students in Prince Memorial Hall, erected in 1962.

Students accepted in residence by the Deans are expected to remain for the whole session, or, in the case of withdrawal during the session, must obtain substitutes satisfactory to the Dean. All residents will be charged with room for the complete session and will be liable for this charge unless or until a substitute has assumed obligation to the University for the balance. No student may withdraw from the residence without notice to the Dean.

The residence will be open for new students from the evening of September 12, 1971, and for returning students September 15, 1971, until December 18, 1971, and from the evening of January 2, 1972, to the morning of May 12, 1972. *(Students not in their graduating year will be expected to vacate the residence 24 hours following their last examination)*. Resident students in faculties whose terms exceed these periods may reside in the College by permission of the Dean on payment of rent; and, when Prince Hall is open, meals may be eaten by arrangement with the Steward.

Confirmation of accommodation will not be made until the student has been accepted by the University for the coming session and a \$50.00 residence deposit has been received by the Business Office. Deposits for all applications made prior to July 15th must be received by that date. Applications for residence accommodation made after July 15th must be accompanied by the \$50.00 deposit. Cancellation of application received by the Registrar prior to August 30th will entitle the student to a refund of the \$50.00 deposit.

It is to be distinctly understood that the regulations regarding courses of study, examinations, fees, etc. contained in this Calendar are applicable to the current year only; and that the University does not hold itself bound to adhere absolutely to the curriculum and conditions laid down.

All students are required to report their local addresses while attending the University, to the Office of the Registrar, on or before October 15. Subsequent changes must be reported promptly.

Place of Residence of Students:

For the purposes of admission to the University the place of residence of a student is the place where he is domiciled. This is normally presumed to be the place (country, province, etc.) where the home of his parents or guardian is located. When a student registers at the University for the first time, his place of residence is determined by the Registrar and entered in the records. That place remains recorded as his place of residence throughout his attendance at the University unless he takes steps that satisfy the Registrar that he has established a place of residence elsewhere.

Admission Ad Eundem Statum: Students from other universities desiring to enter classes in this University may, on producing satisfactory certificates, be admitted with advance standing and given credit for classes equivalent to those offered by Dalhousie-King's. Before proceeding to a degree they must have completed all required classes. No student shall be admitted to a degree in a course in this university unless he has attended and passed in at least one year's work in the Faculty in question, and that essentially the last year of the degree course. In the Faculty of Arts and Science one year's work is interpreted to mean at least five classes of university grade.

Registration

All students of the University are required to appear in person at registration and to enter their names in the Register annually, agreeing to obey all the regulations of the University already made or to be made, and to pay the required fees and deposits before entering any class or taking any examination.

Under no circumstances may a student register unless all previous accounts to the university are paid.

Withdrawal

Students withdrawing from the University or intending to discontinue the work of any class must obtain written approval from the Dean of the Faculty concerned, and notify the Registrar and the Bursar at both Dalhousie and King's.

Late Registration

Late registration in the Faculty of Arts and Science requires the approval of the Registrar. All students who register late must pay a late fee of \$5.00 per day, for each day late in registration, but not to exceed a total of \$35.00.

Discipline

If a student is required by a Faculty to discontinue attendance in the Faculty solely because he has failed to maintain the required academic standing, he is not regarded as dismissed on grounds of general discipline and his right to be considered for admission to another faculty is unaffected.

When the work of a student is unsatisfactory, or his attendance is irregular without sufficient reason, he may be dismissed from one or more classes, or from the University.

No return of fees will be made to any student dismissed from classes or from residence, or from the University.

Non-Academic Student Activities

Students representing the College in non-academic activities must be in good standing. Those who are ineligible for such representation are as follows:

- (a) Students on probation in any Faculty.
- (b) Students registered for fewer than ten lectures per week, a period of two laboratory hours being regarded for this purpose as equivalent to one lecture.
- (c) Students who have more than two failures in college subjects.

These regulations do not apply to the Dramatic Society.

Dalhousie Libraries

King's students enjoy the same privileges in the Dalhousie Libraries as Dalhousie Students. For regulations and hours see the current Dalhousie calendar.

Arrangements can be made for King's students to use the Halifax Public Library, the Nova Scotia Technical College Library, Pine Hill Library and the Provincial Legislative Library.

Conferring of Degrees

Successful candidates for degrees are required to appear at Convocation in the proper academic costume to have the degree conferred upon them.

By special permission degrees may be conferred *in absentia*. A graduating student must notify the Registrar prior to May 6th if he does not plan to be present to receive his degree. If this notification is not given and the student does not attend the graduation ceremony, a charge of \$10.00 is required to be paid to the University to cover additional costs before the degree or diploma is released.

Student Employment

The Department of Manpower and Immigration, Manpower Division, in co-operation with the University, maintains a year-round Canada Manpower Centre on campus. This is done to assist students in obtaining employment and to assist employers wishing to recruit at this University.

All students wishing assistance in obtaining part-time and summer work, or graduates seeking permanent employment, are urged to contact the Canada Manpower Centre early in the academic year.

The Student Placement Office is located in the Student Union Building, on campus. Office hours 8:30-5:00 p.m. Monday to Friday.

There are opportunities for students to earn part of their college expenses by working in the Library, Gymnasium and Dining Hall.

Student Counselling Service

Students worried or anxious about any matter, whether a personal or learning problem, are invited to visit The Rev. Professor R. J. R. Stokoe at King's, or the Student Counselling Services Centre at Dalhousie. Office hours: 9 a.m. to 5 p.m., Monday to Friday, Student Union Building. (Room 422). Counsellors with broad experience in solving personal problems offer a free confidential service to students.

Tutors

The student body has an academic committee which arranges tutorial services for students.

The Service is prepared to advise in the prevention, diagnosis, treatment, and rehabilitation of any condition which may threaten to impede the development, or diminish the fitness, of an individual functioning as a student.

Although the Service is expanding rapidly, staff appointments are keeping pace with the needs of the students. At present there are five full time general practitioners employed to provide twenty-four hour comprehensive medical care. In addition psychiatrists are retained by Health Services and are available for prevention, diagnosis, and treatment of emotional conditions which may in any way interfere with the individual's function as a student.

Further specialist services in a modern, fully accredited medical centre are available wherever indicated.

An in-patient infirmary operates for those who need care not available at home, but who do not require to be treated in a general hospital.

Medical Care - Hospital Insurance

Students must be able to provide proof that they are properly enrolled in any Hospital-Medicare scheme in their home province in order to qualify for service. This applies particularly to residents of any province requiring a premium for Medicare Insurance.

Canadian students remaining in Nova Scotia less than twelve months have their hospitalization paid by their home Province. For residents of Saskatchewan and Ontario (and any other provinces with similar regulations) this requires that the student's premium for hospitalization be paid.

Non-Canadian students who have resided in Nova Scotia for more than three months and show intention of remaining more than twelve months are regarded as residents of Nova Scotia and hence qualify for hospitalization and treatments by a doctor of their choice under Medical Services Insurance.

Registration Requirements

1. All students registering for the first time at the University are required to submit a certificate of health. This requires a physical examination by the student's personal physician and his completion of a student history and examination form provided by the University Health Service to each applicant.

2. All returning students are required to complete an annual medical questionnaire at the

time of registration. Those who have been out for a year or more for any reason are required to submit a certificate of health, as above.

3. Other examinations may be required of all students who are found on admission to be in a low medical category, and also of students participating in major sports?

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.

Tuberculin Tests:

1. All students are required to have an annual tuberculin test done by University Health Services. The purpose of these tests are to:

- (a) detect persons who do not realize they have active tuberculosis and whose lives may be saved or future disability prevented by early treatment;
- (b) to remove any such source of contagion from the University community;
- (c) to indirectly detect and treat carriers of the condition who are unaware they are infecting their friends and acquaintances;

2. The effectiveness of such precautionary measures is reduced very considerably unless every student is tested. The co-operation of students in this simple and harmless test is vital to the welfare of the entire student body.

3. The test must be administered one day and interpreted 48 hours later by University Health Services.

- (a) *IF NEGATIVE* - the person is considered free of disease and to be retested in one year.
- (b) *IF POSITIVE* -
 - (i) Negative previously - must be investigated as having contacted someone with active tuberculosis.
 - (ii) Positive each year - x-rayed each year to be certain the disease is not reactivating.
 - (iii) After vaccination with B.C.G. vaccine - to be x-rayed annually.

In 1968-69 one person was discovered with active tuberculosis and hospitalized. In 1969-70 - one case was discovered at registration and hospitalized and twenty-four persons who had converted from negative the year before to positive were treated while attending classes.

The tuberculin test and reading is a requirement for registration. Those who do not complete this requirement will not be fully registered and will be required to pay the fee for late registration.

Emergency treatment

In the event of a medical emergency students should telephone the University Health Service. 424-2171.

Further services or requirements may be announced at the time of registration.

The University Health Services do not provide the following:

- (a) Medical or Surgical care other than that provided by, or arranged through, the University Health Service.
- (b) X-ray or Laboratory service, except as authorized by the University Health Services.
- (c) Medications (Prescriptions, drugs etc.)
- (d) Dental treatment.
- (e) Illnesses attributable to misconduct.
- (f) Eyeglasses and examinations for same.

Note:

University Health Services will not pay accounts for hospital or medical service, including x-ray, laboratory service, rendered off-campus except in emergency cases or where prior approval was received.

Health and Physical Education

All students in their first year of attendance at the University are encouraged to participate in some form of physical activity. Activities offered include field hockey, basketball, fencing, soccer, badminton, volleyball, swimming and hockey.

Chaplaincy Service

The University provides facilities for chaplains on the campus, extends its facilities to all denominations and religions to make contact with their adherents following registration. All students are invited to make themselves known to their respective chaplains. The chaplains are available at all times for guidance and conversation. The office is located in the Dalhousie Student Union Building. Telephone 424-2287.

Names and addresses are as follows:

ANGLICAN: Rev. Don Trivett, 1663 Oxford Street 423-5707

BAPTIST: Rev. Dave Watt, 2060 Beech St. 423-0094.

JEWISH: Pending appointment. Call Mr. Frank Medjuck 429-3165 or 429-0340.

UNITED: Rev. Don MacDougall, 6 Arlington Avenue 477-4767

LUTHERAN: Rev. R. E. Rock, 44 Summit Street 466-7005

PRESBYTERIAN: Rev. R. D. MacLean, 6357 London Street 454-5253

ROMAN CATHOLIC: Father Gordon MacLean, Bishop Burke House 423-3641 or 422-7217

Canadian Armed Forces

Subsidization Plans

Regular Officer Training Plan (ROTP) is a

completely subsidized university plan covering tuition, books, medical service and a living allowance for up to four years of undergraduate study.

Medical Officer Training Plan (MOTP) and the Dental Officer Training Plan (DOTP) covers the above, with the addition of a graduated pay and rank throughout four years of undergraduate study.

Students interested in any of the above Regular Force Plans should enquire at the:
Canadian Forces Recruiting Centre
Sir John Thompson Building
1256 Barrington St.
Halifax, N.S.
Phone 422-5956 or 423-6945

Primary Reserve

Reserve Officer University Training Plan (ROUTP) provides an opportunity for a limited number of suitable young men, enrolled in Canadian Universities to perform officer training during the summer months, while they are undergraduates and thereby prepare themselves for promotion to commissioned rank in the Primary Reserve of the Canadian Armed Forces. For further details contact the recruiting centre listed above or the nearest Primary Reserve unit.

Scholarships

Military Service Scholarships are available.

Children of War Dead (Education Assistance)

Children of War Dead (Education Assistance Act) provides fees and monthly allowances for children of veterans whose death was attributable to military service. Enquiries should be directed to the nearest District office of the Department of Veterans' Affairs.

Expenses

Payment must be made at par, Halifax, N.S. Please make cheques payable to the University of King's College for the required amount and for convenience add "plus exchange", if outside Halifax area.

Resident Students

A complete session is defined for students registered in the faculty of Arts and Science and for students registered for the Atlantic School of Theology as being from the first day of regular registration (including Sunday, September 12) until the day following the last regularly scheduled examination in the Faculty of Arts and Science (for students in this Faculty) and in the Atlantic School of Theology (for students in this School). The annual charges for these periods for board, light, meals,

etc. are as follows:

Men's Residence	Double	
Women's Residence	\$950.00	Single
Women's Residence (Suite)	950.00	\$1025.00
		1025.00
		1075.00

A graduating residence student may stay in residence without charge after these periods up to and including the last day of Encaenia activities, but will be expected to pay for meals during this time.

In exceptional circumstances a student may seek permission of the Dean of Residence to occupy a room at times other than those specified above. The charge for such accommodation is \$2.00 per night.

Students in residence must make a deposit of \$500.00 at commencement of the first term, the balance of the bill to be paid in January. New students are expected to deposit \$50.00 when pre-registering and returning students \$20.00. This will be credited to first term account.

Resident students as well as non-resident, must pay the following at commencement of the first term: Student Body Fees \$40.00, Gown \$15.00, and any tuition fees payable to the University of King's College. (Gowns for non-resident students are optional.)

Surcharges

If deposit is not paid within 21 days of registration day a surcharge of 3% will be charged and a further 2% for each additional complete month until paid. The same applies to charges payable by Non-Resident Students.

Second term residence fees are due in January and surcharges as above will be levied after January 30th.

Fee For Student Organizations

At the request of the King's student body, a fee of \$40.00 is collected on enrolment from each student who takes more than one class. This fee entitles the student to the privileges of the various students' organizations and clubs, and a copy of the King's College RECORD.

Caution Deposit

On enrolment each resident student is required to make a deposit of \$25.00 as caution money to cover damage done to furniture, etc. This amount, less deductions, will remain a credit on the books until the student graduates or leaves, when the balance will be returned by cheque, usually during June. No refund in whole or in part will be made before that month.

Each year a student, on returning, is expected to settle for the previous year's deductions so that his credit may be maintained at \$25.00.

The items above, together with a key deposit of \$5.00 are payable at King's Business Office.

Tuition Fees

Payment for Arts & Science students is to be made to Dalhousie University Business Office.

Pre-Registration

Returning students who wish to preregister must pay the first instalment of fees by mail before August 15, with money order or negotiable cheque. If fees are to be paid by scholarship, a government or other sponsoring agency, students must register on the regular registration day in September.

Returning students in the Faculties of Arts and Science may reserve their classes on payment of \$100.00 by July 15 and completion of required registration forms.

All prepaid deposits will be applied to the first instalment due for fees.

Regular Registration

Fees must be paid in Canadian funds by cash or negotiable cheque. A charge of \$5.00 is made for any cheque returned by the bank and penalties as shown below for unpaid accounts may be added. Post-dated cheques cannot be accepted.

FOR FULL TIME STUDENTS, (students registered for more than two classes), fees are payable in full on registration or in two instalments. The first instalment is \$445.00 including incidental expenses. The second instalment, \$240.00, is due by January 28th. Registration is not complete until the first instalment is paid.

Penalties for Late Payment

Students unable to pay the first instalment due for fees may register conditionally. A penalty of \$5.00 per day, to a maximum of \$35.00 commencing on the first business day following the regular registration day, will be charged. To all accounts outstanding beyond October 1, an additional charge of 9% interest from October 1 will be added. If confirmation of a Provincial loan is delayed, penalty charges will be waived for students producing evidence of receiving a provincial loan and paying fees from that loan prior to October 29. All students paying accounts after October 29 will be charged \$35.00 penalty, plus 9% interest from October 1. Interest at 9% will be charged on second instalments outstanding after January 28. No examination results will be released, nor will the student be permitted to register for another session until all accounts are paid in full. The names of graduating students whose accounts

are not completely paid by April 28 will not be included in graduation lists.

FOR PART TIME STUDENTS, registering for two full credits, or less, the total fees due must be paid on registration.

SCHOLARSHIPS awarded by King's College will normally be applied to charges at King's. If a student has a larger scholarship than his obligation to King's, the balance may be paid by King's to Dalhousie University for tuition fees. The student should enquire at the Bursar's Office to ascertain if the Dalhousie Business Office has been informed of the arrangement.

The Dalhousie Business Office does not issue bills for tuition fees; the receipt issued at registration will show the balance, if any, which is outstanding.

Residence Deposits

King's College requires a deposit of \$50.00 for each new student requesting residence, and a \$20 deposit from returning students. The room deposit will be refunded only when notice of cancellation of accommodation has been received by the Deans before August 30.

Charges

Full time students registered for more than 2 classes.

Faculty of Arts and Science

King's Students \$680.00

The above charges include class fees, laboratory fees, library fees, examination, diploma and registration fees, instrument rental charges, and hospital clinics where applicable.

Incidental Fees are collected for the Students' Union. Students' Union Fee \$40.00

Part time students (These charges include incidental fees of registration and library only):
Students registering for 1 or 2 classes in all Faculties for University credit, per class \$150.00

Students registering for one-half credit class \$ 75.00

1/3 credit class \$50.00

Audit students (This charge does not entitle students to any privileges other than attendance at class):

Students not candidates for University credit who wish to take one University lecture class because of their interest in it. No credit or official transcript will be issued to such a student.

1 credit class \$60.00

1/2 or 1/3 credit class \$35.00

(A student enrolled at King's is required to pay the King's Council of Students' fee of \$40.00, but not the Dalhousie Council of Students' fee, or the Rink and Athletic Field fee. However, any King's student who wishes to participate in the Dalhousie Council of Students' activities must pay both of the above Dalhousie fees. Dalhousie students resident at King's College must pay King's College Council of Students' fee of \$40.00)

Library Fee

Divinity students who are not registered for any Arts courses must pay a Library fee of \$5.00 to King's College Business Office.

Faculty of Theology

Fees

Full-time students	\$350.00
Part-time students for each course below Master's level	\$ 75.00
Part-time students for each course at Master's level	\$125.00
Arts and Science courses, when necessary	\$115.00
A. K. C. Registration .. on application	\$10.00

A.K.C. Examinations: per paper to be paid by the preceding December 1, and non-refundable
..... \$ 5.00

Examinations

An application for examination must be accompanied by the proper fee:

Supplemental and Special (per examination)	\$15.00
At an outside centre (each - extra)	\$10.00
For re-examination of a paper	\$ 3.00

(Application for re-marking must be made in writing to the Registrar within three months of the date of the examination).

For any application accepted after July 9, an additional fee of \$2.00 per day (maximum \$5.00) must be paid. If application for refund of supplemental examination fee is not made on or before July 31, the fee will be forfeited.

Diplomas

Diploma Fees are payable at registration in the final year of the course.

L.Th., A.K.C., Testamur	\$12.00
B.S.Litt., B.S.T., M.S.T.	20.00
B.D., A.Th.	40.00
Additional fee for any degree in absentia at the Spring Convocation	10.00

Transcripts

A student may receive *only* an unofficial transcript. An application for a transcript must

be accompanied by the proper fee. First transcript, no charge; additional copies, each original, \$1; extra copies, \$.50 each. No transcript will be issued until all charges owing to the university have been paid in full.

Student Photograph

At time of first registration at King's each student will be required to supply three pictures. These should be approximately one inch by one and one-half inches.

Laboratory Charge

No laboratory deposit is charged. Individual students will be charged for careless or willful damage.

Parking on the Campus

Each student who has a car on campus may obtain a parking permit from the General Office upon the presentation of insurance and license number, for a charge of \$10.00.

Students with motorcycles may obtain parking permits under the same conditions for a charge of \$2.50, and will be required to park them in designated areas only.

Refund of Fees

A student who has completed registration and wishes to withdraw must obtain written approval from the Registrar.

A student withdrawing after two weeks from the date of commencement of classes will be debited in full for the incidental fees and may receive a refund 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 approved, 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 who is dismissed from the University for any reason will not be entitled to a refund of fees.

Applications for a refund or adjustment should be made to the Business Office at Dalhousie after the approval of the proper authority has been obtained. N.B. - King's College students must report AS WELL to the Registrar and Bursar, King's College.

Admissions and Programmes: Faculty of Arts and Science

Admission from Canadian High Schools

Application

If you wish to be admitted to the Faculty of Arts and Science you must arrange to send a completed application form (available either from your high School or from the Registrar's Office) as soon as possible after January 1. You should also ask your school Principal or Guidance Counsellor to send a High School Record Transcript, showing academic standing at mid-year.

You must ensure that copies of the following documents are sent to the Registrar's Office:

- (1) A certified transcript of Nova Scotia XI Junior Matriculation high school marks or their equivalent, or the Grade XI Provincial examination certificate;
- (2) Evidence of completion of Nova Scotia Grade XII, Senior Matriculation, or its equivalent, in the form either of a Provincial examination certificate, or of a Principal's report. (This should be sent to the Registrar's Office by Aug. 16th.);
- (3) A copy of scores in either the SACU or the CEEB tests, if you have taken either of these and wish your scores to be considered by Admissions Office. (Commencing, September 1972, SACU scores will be required of Canadian applicants from High School.)

Admission Requirements

(1) Completion of final Provincial, or local high school, examinations in the University Preparatory Program for Nova Scotia Grade XI, or its equivalent, with a mark of at least 50% in each of five subjects including English;

And

(2) Completion of or current registration in Senior Matriculation year (Nova Scotia University Preparatory Program in Grade XII or its equivalent).

You can then be admitted if:

(i) after mid-year examinations, or Easter examinations you have an average of 70%, with no failures, in five subjects;

Or

(ii) after you have completed your final Grade XII high school examinations, or Province of Nova Scotia Grade XII Examinations, or their equivalents, an average of 60%, with no failures, in five subjects:

Or

(iii) having completed high school, or Province of Nova Scotia Grade XII examinations, or their equivalent, he can show eligibility for a total of seven (7) points calculated on the

following basis:

Mathematics, English, and any one other recognized language - 2 points each;

Any other recognized subject (at present Biology, Chemistry, Geography, Geology, History, Physics, and any additional recognized language) - 1 point each.

A grade of at least 50% is required for point allocation, with an average of at least 60% in the subjects offered.

SPECIAL CASES:

The University will consider for admission students who are lacking the normal high school preparation, provided that the applicant can show (by his record, in interview, perhaps by additional tests) that his qualifications in other respects are acceptable.

EQUIVALENT CERTIFICATES OF MATRICULATION AND RECORDS OF MARKS

For purposes of consideration for admission, official certificates and records of marks at the completion of the following levels are considered as Senior Matriculation:

Atlantic Provinces of Canada

Nova Scotia - Grade XII.

New Brunswick - The former Grade XIII; or first year of a university, or Junior College, which admits students at the Junior Matriculation level. (but see below)

Newfoundland - First year Memorial University.

Prince Edward Island - First year University of Prince Edward Island. (but see below)

Other Canadian Provinces

Quebec - McGill Senior Matriculation; or Senior High School leaving Certificate; or the C.E.G.E.P. Diplôme d'études collégiales.

Ontario - Grade XIII (Secondary School Honour Graduation Diploma).

Manitoba - Grade XII

Alberta - Grade XII

Saskatchewan - Grade XII

British Columbia — The former Grade XIII; or first year of a university, or Junior College, which admits students from the Junior Matriculation level.

Certificates issued in the next to last high school year (which in Nova Scotia is Grade XI) are normally recognized as being at the level of Junior Matriculation.

Although the Grade XII certificates from New Brunswick and from Prince Edward Island are classified as Junior Matriculation, students from these Provinces with consistent averages above 80% may be considered for admission provided they have passed in five subjects including English.

OBJECTIVE TESTS (SACU AND CEEB)

Canadian and American applicants for admission in 1971 are strongly urged to present scores of objective tests (SACU and CEEB).

Beginning with admissions in 1972, SACU scores will be a normal part of all applications from residents of Canada; CEEB or equivalent scores for applicants from other countries.

Admission of Students from other Canadian Colleges or Universities

ADMISSION REQUIREMENTS AND REGULATIONS

Students who have attended Junior Colleges

If you have attended a recognized Junior College and can present satisfactory certificates, you may be granted Senior Matriculation standing for the work of the appropriate grade. For work beyond this level you may receive credit on admission for a maximum of five equivalent classes. This means that you can complete the requirement for a General degree in two years or an Honours degree in three years. This recognition is regularly offered to the Nova Scotia Teacher's College in Truro.

Students who have attended other Canadian Universities.

1. If you have attended another university you will not be admitted if, on academic grounds, you are ineligible for readmission to that university.
2. If you were admitted to another Canadian university from the Junior Matriculation level and are in good standing at that university, you may present *FIVE* appropriate university credits in lieu of Senior Matriculation subjects in order to meet the entrance requirements for admission to the first year of study. If you have more than five university credits, you may surrender five for matriculation purposes and retain credit for other appropriate classes in accordance with regulations set out below in

paragraphs 4 and 5.

3. If you were admitted to another Canadian university from the Senior Matriculation level and are in good standing, you may be admitted to King's-Dalhousie and may retain credit for appropriate classes in accordance with regulations set out below in Paragraphs 4 and 5.

4. If you are admitted from another university or from a Junior College, you can be given credit only for classes essentially equivalent in content and level to those offered at King's-Dalhousie University. No credit will be given unless the classes are credited to you unconditionally at the other university.

5. **Transfer Credits:** Upon receipt of an application for admission to this University, students will be advised of the number of credits which may be transferred from another university.

6. You must undertake all or most of the advanced work of your course at King's-Dalhousie. This must include at least one-half of those senior classes in your areas of specialization which are normally taken in the second and subsequent years of study.

7. If you are enrolled in an Honours programme you must attend King's-Dalhousie as a full time student in your last two years unless the Committee on Studies gives you special permission for this requirement to be waived.

Application Procedure

You should send to the Registrar's Office by July 1:

1. A completed application form. The form will be sent to you on request by the Registrar's Office.
2. Official academic transcripts (or certified copies).
3. A copy of your university calendar in which each of the classes that you have taken has been marked clearly.

Admission of Students Educated Outside of Canada

If you wish to be admitted to the Faculty of Arts and Science and your native language is not English, you must complete the English Language test offered by the University of Michigan. These tests are administered locally throughout the world. You can arrange to take this test by writing to the English Language Institute, Testing and Certification, University of Michigan, Ann Arbor, Michigan, U.S.A.

Admission Requirements

If you have the following academic qualifications which are accepted as equivalent to the Canadian Senior Matriculation, you are eligible to enter the first year of a degree programme in the Faculty of Arts and Science.

U.S.A.

You will normally be admitted to the first year of a three-year Bachelor's degree programme if

you have completed one year of study (minimum of 30 semester hours) at an accredited institution of higher learning in the U.S.A. (Note: A general or pass bachelor's degree in the United States requires four years of study. A King's-Dalhousie General B.A., B.Sc. degree requires only three years of study. This accounts for the additional year of study required by American applicants.)

However, if you have been graduated from high school with high standing and have achieved high scores on CEEB or advanced placement tests, you will be considered for admission to first year of a three-year General Bachelor's degree programme.

U.K., West Indies, West Africa

G.C.E. with standing in at least five subjects, of which at least two must be passed at Advanced Level; or four subjects of which three must be passed at Advanced Level. *English is imperative at least at Ordinary Level.*

Hong Kong

G.C.E. as above, or University of Hong Kong Matriculation Certificate on the same basis as G.C.E.

India and Pakistan

Bachelor's degree with first or second class standing from an approved university, or, in certain circumstances, first class standing in the Intermediate examinations in Arts and Science, provided that the candidate has passes at the university in English, Mathematics, and a language other than English. (It should be noted that this is the requirement for entry to the first year course in Arts and Science and will not qualify for admission to the sequential B.Ed. year.)

Application Procedure

- I. Applications from the U.S.A. must be received by the Registrar's Office by August 15.
- II. All other applications must be received by the Registrar's Office by May 1. *Note* Students from the United Kingdom and the West Indies who write qualifying G.C.E. examinations in June may request delayed consideration if they can ensure that their examination results can be made available to the Admissions Office by August 21; otherwise the May 1 deadline must apply.



Programmes of Study

FACULTY OF ARTS AND SCIENCE

B.A. (general) three years:

Yr. I: five classes: one from each of the three groups A, B, C, D; two other classes from any groups.

Yr. II and

Yr. III: ten classes: six classes beyond the 100 level in two subjects one of which must be declared as the major area of concentration and the other as the minor, together with four classes normally outside the major-minor group (at least one of which is at the 200 level or higher in the subject chosen).

B.A. (honours) four years:

Yr. I: same as for general B.A.

Yr. II: and

Yr. III: and

Yr. IV: nine classes beyond the 100 level; two classes in the minor; four other classes. (combined honours programmes are also offered).

B.Sc. (general) three years:

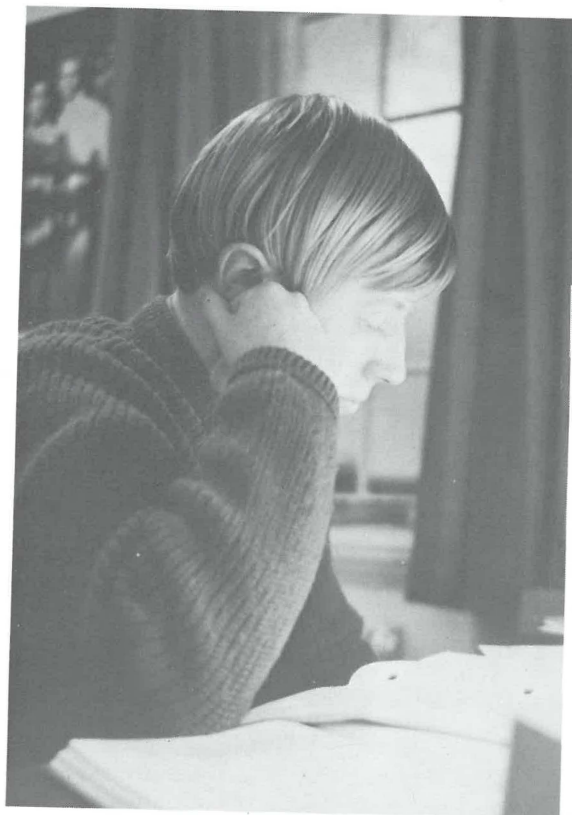
Yr. I: five classes as for general B.A. (above).

Yr. II and

Yr. III: ten classes beyond the 100 level in two subjects selected from biology, chemistry, geology, mathematics, physics, psychology; four other classes in the subjects other than the two selected above.

B.Sc. (honours) four years:

Yr. I: same as for general B.Sc. (students should consult with the department concerned for advice on selecting their own programme).



General Faculty Regulations

Students are subject to changes in regulations and courses made after their first registration unless specifically excused by the Faculty. All enquiries about the regulations hereunder should be made to the Registrar. Enquiries about honours courses should be made to the head of the department concerned.

Credits

1. Degrees are normally earned by credit given for studies in classes of the Faculty of Arts and Science of Dalhousie University during the regular (September to May) academic year; by exception, credit may be obtained for university-level studies—

- a) during a summer session;
- b) by extension courses;
- c) at other universities attended by the student prior to entrance;
- d) in other Faculties of the University. A student taking classes in another Faculty as part of an affiliated course must conform to the regulations of that Faculty with respect to these classes.
- e) at other institutions while still registered at King's-Dalhousie with special permission of the Committee on Studies. Ordinarily, no student may register at King's-Dalhousie in the same session in which he is taking work in another educational institution. In exceptional circumstances the Committee on Studies may permit deviations from this regulation. Details of the regulations governing credits earned in these ways are given below.

Late Registration

Students who do not register on the proper day are warned that they may not be able to obtain places in some classes.

Classes in the Faculty of Arts and Science

Admission to Classes

2. No student shall be admitted to a class until he has satisfied the regulations regarding entrance and complied with the General University Regulations.

Duration of Undergraduate Studies

3. A student is normally required to complete his undergraduate studies within ten years of his first registration. In special circumstances, for each individual case, the Committee on Studies may grant permission to continue studies beyond this period subject to conditions specified by the Committee.

Workload

4. Five classes shall be regarded as constituting

a normal year's work for a student, and may not be exceeded without written permission from the Committee on Studies. Such permission will not normally be granted to any student who is in his first year of study or to any student who, in the preceding academic year, has failed any class or had an average of less than 60%.

5. A full-time student registered in this University may, with the permission of the instructor concerned, audit any class in the Faculty of Arts and Science, provided that it is clearly understood that he will not be eligible to write examinations in the class and will not, under any circumstances, be granted credit for it.

6. A student possessing advanced knowledge of a subject, which he has acquired otherwise than at a university, will be encouraged to begin his studies in that subject at a level appropriate to his knowledge, as determined by the department concerned, and will be exempted from any classes which are normally prerequisites for the one to which he is admitted. However, the student must substitute for the exempted classes an equal number of other classes, not necessarily in the same subjects (i.e. he must complete at the University the full number of classes required for a general or an honours degree).

Class Work

7. In order that his class work may be recognized as qualifying for a degree or diploma, a student must meet the regulations for the degree or diploma concerned, and conform to the following requirements:

- a) he must attend the classes of his prescribed course regularly and punctually;
- b) he must appear at all examinations, prepare such essays, exercises, reports, etc. as may be prescribed and, in a class involving field or laboratory work, complete such work satisfactorily.
- c) he must have settled all obligations to the University with respect to tuition and residence fees, bookstore debts, library fines, etc. (not later than April 30 for Spring Convocations).

8. When the work of a student becomes unsatisfactory or his attendance irregular, his case will be discussed by the Committee on Studies which may require him to withdraw from the class or classes concerned and to be excluded from the relevant examinations.

9. In determining pass lists, the standings attained in prescribed class exercises, in field or laboratory work, and in the various examinations, are taken into consideration. A student

who fails to obtain a pass mark on the work of the session in any class shall lose credit for attendance in that class and can gain credit only by repeating it.

Sessional and Class Examinations

10. In all classes, covering two terms, examinations are conducted or other forms of assessment are made; at the end of the first term, before the Christmas vacation; and the Spring after the close of lectures in the Spring. Other examinations, etc. in any class may be held at dates appointed by the instructor. The papers set at the Spring examination in any subject cover the work of the whole session in that subject, and not merely the work of the second term, and approximately 25% of the questions will be set on the work covered before Christmas.

11. In half-classes occupying one term, examinations are conducted or other forms of assessment are made at the end of the term, either before the Christmas vacation for first-term half-classes or after the close of lectures in the Spring for second-term half-classes.

12. Any student who has not shown reasonable proficiency in the first term may be advised to withdraw from the University for the remainder of the session or to reduce the number of classes he is taking.

13. Application for re-marking of examinations must be made to the Registrar within three months of the date of the examination.

Failed Year

14. A student is considered to have failed his year if in the Spring pass lists he passes fewer than three of the classes for which he is registered, unless:

- a) the year is the first he has spent at any university, when passes in only two classes are required;
- b) he is a part-time student, when he must pass at least one class.

The results reported in the Spring pass lists of the academic year determine whether a student has passed or failed his year. A student who fails his year is not entitled to supplemental examinations.

15. A student who has failed his year for the first occasion is required to reapply to the Faculty for consideration for readmission.

16. A student who fails a year on two occasions will be ineligible to return to the University as either a full-time or a part-time student. An appeal against the application of this rule may be addressed to the Committee on

Studies but will be allowed only if illness has seriously interrupted the student's studies, or in other very exceptional circumstances.

An appeal on the grounds of illness will only be considered if a medical certificate from the physician attending the student is submitted to the Registrar at the time of the illness.

Supplemental and Special Examinations

17. A student may be permitted to write a supplemental examination in one class in which he failed if:

- a) he has otherwise fulfilled the requirements for class work (see above);
- b) he has obtained a mark of not less than 40% (or FS grade) in the final examination in that class;
- c) he has not failed his year (see above).

18. The supplemental examination must be written in the August immediately following the failure. It may not be deferred.

19. A student who fails to pass the supplemental examination can obtain credit for that class only by repeating it.

20. No more than one supplemental examination may be written by any student on the work of any one year.

21. The supplemental examination may, at the discretion of the department concerned, constitute the same proportion of the final mark as did the Spring examination in the original class.

22. No student may write both a supplemental examination and an examination at the end of the Summer School in the same class in the same year.

23. No supplemental examinations are allowed for classes taken at the Summer School.

24. No more than five passes obtained as a result of supplemental examinations may be counted towards a degree.

25. Special examinations may be granted to students in case of genuine illness, supported by a medical certificate, or in other unusual or exceptional circumstances. Medical certificates must be submitted at the time of the illness and will normally not be accepted after a lapse of one week from the date of the examination.

26. A student wishing to appear as a candidate at a supplemental or special examination shall be required to give notice of his intention to the Registrar's Office at Dalhousie on or before July 10, the fee to be remitted with the notice. Students wishing to write at outside centres must apply by July 10th.

Summer School and Extension Classes

27. Up to five credits from Summer School and correspondence classes may be accepted towards the requirements for a degree, not more than two of them by correspondence. Such classes must have been passed at an adequate level and can be accepted only if they are closely equivalent in content to classes normally given at Dalhousie-King's.

28. No student may take classes totalling more than one full credit in any one Summer School session. Not more than two full credits can be obtained at Summer School in any one academic year.

Exceptions will normally be granted by the Committee on Studies only in respect of attendance at a university which operates a trimester system or its equivalent.

In all cases, permission must be obtained in advance, following the procedure detailed below.

29. A student wishing to take, at a university other than Dalhousie, a Summer School class to be counted for credit towards a Dalhousie degree must:

- a) obtain an application form from the Office of the Registrar at Dalhousie University;
- b) obtain from the university he proposes to attend a full description of the Summer School classes (or alternative classes) he wishes to take; usually the Summer School Calendar will suffice;
- c) make application to the Registrar of Dalhousie University and submit the class description of the class he wishes to take (alternatives should be indicated where possible).

When a decision has been reached, the student will be notified directly by the Registrar. If the decision is favourable, the receiving university will be so advised by the Registrar's Office.

Students should make application for Summer School as early as possible in order that they may make necessary arrangements and obtain a list of the text-books required.

Similar regulations relate to correspondence classes and, at the present time, only the correspondence classes offered by Queen's University, Kingston, Ontario will be considered.

Transfer Credits

30. Upon receipt of an application for admission to this University, students will be advised of the number of credits which may be transferred from another university.

31. A student must undertake all or most of the advanced work of his course at Dalhousie-King's. This must include at least one-half of those classes in his areas of specialization which are normally taken in the second and subsequent years of study.

A student enrolled in an honours programme must attend Dalhousie-King's as a full-time student in his final two years unless the Committee on Studies gives special permission for this requirement to be waived.

Degrees

Minimum Standing for a General Degree

32. In order to qualify for the award of a general degree, candidates must have obtained a minimum of ten points on the fifteen classes required.

Points are awarded for each class as follows:

Division	Grade	Points
I	A	3
II	B	2
III	C D	I None

Note that, while a pass is recorded for a D grade result, no points are awarded. For a half-credit class, the points awarded for the grade assigned will be one-half the above values; e.g., for an A grade 1½ points will be awarded.

33. Students receiving credit for classes taken at another institution are not awarded points for those classes. In such cases, the minimum number of points required for a general degree is in proportion to the number of Dalhousie-King's classes actually taken. The minimum number of points required is calculated by multiplying the number of classes passed at Dalhousie-King's by the fraction two-thirds, and rounding the product upwards to the nearest whole number.

34. A general degree will be awarded "With Distinction" to a student who has achieved an aggregate of 40 points in the 15 classes taken for his degree (or a proportional figure if he has taken more than 15 classes).

Minimum Standing for an Honours Degree

35. Students in honours courses are expected to maintain an average of at least C grade in each year of study and, if they fail to do so, may be required by the Committee on Studies to transfer to a general degree course.

Counting of classes towards two undergraduate degrees

36. A student who already holds one undergraduate degree (B.A., B.Sc. or B.Com.) and who wishes to gain a second undergraduate degree must fulfil the following requirements:
- only classes on the 100 and 200 levels may be carried forward for credit;
 - of these, only classes that are applicable to the course for the second degree may be counted for credit;
 - each applicable class must bear at least one merit point in order to receive credit (no classes carrying less than a C grade may be so used);
 - a new major field of concentration must be chosen.

Change of Registration

Changing a Course or Class

37. (Class changes *will not* be permitted during the first week after commencement of classes in September.) A student desiring to change a course or class for which he has registered may do so between 27 September and 12 October. Students must complete the appropriate registration change form which must be approved

by the instructors of the classes concerned, and by the Registrar.

38. After 12 October a fee of \$1.00 will be charged for each class change, except for classes which commence after Christmas, when the fee must be paid for changes after January 10, 1972.

39. The last day for withdrawing from classes that terminate at Christmas is 12 October. The last day for withdrawing from any class that terminates in April will be 28 January. After these dates all classes for which a student remains registered will be recorded.

40. A registered student who wishes to withdraw from the University, or one who wishes to change from full-time to part-time status, must write to the Registrar explaining his circumstances. In either case, the student should not discontinue attendance at any class until his application has been approved. A student proposing withdrawal will normally be invited to discuss his situation with the Dean or the Assistant Dean of Student Services.

Requirements for Entrance to the Divinity School

The basic Divinity course is normally a post-graduate programme regulated by the Senate of the Atlantic School of Theology. Students may take Divinity classes without being committed to ordination, either on the part of themselves or the Faculty.

Non-graduates who have university matriculation may, on the recommendation of a Bishop, be admitted to the Divinity School. Before embarking on the Divinity course they will be required to complete a probationary programme of one or two years depending on their standard of matriculation, provided always that five university credits or their equivalents be completed. On satisfactory completion of the basic programme in Divinity they will be granted the Licentiate in Theology (L.Th.). This provision is intended for older men. Only in exceptional circumstances will it be allowed to enrol under the age of twenty-five.

Bachelor of Sacred Letters (B.S.Litt.)

Prerequisites for this degree are two courses in Classical Greek in their prior undergraduate degree. Three classes in Greek Bible and two in Hebrew must be taken as part of the complete Divinity Course. In addition the candidate must earn two hours' credit beyond the requirements of the basic Divinity Course. An annual average of at least 65% must be maintained.

Bachelor of Sacred Theology (B.S.T.)

This degree is awarded to those who already hold a bachelor's degree on entering the Divinity School. The course consists of the basic programme of the Divinity School, (the choice of electives being approved by the Divinity Faculty,) passed with an overall average of at least 65%, which must be maintained each year.

The Licentiate in Theology (L.Th.)

The completion of the basic Divinity programme with pass marks of not less than 50% entitles the student to the diploma.

The Testamur

A student who has passed not fewer than two-thirds of the required courses of the basic programme may be awarded the Testamur.

Bachelor of Divinity

Students who have received the B.S. Litt. or B.S.T., and graduate students who have qualified for the L.Th. may proceed to the final examination for the extramural degree of B.D. under the General Synod Board of Examiners.

Medical Examination

For all candidates for ordination a medical examination by the General Synod physician is required during their first year in Divinity. It is the responsibility of the student to make the necessary arrangements with the Diocesan Office at the earliest opportunity.

Supplemental Examinations

No student may write more than three supplemental examinations in one year, the recorded pass mark for which is 50%.

The Divinity Curriculum

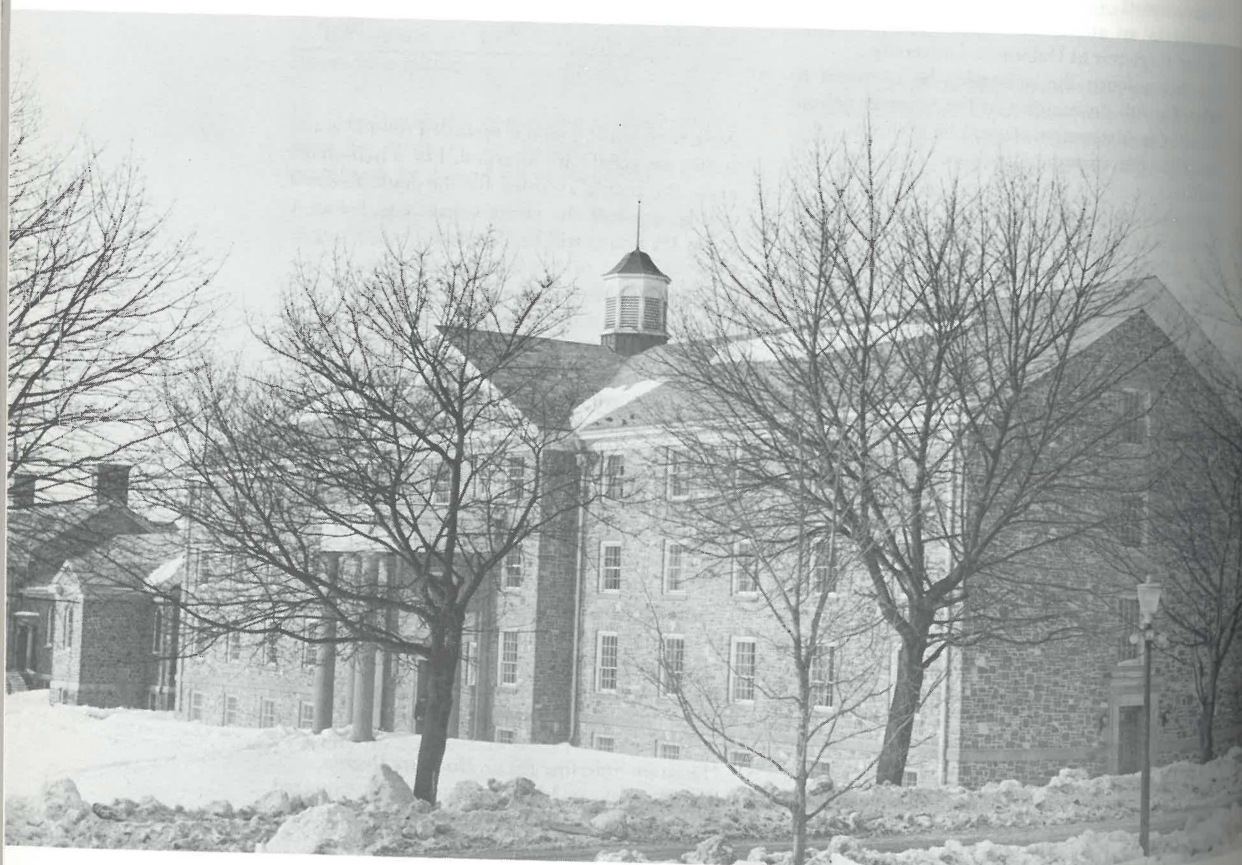
In association with the Atlantic School of Theology, the curriculum of the Divinity School is carefully designed to cover the essential tenets of the Christian Faith, its origins and history, and its application in the life of the twentieth-century.

In most cases, the curriculum followed by an individual student will be mapped out as a result of consultation between that student and King's Dean of Divinity. It will draw as appropriate on the resources of the Atlantic School of Theology, supplementing these as and if required for specific goals of the student, for example full-time ministry, ordained or otherwise, in the Anglican Church of Canada. Such supplementary studies or training will normally be recognized for credit by the Atlantic School of Theology and not constitute an additional burden on top of the requirements of the School.

Details of the basic course requirements and offerings of the Atlantic School of Theology are given in a bulletin published separately, and available from the School or from King's Registrar on request.

PARISH TRAINING

All students who are candidates for ordination are expected to undertake some Sunday responsibilities, and may participate in the annual "Parish Training School" arranged by the Pastoral Committee of the Diocese of Nova Scotia as a help for students going to summer work in rural or mission parishes. The Professor of Pastoralia shares in the overall direction of this Parish Training Program which is graded to the student's capabilities and is not onerous: The School takes place between the end of Spring Examinations and graduation week.



Alexandra Hall in a Winter Setting

Degree of Master of Sacred Theology

In conjunction with the Institute of Pastoral Training, the University of King's College now offers the degree of Master of Sacred Theology in the field of pastoral care. Particulars concerning regulations for this degree may be obtained from the Executive Director of the Institute of Pastoral Training at the University of King's College.

Degree of Bachelor of Divinity

By agreement among all Anglican Theological Colleges in Canada, the Degree of Bachelor of Divinity is now awarded only by examination by the Board of Examiners of General Synod. Particulars concerning regulations for this Degree may be had upon application to the Registrar.

Diploma of Associate of King's College (Nova Scotia)

The University of King's College has established the diploma of Associate of King's College (Nova Scotia), A.K.C., (N.S.), to encourage further study for those persons who are not eligible for the B.D. It combines extramural and intramural work, and now includes Pastoralia. Particulars concerning regulations for this diploma may be had upon application to the Registrar.

Associate in Theology

By arrangement among all Anglican Theological Colleges in Canada, the Title of Associate in Theology is now awarded only by examination by the Board of Examiners of General Synod. Particulars concerning regulations for this Title may be had upon application to the Registrar.



King's Chapel

Speech Arts**Lecturer**

Stella Kryszek, L.G.S.M. (Speech Arts). Gold Medalist, L.A.M.D.A., S.R.N.

Oral Communication

This course covers the fundamentals of good speech — breathing for voice production, development of good tone quality, and voice projection; the formation of vowel and consonant sounds, articulation and pronunciation; sentence structure, and building a vocabulary for effective communication. Study of vocal expression will include pitch, inflection, emphasis and pause. Opportunity will be given to practise the art of oral reading, and effective interpretation of prose and poetry.

The course is designed to give the student personal composure in speech situations, help him develop a pleasing well modulated voice, and make him a competent person in the art of oral communication.

There are two terms of four months each. Sixteen lessons are given in each term. First term begins September, 1971; second term begins January, 1972.

Fees

Private lessons (one hour), \$80.00 per term. (subject to change)

Effective Speech Communication for Professional and Business People

Good speech communication requires satisfactory understanding in a conversational or speaker-listener exchange.

This course is designed as an introduction to the art of communicating with groups of people. It is practical and realistic, and offers speaking experience as well as study of areas closely connected with oral communication in today's highly competitive society. These include study of the speaker and his audience; speech construction, forms and formats; collection and arrangement of suitable material; voice production; the visual impact of the speaker upon the audience, and effective oral interpretation. Instruction will be given in parliamentary procedure, conduct of meetings, impromptu and formal speaking and use of public address systems.

This is an extension course, and no academic prerequisite required.

Fee

\$75.00

Time and dates to be announced.



Atlantic Summer School of Advanced Business Administration

June 13th – July 16th, 1971

The Maritime Universities have for several years jointly sponsored a Summer School in Advanced Business Administration whose home is at the University of King's College. In 1971 the School will be held from June 13th to July 16th.

The purpose of the School is to provide further training at an advanced level for those who are already engaged in work in the business world. Instruction is offered, under the tutelage of a staff drawn from the Harvard School of Business Administration, in Human Relations, Business Policy, Financial Analysis and Control, Labour Problems, Marketing Problems, and Government Policy and The Canadian Economy.

Admission to the School is by recommendation from the firm which employs the student and participation is invited from all sizes and types



Tree Planting Ceremony (Graduates 1971)

of companies. There are no formal educational requirements, but it is expected that sponsors will recommend only those who, by virtue of experience, intelligence, industry, and interest in their jobs, will profit from the instruction offered.

Members of the School will live in single rooms in Alexandra Hall and eat in Prince Memorial Hall. The cost of tuition, books, board and room amounts to \$1,500.00 for the five weeks. Further details will be sent to applicants shortly before the opening of term in June. \$200 charge if an executive is withdrawn after June 1st.

Additional information as to the details of syllabus, etc., and application forms for admission are available from Dean H. E. Dysart, Director, Atlantic Summer School of Advanced Business Administration, University of King's College, Halifax. Applications should be completed by June 1st.

University of King's College
Atlantic School of Theology
Acadia Divinity College
Medical Faculty of Dalhousie University

The organization of the Institute in collaboration with Pine Hill Divinity Hall, the Divinity School of Acadia University, Presbyterian College, Montreal, Medical Faculty of Dalhousie University, pioneered this modern development in Theological education on the Canadian scene. It is the objective of the Institute to bring pastors and theological students face to face with human misery as it exists both in and out of institutions, through courses in Clinical Pastoral Education in both general and mental hospitals, reformatories and juvenile courts, homes for the aged, alcoholism treatment centers, and other social agencies. In this connection, the Institute now sponsors six-week courses in Clinical Pastoral Education, usually commencing mid May, at the Nova Scotia Hospital, Dartmouth (mental), the Nova Scotia Sanatorium, Kentville, the Victoria General Hospital, Halifax, the New Brunswick Provincial Hospital in Lancaster, King's County Hospital, Waterville, and Springhill Medium Security Correctional Center, Springhill.

While the above mentioned courses aim primarily at increasing the pastoral competence of the parish minister or church worker, students of particular aptitude and interest can be guided in further theological training to become qualified teachers of these subjects in theological courses, directors of Clinical Training Courses, and institutional chaplains; also, in certain cases, to become experts in particular specified fields, such as ministering to the mentally ill or alcoholics, where the church may have a significant role to play in partnership with other helping professions.

A recent development in this field was the formal constitution in December 1965 of "The

Institute of Pastoral Training

Canadian Council for Supervised Pastoral Education", which seeks to co-ordinate training across Canada, establishing and maintaining high standards, accrediting training courses, and certifying supervisors. The Institute of Pastoral Training has links with the Council, its Executive Director currently serving as President of the Council and as a member of the Board of Directors, and two members of its Executive serving on the Council's Committee on Accreditation and Certification. Professor R. J. R. Stokoe of King's College, who has directed the six-weeks course at the Nova Scotia Hospital, Dartmouth, and now directs courses at the V.G. Hospital, has been accredited as a Chaplain Supervisor, by the Canadian Council and also by the Association for Clinical Pastoral Education in the United States.

Other goals of the Institute include the production of teaching materials, the promotion of workshops, and the establishment of a first class library and reference center at the Institute office.

A number of one-day and four-day workshops have already been held in various localities in the Maritimes, and information as to what is involved in setting one of these up may be obtained from the Secretary of the Institute.

All enquiries concerning courses offered should be addressed direct to the Secretary of the Institute, the Reverend Howard H. Taylor, University of King's College, Halifax, N.S. Board and lodging can usually be arranged, and some bursary assistance is forthcoming. Academic credit is given by certain Canadian and American universities for satisfactory completion of any of the courses offered. Applications to attend the courses from bona fide enquirers belonging to other professions are welcomed, and receive equal consideration.



Any scholarship winner who can afford to do so is invited to give up all or part of the money awarded. He will still be styled the winner of the Scholarship during its tenure. This arrangement increases the value of the Scholarships Funds, as it enables other students of scholarly attainments to attend the University.

All Scholarships, Prizes and Bursaries except awards to Graduating Students, will be credited to the student's account and not paid in cash.

Application for scholarships and bursaries should be made to the Registrar.

In order to retain scholarships tenable for more than one year, an average of 65% must be made each year, with no failing mark in any subject.

Arts and Science

A. Entrance Scholarships

Dr. W. Bruce Almon Scholarship — \$1500 a year. Established by the will of Susanna Weston Arrow Almon, this scholarship is open to a student entering the University of King's College and proceeding to the degree of Doctor of Medicine at Dalhousie University. It is renewable yearly provided that the student maintains a first class average, and lives in residence each year until the regulations of Dalhousie Medical School require otherwise.

By the terms of the will preference is given to a descendant of Dr. William Johnstone Almon.

Susanna Almon Scholarships — \$750 a year. Established by the University from the legacy of Susanna Weston Arrow Almon, these scholarships are tenable for four years from Grade XII.

Chancellors' Scholarships — \$500 a year. Established originally through the generosity of the Hon. Ray Lawson, O.B.E., LL.D., D.C.L., former Chancellor of the University, and continued by succeeding Chancellors, these scholarships are open to students of the Atlantic Provinces, and are tenable for four years from Grade XII. The holders of Chancellors Scholarships will normally be required to live in residence.

King's Foundation Scholarships — \$350 a year. Established by the Board of Governors, these scholarships are tenable for four years from Grade XII.

Halifax-Dartmouth Scholarships — \$300 a year. An entrance scholarship for students entering

the University from the Halifax-Dartmouth area.

King's College Bursaries — \$100. The University offers a limited number of bursaries of \$100 to entering students of satisfactory academic standing and in need of financial assistance.

Alumni Entrance Scholarships — \$600. Established by the Alumni Association, these scholarships are intended for entering students, but consideration will be given to applications from students who are already members of the College and who are in good academic standing. The holders of Alumni Entrance Scholarships will normally be required to live in residence.

Margaret and Wallace Towers Bursary — \$600 a Year. Established by Dr. Donald R. Towers, an alumnus of King's, in memory of his mother and father. This bursary, tenable for four years from Grade XII, is open to a student of high academic standing entering the University to study Arts or Science and who is a resident, or a descendant of residents, of Charlotte County, New Brunswick, or of Washington County, Maine. Failing any qualified applicants from these counties in any one year, the bursary for that year only will become available to a student resident anywhere outside the Maritime Provinces of Canada.

Winfield Memorial Entrance Scholarship — \$200. Established by Mrs. W. A. Winfield in memory of her husband.

The Alumni Scholarships — \$300. The Alumni Association has established two scholarships of \$300 each: one restricted to students of King's College School, Rothesay Collegiate, Edgehill, Netherwood or Halifax Ladies College; and one unrestricted.

Keating Trust Scholarships — \$125. Awarded from a bequest to the College from the Rev. J. Lloyd Keating to students entering College with outstanding marks in Science, these scholarships, according to the will of the donor, are intended to encourage students, and preferably Divinity students, in the study of chemistry and physics, and scholars will be required to take at least one class in physics or chemistry during the year in which they hold the scholarship.

Nova Scotia Light & Power Co. Ltd. Scholarship — \$300 a year. The Nova Scotia Light & Power Co. Ltd. offers an entrance scholarship of \$300.00 a year, tenable for three or four years, providing the student maintains an average of 65% and has no failure in any subject.

Nova Scotia Teachers College Bursary — \$500. Awarded on the recommendation of the Principal to a graduate of Nova Scotia Teachers College who registers as a full time student in the Faculty of Arts and Science.

The Halifax Rifles Centenary Scholarship — \$200. Established by the Halifax Rifles as an entrance scholarship. For particulars apply to the Registrar.

King's College Naval Bursary — \$300 a year. In order to commemorate the unique and valuable relationship between the University of King's College and the Royal Canadian Navy during the Second World War, ships and establishments of the Atlantic Command have set up a Bursary to enable a student to attend King's.

Applicants must be children of officers and men either serving in the Royal Canadian Navy or retired from the R.C.N. on pension. Academic achievement and promise will be the first consideration in selecting a candidate. Purpose, industry, and character are to be carefully weighed, together with the likelihood that the candidate will make good use of higher education to benefit not only himself but also his country.

The Bursary is awarded annually but it is intended to be tenable by the same student to the completion of his course at King's College provided that he makes acceptable progress. The Bursary will be withdrawn in the event of academic failure or withdrawal from King's College for any reason.

Deihl Bridgewater Bursary — \$250. To assist needy students of suitable standing, resident in the town of Bridgewater, or within six miles of the town. Bequeathed by the late Lena Ruth Deihl.

Walter Lawson Muir Bursary — \$175. To be awarded at the discretion of the Scholarship Committee either to a student entering college for the first time or to a student returning to college who won high scholastic standing in the previous year. Endowed by Mrs. W. L. Muir.

The United States Scholarship — \$500. Awarded annually by Friends of New York State Corporation, to a student resident in the United States who in the judgment of the Directors of the Corporation best exemplifies an appreciation of the importance of good relationships between the people of the United States and Canada.

In any year the scholarship may be divided among two or more students.

Imperial Oil Higher Education Award. Imperial Oil Limited offers annually free tuition and

other compulsory fees to all children or wards of employees and annuitants who proceed to higher education courses. The award is tenable for a maximum of four years. For particulars apply to the Registrar.

Redpath Sugar Scholarship — \$1000 for two years. Establishment of a Redpath Sugar Scholarship for a son or daughter of a Maritime miner to study at a Maritime University was announced January 28th, 1959, by W. J. McGregor, President of the Redpath Sugar Refinery, in memory of men lost at Springhill. For particulars apply to the Registrar.

I.O.D.E. Bursaries — \$100 to \$200. The Provincial Chapter of Nova Scotia, I.O.D.E., will award a limited number of bursaries of from \$100 to \$200 to university students of satisfactory academic standing in need of financial assistance. First-year students will be given preference. For particulars apply to the Provincial Educational Secretary, I.O.D.E., 5677 Victoria Road, Halifax, Nova Scotia by June 1.

B. Scholarships, Bursaries and Prizes Awarded in Course

The President's Scholarship — \$250. Three scholarships of \$250 will be awarded to the students who make the highest average at the end of the first, second and third year examinations and hold no other scholarship.

The Stevenson Scholarship — \$120. Founded by the Rev. J. Stevenson, M.A., (sometime Professor of Mathematics), of the value of \$120 a year tenable for two years, this scholarship will be awarded to a student who makes the highest aggregate in the first year examinations.

The Scholarship will be credited in half-yearly instalments, provided always that the scholastic standard is maintained.

Alexandra Society Scholarship — \$300. An annual award offered by the Alexandra Society of King's College to a woman student who stands highest in the second or third year examinations, provided that she live in residence. If the student who stands highest is otherwise ineligible, the award shall be left to the discretion of the Scholarship Committee.

April Fund Scholarship — \$600. A scholarship of \$600.00 has been established by the Trustees of the April Fund to be awarded to a student of outstanding academic distinction entering his or her graduating year. Any student may apply for this scholarship whether or not he has previously studied at the University of King's College.

The scholarship holder will be required to live in residence.

Applications should be made to the Registrar not later than May 15th. An applicant who is not already a King's student must submit his transcript and the names of two professors who can supply references.

Saint John University Women's Club Scholarship — \$100 (Undergraduate). The Saint John University Women's Club awards a scholarship of \$100 each year to a woman student entering her senior year in a Maritime University. The award is to be made to a student from the City or County of Saint John, with consideration being given to both academic attainment and financial need. For particulars apply to the Registrar, before March 1.

The Lawson Prize — \$100. Established by The Hon. Ray Lawson, former Chancellor of the University, for the student who shows the greatest progress between the first and second year.

Dr. M. A. B. Smith Prize — \$25. Established by a bequest of \$500 from the late Dr. M. A. B. Smith. Awarded to the student with the highest marks at the end of his second year with ten classes. In case of a tie preference will be given to a Divinity student.

Bishop Binney Prize — \$20. This prize, which was founded by Mrs. Binney in memory of her husband, the late Bishop Binney, is given to the undergraduate with the best examination results at the end of the second year with ten classes.

The Akins Historical Prize — \$100. Founded by T. B. Akins, Esq., D.C.L., Barrister-at Law and Commissioner of Public Records.

The award is made for the best original study in Canadian History submitted in competition.

Essays must be handed in, under a *nom de plume*, with the writer's name in an attached envelope, on or before the 1st day of April of the year concerned. Essays become the property of King's College.

The Beatrice E. Fry Memorial — \$50. Established by the Diocesan Board of the W.A. of the Diocese of Nova Scotia, in memory of Miss Beatrice E. Fry. To be awarded to the woman student (Anglican) of the College obtaining the highest mark of the year in English 100, provided that mark exceeds 65%.

The Henry deBlois English Prize — \$15. The late Rev. Henry D. deBlois, D.C.L., a graduate

of King's College, left the sum of \$200 to the Governors of the College to establish a prize in English. Awarded to the student of the 3rd or 4th year in Arts or Science who submits the best essay on some subject relating to English Literature.

For conditions, apply to the Registrar. All essays must be in the hands of the Registrar of King's College by February 15.

The Almon-Welsford Testimonial — \$30. The Honourable William J. Almon, Esq., M.D. (1816-1901) and his family endowed a prize to commemorate the gallant and loyal deeds of Major Augustus Frederick Welsford who died in the Crimean War (1855) and to encourage the study of Latin. The prize is awarded annually to the student in his first year who makes the highest mark in either Latin 100 or Latin 200, provided the mark is not less than 65%.

The McCawley Classical Prize — \$35. Established as a testimonial to the Rev. G. McCawley, D.D., on his retirement from the office of President.

Open to students who have completed their first year.

The Zaidee Horsfall Prize in Mathematics — \$10. Established as a memorial to the late Zaidee Horsfall, M.A., D.C.L. Awarded to the student who makes the highest mark in first year Mathematics.

Khaki Bursary — \$60. Awarded to the sons and daughters of the soldiers of the Great Wars. Written application must be made to the Registrar showing claim for consideration.

The Binney Bursary — \$50. Founded in the year 1858, by Miss Binney, sister of the late Bishop Binney, and daughter of the late Rev. Hibbert Binney, in memory of her father.

This scholarship is intended to aid students who may require assistance, and who shall have commended themselves by their exemplary conduct, although their abilities and achievements may not qualify them to be successful competitors for an open scholarship.

Charles Cogswell Bursary — \$20. Charles Cogswell, Esq., M.D., made a donation of \$400 to the Governors of King's College, the object of the donation being "to promote the health of the students and encourage them in the prosecution of their studies".

The Harry Crawford Memorial Prize — \$40. Offered annually by a friend in memory of Harry Crawford, son of Thomas H. and

Elizabeth A. Crawford, Gaagetown, N.B.; a student of this College, who died true to his King and his Country, April 14, 1915, while serving in the Canadian Motor Cycle Corps.

The prize is awarded to the student completing the second year Arts course, of good character and academic standing, who in the opinion of the Faculty deserves it most.

The Jackson Bursary — \$25. Founded by the Rev. G. O. Cheese, M.A. (Oxon.), in memory of his former tutor, the late T. W. Jackson, M.A., of Worcester College, Oxford.

C. Graduate Scholarships, Medals and Prizes

The Governor General's Medal. Awarded to the candidate who obtains the highest standing in the examination for B.A. or B.Sc. Degree. Preference will be given to an Honours Student.

The Rev. S. H. Prince Prize in Sociology. This prize was made available by a \$1,000 bequest under the will of the late Dr. S. H. Prince for annual award to both Dalhousie and King's Students.

The Rhodes Scholarship. This scholarship is of the annual value of 750 pounds sterling. Before applying to the Secretary of the Committee of selection for the Province (which application must be made by November 1), consult the Registrar, King's College.

Rhodes Scholars who have attended the University of King's College

- 1909 Medley Kingdom Parlee, B.A., '08
- 1910 Robert Holland Tait, B.C.L., '14
- 1913 Arthur Leigh Collett, B.A., '13
- 1916 The Rev. Douglas Morgan Wiswell, B.A., '14 M.A., '16
- 1916 The Rev. Cuthbert Aikman Simpson, B.A., '15, M.A., '16
- 1919 William Gordon Ernst, B.A., '17
- 1924 The Rev. Gerald White, B.A., '23, M.A., '24
- 1925 M. Teed, B.A. '25
- 1936 Allan Charles Findlay, B.A., '34
- 1938 John Roderick Ennes Smith, B.Sc., '38
- 1946 Nordau Roslyn Goodman, B.Sc., '40, M.Sc., '46
- 1949 Peter Hanington, B.A., '48
- 1950 Ian Henderson, B.Sc., '49
- 1950 Eric David Morgan, B.Sc., '50
- 1955 Leslie William Caines, B.A., '55
- 1962 Roland Arnold Grenville Lines, B.Sc., '61
- 1963 Peter Hardress Lavallin Puxley, B.A., '63
- 1969 John Hilton Page, B.Sc., '69

University Women's Club Scholarship — \$500. The University Women's Club of Halifax offers

a scholarship of the value of \$500 every second year, 1964, 1966, etc., to a woman graduate of Dalhousie University or King's College, to assist her in obtaining her M.A. or M.Sc. degree at any recognized graduate school. For particulars apply to the Registrar.

The Canadian Federation of University Women Fellowships — \$1500 to \$2500. For information apply to the Registrar.

The Imperial Order Daughters of the Empire Post-Graduate Overseas Scholarship — \$2000. For information apply to the Registrar.

Imperial Oil Graduate Research Fellowship \$3000 for three years. For information apply to the Registrar.

Commonwealth Scholarships. Under a Plan drawn up at a conference held in Oxford in 1959, each participating country of the Commonwealth offers a number of scholarships to students of other Commonwealth countries. These scholarships are mainly for graduate study and are tenable in the country making the offer. Awards are normally for two years and cover travelling, tuition fees, other university fees, and living allowance. For details of the awards offered by the various countries consult the Registrar's office or write to the Canadian Universities Foundation 75 Albert Street, Ottawa.

Rotary Foundation Fellowship. Open to graduate students for advanced study abroad. Available every second academic year, 1963, 1965, etc. Applications must be considered before August 1st of previous year. Information may be obtained from Rotary Clubs or the Registrar.

Divinity

Owen Family Memorial Scholarships — Two of \$250. Established by Mr. and Mrs. D. M. Owen, in memory of the Owen Family, tenable for one year, but renewable, and open to applicants who are Nova Scotia born, and resident therein, and are or are about to become theological students at King's College, preference being given (1) to native residents of the town of Lunenburg, and (2) to native residents of the county of Lunenburg.

Canon W. S. H. Morris Scholarship — \$1,500. This Scholarship has been founded by Robert H. Morris, M.D., of Boston in memory of his father, the Reverend Canon W. S. H. Morris, M.A., D.D., Kingsman, Scholar and Parish Priest in the Diocese of Nova Scotia for forty years.

The Scholarship may be awarded annually by the President and Divinity Faculty to the most

deserving member of the present or recent graduating class of the Divinity School, who has been at King's at least two years, and who, in the opinion of the Faculty, would benefit from travel and/or study in Britain, the U.S.A. or some other area outside the Atlantic Provinces of Canada, provided he reaches a satisfactory standard. Applications, stating the use which the applicant expects to make of the Scholarship, must be submitted to the Dean of Divinity on or before January 8 of the applicant's graduating year. The recipient will be required to serve in the Atlantic Provinces for a minimum of three years after his return from abroad.

William Cogswell Scholarships. Open to students intending to work in the Diocese of Nova Scotia. Scholarship (A): Under the direction of the Trustees of the William Cogswell Scholarship to be awarded to the student who passes a satisfactory examination and who takes his Divinity course at any recognized Divinity College of the Anglican Church in Canada best fitted, in the opinion of the Trustees, to serve the terms of the Trust, giving when possible preference to King's College.

Scholarship (B): Under the direction of the Faculty of Divinity of the University of King's College, Halifax, Nova Scotia, an entrance scholarship of \$200 or \$300 depending on quality of work submitted, will be awarded to the properly accredited student entering the Divinity School for the first time in September, 1971, who stands highest in a special examination to be held on September 17, 1971 provided he reaches a satisfactory standard. The recipient will be required to sign a statement promising to serve in the Diocese of Nova Scotia for a period at least as long as the period during which he holds the scholarship.

This examination will consist of two papers:

- A paper on the content of the Old and New Testaments, and
- A paper on A. H. McNeile's Introduction to the New Testament (revised edition by C. S. C. Williams) Oxford, 1953.

Awards will not be made every year.

The Daniel Hodgson Scholarship — \$240. Founded in 1883 by Edward J. Hodgson and the Reverend G. W. Hodgson in memory of their father Daniel Hodgson, who died about that time. This Scholarship of an annual value of \$60, tenable for four years, is for the purpose of encouraging students to take an Arts Degree before entering upon the study prescribed for Holy Orders. Candidates, who must be residents of Prince Edward Island, shall file their applications and certificates of having passed the full Arts matriculation requirements before August 15th, and must not be over 24 years of age at that time. They must also satisfy

the Diocesan Committee for Holy Orders as to their aptitude for the Ministry of the Church. At the end of each academic year the Scholar shall file with the Trustees a certificate from the President or Secretary of the University "that during the past year he has resided in the College (or has been excused from such residence) and has attended the full Arts course in the College", together with a certificate that his moral conduct, his attention to his studies and his general conduct have been satisfactory to the Board of Governors.

Scholars who fail to comply with the foregoing conditions automatically forfeit the Scholarship, but in special cases the Bishop, on the representations of the Trustees, may restore a terminated Scholarship in whole or in part.

The Bishop Waterman Bursary (Parish of Clements) — \$150. The Parish of Clements, Nova Scotia, wishing to give tangible expression to its appreciation to the Rt. Rev. R. H. Waterman, D.D., for his services to the Parish immediately following upon the death of their Rector (Rev. W. H. Logan, December 19, 1964), has set up a Bursary Fund, to be known as the Bishop Waterman Bursary Fund, to help young men entering King's to undergo training for the Ministry. An amount not less than \$150 is to be forwarded by the Treasurer of the Parish to the Bursar at King's on September 1st of each year. This money is to be used at the discretion of the Dean of Divinity in consultation with the Bishop of the Diocese for the assistance of any candidate for Holy Orders needing it from any Parish of the Diocese of Nova Scotia enrolled at King's for training for work in the Diocese of Nova Scotia or any Missionary Diocese. If any young man from the Parish of Clements offers himself for such training, he shall be given first consideration in the awarding of the Bursary.

The Mabel Rudolf Messias Divinity Bursary — \$120. The interest on an endowment of \$2,000.00, the gift of Mrs. M. R. Messias of Wolfville, Nova Scotia, is to be used to provide an annual bursary for a needy and deserving Divinity student studying at the University of King's College, on the nomination of the Dean and the Faculty of Divinity.

Order of The Eastern Star — \$300. Four scholarships are to be awarded, primarily on the basis of financial need, to 2nd or 3rd year Arts students, or to older men with their Arts degree, in their 2nd or 3rd year of Theology.

Mary How Donaldson and Cornwallis W. A. Bursary — \$400. This Bursary was established by St. John's (Cornwallis, N.S.), Anglican Church Women to provide a living memorial to the life and work of Mary How Donaldson, who

had family connections with King's, and of the Cornwallis W. A., of which she was a charter member. It is to be awarded on the recommendation of the Dean and Divinity Faculty to a deserving member of the Divinity School at King's, male or female, preferably a Nova Scotian, who is preparing for full-time service in the Church and is in need of financial assistance.

The George M. Ambrose Proficiency Prize. (\$300. Approx.). The income from a trust fund set up in memory of Canon G. M. Ambrose, M.A., an alumnus of King's, provides an annual award to the Divinity student who receives the highest aggregate of marks at the end of his first year, provided that during that year such student takes the regular full course in theology.

The Margaret Draper Gabriel Bursary — \$450. A Fund has been established in memory of Margaret Draper Gabriel by her son, Rev. A. E. Gabriel, M.A., an alumnus of King's, the yield from which is to be used to give financial aid to a Nova Scotian Divinity Student entering King's College in preparation for the Ministry of the Church. The recipient must be nominated or recommended by the Bishop of Nova Scotia. If in any year there is no candidate for this assistance the yearly yield is to be used to augment the Fund. Should King's College Divinity School cease to exist as such, the fund is to be transferred to the Diocese of Nova Scotia and the income used as aforesaid.

H. H. Pickett Memorial Scholarship — \$175. This scholarship is payable to the student entering the final year of study for the Sacred Ministry who has shown the greatest all round improvement during his time in Divinity studies. Preference is to be given, first, to a student from Trinity Church, Saint John, and, second, to a student from the Diocese of Fredericton.

John Clark Wilson Memorial Bursaries — \$100 each. Established in 1947 by Miss Catherine R. Kaiser, in memory of John Clark Wilson. Two bursaries of \$100 each, tenable for one year. Awarded to Divinity students deemed worthy of financial help.

Organ Fellowship — \$200. Awarded to a student qualified and willing to play the organ in the College Chapel (Casavant-2 manual pipe organ) at services throughout the year.

Glebe Scholarship. A scholarship of approximately \$250 is offered annually to Anglican students of Prince Edward Island, preference being given to Divinity students.

Application, accompanied by a certificate of character from the applicant's Rector, must be

sent to Canada Permanent Trust Company, Charlottetown, P.E.I. on or before May 31st.

Moody Exhibition — \$100. The "Catherine L. Moody" Exhibition of \$50 a year for two years is awarded every two years to the student entering the second year preparing for Holy Orders, whose scholarship and exemplary conduct shall, in the opinion of the Faculty, merit it. (Next award 1971).

The George Sherman Richards Proficiency Prize — \$120. In Memory of the Reverend Robert Norwood, D.D. The income from a fund of \$2,000 to be awarded annually to the Divinity student who gains the highest aggregate of marks at the end of his penultimate year, provided that in that year he takes the regular full course in Theology.

The Countess de Catanzaro Exhibition — \$100. The income from a fund of \$2,000 to be awarded by the Faculty to a Divinity student during his second year in college. The award will be made on the basis of character and need.

The McCawley Hebrew Prize — \$25. Open to all members of the University who are below the standing of M.A.

This prize is given out of the interest of a Trust Fund, the gift of the Reverend George McCawley, D.D., in the hands of the Society for the Propagation of the Gospel in Foreign Parts.

This prize will be awarded to the student who leads the class in Hebrew 2 and receives a recommendation from the professor of Hebrew.

Junior McCawley Hebrew Prize — \$25. With the accumulated unexpended income from the McCawley Hebrew Prize a fund has been set up establishing a second prize, to be awarded to the student standing highest in first year Hebrew.

Archdeacon Forsyth Prize — \$50. The Ven. Archdeacon D. Forsyth, D.C.L., of Chatham, N.B. who died in 1933, left to King's College \$1,000 to provide an annual prize or scholarship, to be awarded to a Divinity student for proficiency in the study and knowledge of the original Greek Scripture. To be awarded on the combined results of Greek Testament 1 and 2.

Shatford Pastoral Theology Prize — \$40. Established by an anonymous donor, in memory of the late Rev. Canon Allan P. Shatford, C.B.E., D.C.L. Awarded annually for Pastoral Theology. The winner must receive a recommendation from the Professor of Pastoralia.

Laurie Memorial Scholarship. One or more scholarships of about \$250 each, founded in

memory of Lieut.-Gen. Laurie, C.B., D.C.L., open to candidates for the Ministry, under the direction of the Trustees. Particulars may be had from the Registrar.

The Wiswell Trust Divinity Studentship — \$120. A. B. Wiswell, D.C.L., Hon. Fell. (Vind.) of Halifax, N.S., in order to perpetuate the memory of the Wiswell Family, augmented a bequest from members of the family, thus providing a capital sum of \$2,500, the income of which is to assist Divinity students at King's College, who were born in Nova Scotia and who propose entering the ministry of the Anglican Church in Canada.

Prince Prize in Apologetics — \$60. Established by a bequest of the late Dr. S. H. Prince. Awarded every alternate year, at the discretion of the Faculty. (Next award 1971-72).

Wiswell Missionary Bursary — \$200. Founded by Dr. A. B. Wiswell for help to a Divinity student who believes he has a call to the Mission Field either Overseas or in the Canadian West.

Preference will be given to a student who has given promise of the needed qualities and has taken his degree or is within a year of completing his Arts Course. If there is no student meeting the above requirements the award will be left to the discretion of the Divinity Faculty.

Clara E. Hyson Prize — \$5.00. Founded by Miss Clara E. Hyson and awarded each year on vote of the Faculty.

A. Stanley Walker Bursary — \$200. Awarded by the Alexandra Society of King's College. To be given annually to a Divinity student.

Johnson Family Memorial Bursary — \$60. Founded by the Misses Helen and Marguerite Johnson in memory of their parents, this bursary is to be awarded annually at the discretion of the President and Divinity Faculty to the Divinity student considered most worthy on grounds not only of scholarship, but also, of financial need and of devotion to his vocation. Preference will be given to a student from the parish of St. Mark's, Halifax.

Divinity Grants. Grants to aid students in Divinity who require assistance are made by the Bishop of Nova Scotia, and by the Archbishop of Fredericton. The holders of these must fulfill such conditions as the Bishops lay down and in every case attend a personal interview. For further particulars apply to the Dean of Divinity.

The King's Divinity Scholarship — \$150. The Anglican Church Women in the Diocese of

Nova Scotia makes an annual grant of \$150 towards the expenses of Divinity students who agree to work in the Diocese of Nova Scotia after ordination.

Archbishop Kingston Memorial — \$100. Awarded annually by the Nova Scotia Diocesan A.C.W. on recommendation of the Divinity Faculty, to a needy divinity student.

The Wallace Greek Testament Prize — \$50. A Book Prize established by the late Canon C. H. Wallace of Bristol, England, in memory of his father, Charles Hill Wallace, barrister, of Lincoln's Inn, who graduated at King's College in 1823, and died in England in 1845. Subject: Epistle to the Hebrews. Application to be made to the Registrar by March 1st.

Agnes W. Randall Bursary. Two bursaries of \$8.00 each will be given each year to the students in Theology who show the greatest diligence in their studies. An award will not be made twice to the same student.

Bennett-Cliff Memorial Prize. A prize of \$10.00 each year. Award to be at the discretion of the President.

Kenelm Eaton Memorial Scholarship — \$60. This scholarship is provided by the Synod of Nova Scotia as a memorial to The Hon. Captain Kenelm Edwin Eaton, B.Sc., L.Th., who made the supreme sacrifice while serving as a Chaplain in Italy, August 31, 1944. For particulars apply to Registrar.

Dr. C. Pennyman Worsley Prize — \$100. A memorial to the late Dr. Worsley. To be used in alternate years for a prize in Church History. Next award 1971-72.

Fenwick Vroom Exhibition — \$40. To be awarded to a Divinity Student at the discretion of the Faculty.

The Church Boy's League Bursary Fund. Students eligible for assistance from this Fund are those who have, at one time, been full-pledged members of any Parochial C.B.L. branch in Canada. Particulars are available from the Registrar.

The Reverend Canon R. A. Hiltz Memorial Bursaries. To be awarded to present or former members of the A.Y.P.A. who are in full course of Theology and in need of financial assistance.

Bursaries up to a total of \$300 each year.

Archbishop Owen Memorial Scholarships. A number of scholarships of \$300 each are awarded each year by the General Synod Committee concerned to students in their final

year in Theology, who are ready to take up missionary work, either in Canada or overseas. Academic standing and financial need are taken into account in making the award.

Application should be made to the Dean of Divinity by November 1st of each year.

The Florence Hickson Forrester Memorial Prize — \$100. The prize, presented in memory of the late Mrs. Forrester, by her husband, is to be awarded on Encaenia Day to the Divinity Student in his penultimate or final year who passes the best examination on the exegesis of the Greek text of St. Matthew, Chapter V-VII provided always that the standard is sufficiently high.

Bibliography:

T. W. Manson: *The Sayings of Jesus*, (SCM)
J. Jeremias, *The Sermon of the Mount*, (Athlone Press)

F. W. Beare: *The Earliest Records of Jesus*, (Blackwell) pp. 52-69 and 95-98.

H. K. MacArthur: *Understanding the Sermon on the Mount* (Epworth).

The Bullock Bursary — \$225. Established by C. A. B. Bullock of Halifax for the purpose of defraying the cost of maintenance and education of divinity students enrolled at King's College who were, before being enrolled, residents of Halifax, and members of a Parish Church there, and who are unable to pay the cost of such maintenance and education.

The Harris Brothers Memorial — \$100. To be awarded at the beginning of each college year as a bursary to a student of Divinity at the University of King's College. The student shall be selected annually by the Divinity Faculty, preference being given to a needy student from Prince Edward Island, failing that, a needy student from the Parish of Parrsboro, and failing that, to any deserving student of Divinity at the said University.

The Carter Bursaries — \$160. Two bursaries of a value of \$160 each, established under the will of Beatrice B. Carter of Amherst, Nova Scotia, to be used to assist young men studying for the Ministry.

Royal Canadian Air Force Protestant Chapel Bursary — \$120. This Bursary, established in 1959 by endowment from collections taken in R.C.A.F. chapels, is awarded annually at the direction of the Divinity Faculty to a bona fide onlinand, preference where possible being given to (a) ex-R.C.A.F. personnel, (b) children of R.C.A.F. or ex-R.C.A.F. personnel.

The Ott Reading Prize — \$25. Established by Dr. T. Gordon Ott. Awarded annually to a

student of Divinity for the best reading of the Bible and the Services of the Church.

The Ott Preaching Prize — \$25. Established by Dr. T. Gordon Ott. Awarded annually to a student of Divinity for the best extempore sermon of an expository nature.

William A. and Kathleen Hubley Memorial Bursary — \$175. This bursary is designed to assist students from St. Mark's Parish, Halifax, and failing a suitable candidate then from any parish in the Diocese of Nova Scotia, who are studying for the Sacred Ministry at any recognized College in the Anglican Communion, preference being given to students studying at the University of King's College. The award is made on the basis of need and may be renewed provided a certain acceptable standard is attained. The recommendations of the Rector of St. Mark's and the Dean and Divinity Faculty are necessary conditions. The bursary must be applied for annually.

The Reverend Dr. W. E. Jefferson Memorial Bursary — \$100. This bursary, the gift of the Parish of Granville, N.S., is established in memory of Reverend W. E. Jefferson, D.Eng., an alumnus of King's and a graduate engineer, who was ordained late in life and yet was able to give nearly twenty years of devoted service to the ordained ministry. Preference will be given to older men pursuing post-graduate studies or to older men preparing for ordination. The award is to be made by the Dean and Divinity Faculty.

The Reverend James R. McMahon Memorial Bursary. A bursary of \$100.00 each year will be granted by an anonymous friend to the Divinity Student who best personifies the qualities of the late Reverend James R. McMahon, alumnus and former Registrar. Financial need will be taken into consideration, as well as kindness, understanding and the readiness to give a helping hand.

The Archdeacon Harrison Memorial Bursary — \$20. Established by Miss Elaine Harrison in memory of her father. To be awarded to a deserving and needy Divinity student, at the discretion of the Faculty.

St. Paul's Garrison Chapel Memorial Prize — \$20. To be awarded to the Divinity student chosen by the Faculty to attend a Christmas Conference.

The Clarke Exhibition. An endowment was established by the late Reverend Canon W. J. Clarke of Kingston, New Brunswick, the first charge upon which shall be the provision of copies of "The Imitation of Christ" to members of each year's graduating Class in Divinity. The

balance of the income each year is to be awarded by decision of the Divinity Faculty to a deserving Divinity Student for the coming year.

Loan Funds

Edith Mabel Mason Memorial Students Loan Fund. Established by Alumni and friends as a memorial to the late Miss Edith Mabel Mason, M.A., a former Dean of Women and Professor of Modern Languages. Available to women students entering upon their third or fourth year. Application to be made in writing to the Registrar.



Dramatics

Canada Student Loans

1. All Canadian students and landed immigrants who have resided in Canada for at least 12 months are eligible to be considered for Canada Student Loans which, in most provinces, are administered in conjunction with provincial bursary plans.

2. Students should apply as early as possible by requesting application forms from the provincial authority in order to have the money available for registration.

Student Organizations

The University of King's College Students' Union

The University of King's College Students' Union is the organization in which the students enjoy their right of self government. The constitution, revised in 1964, provides for a democratic government in which the participation of every student is expected. The students endeavour to play a determining role in every aspect of university life. The Union's main organs are the Student Assembly, the Executive of the Students' Union, the Students' Council. The power of self discipline is exercised through the Union's Male and Female Residence Councils and the Campus Police.

The Union operates through a number of permanent committees, e.g: the Academic Committee, the Social Committee, the Saturday Dance Committee; committees on the constitution, elections, finances, Dalhousie relations, awards, etc.

The King's College Amateur Athletic Association

The object of this association is the promotion of amateur sports of all kinds. The K.C.A.A.A. is affiliated with the Maritime Intercollegiate Athletic Union and is governed according to the rules of that association. The K.C.A.A.A. enters teams in several intercollegiate competitions including soccer, basketball, curling, and tennis. There are also interbay competitions in softball, hockey, volleyball, badminton, ping-pong, and basketball.

King's College Girls' Amateur Athletic Association

The object of this organization is the promotion of amateur sports of all kinds. The K.C.G.A.A.A. is affiliated with the Maritime Provinces Amateur Athletic Association, and is governed according to the rules of that association. The K.C.G.A.A.A. sponsors intercollegiate teams in basketball, and volleyball, and in addition organizes and arranges co-ed badminton and volleyball matches in the King's College Gymnasium.

King's College Dramatic and Choral Society

This society was founded in 1931 to further interest in dramatic and choral work. The society presents an evening of one-act plays during the first term, and a three-act play. In

addition, the society sponsors an inter-bay play evening and enters a play in the Connolly Shield Competition.

The Dalhousie Drama Workshop, a branch of the Department of English, offers training in voice production, acting, dance, movement, make-up, costume, set design and construction, and lighting under the direction of experienced instructors. King's students are invited to participate in the activities and productions of the Workshop on the same basis as Dalhousie students.

The King's College Record

The Record (founded 1878) is published by the undergraduates of the College during the academic year. It contains a summation of the year's activities and awards.

The Quintilian Debating Society

This Society was founded in 1845. Quintilian sponsors interbay debates in competition for the Alumni Association (Halifax Branch) Interbay Debating Award. In addition further campus debates are seen in competition for the Rev. Canon A. E. Andrew Memorial Award for Block Debating. During the Easter weekend of each year a High School competition is coordinated by the Society, the Quintilian Exhibition Shield being awarded to the successful school in the Metro area (the Shield having been given by the Alumni Association, Saint John Branch). Annual tours of Upper Canadian Colleges and Universities complete the Society's wide range of academic activities.

The Haliburton

The Haliburton was founded and incorporated by Act of Legislature in 1884, and is the oldest literary society on a college campus in North America. Its object is the cultivation of a Canadian Literature and the collecting of Canadian books, manuscripts, as well as books bearing on Canadian History and Literature. College students and interested residents of the City of Halifax meet to listen to papers which are given by literary figures and by the students.

The Ancient Commoner

The "Ancient Commoner" is the students newspaper.

The Students' Missionary Society

This society was founded in 1890. Its object is to promote interest in missionary work and to further the missionary work of the Church, especially in the Maritime Provinces. The annual meeting is held on Saint Andrew's Day, or as near to it as possible. Through the efforts of this organization, divinity students are provided with summer charges and foreign students have been afforded the opportunity of studying Theology at King's. The society at present holds a special status in the Theological Community of King's.

The King's College Theological Community

The Theological Community is the Divinity and pre-Divinity student body of King's. The community is the co-ordinating body of all student activities in the Divinity School. It also provides a means of fellowship for Divinity and pre-Divinity students at King's. The community holds regular business meetings including special lecture series which are open to all students at King's. Other activities include the delegating of members to national conferences and the participating in ecumenical discussions with other divinity schools of the Atlantic Region.

Awards

The Student Bodies of the University of King's College combine to award an overall "K" to participants in King's activities. Under this system, begun during the 1956-1957 term, a student may receive a silver "K" upon amassing 160 points and a gold "K" upon amassing 250 points.

In addition several awards are presented to students for outstanding achievements in extra-curricular activities.

Bob Walter Award. Awarded to the graduating male student who best exemplifies the qualities of manhood, gentlemanliness, and learning, and has contributed to the life at King's.

Warrena Power Award. Awarded annually to the graduating female student who best exemplifies the qualities of womanhood, gentleness, and learning, and has contributed to the life at King's.

The R. L. Nixon Award. This award is given annually to the resident male student who, in the opinion of his fellows, contributes most to residence life in King's.

The Prince Prize. This prize is designed for the encouragement of effective public speaking. The recipient is chosen by adjudicators in an annual competition.

The H. L. Puxley Award. Awarded annually to the best all-round woman athlete.

The Bissett Award. This award is given annually to the best all-round male athlete.

The Arthur L. Chase Memorial Trophy. This is presented annually to the student who has contributed most to debating in the College.

Societies Connected With The College

Alumni Association of King's College

This Association, incorporated in 1847 by Act of the Legislature, consists of graduates and others whose object is the furtherance of the welfare of the University.

The Association maintains annual scholarships.

The annual meeting of the Association is held the day before Encaenia.

The Officers of the Association in 1971-72.

President,
The Rev. Emery G. Harris, 21 Lynn Drive, Dartmouth, N.S.

Vice-President,
Mr. Carmon W. Stone, 6071 Shirley St., Halifax, N.S.

Treasurer,
Dr. Henry Muggah, Q.C., 6033 Belmont Road, Halifax, N.S.

Executive Secretary,
Mrs. J. Desrosiers, University of King's College, Halifax, N.S.

The Alexandra Society of King's College

This Society, which has branches all over the Maritime Provinces, was formed in Halifax in 1902 as the Women's Auxiliary to the College. It maintains an annual scholarship and bursary and supports the Alexandra Special Lecturer in Pastoralia (Director of Parish field Work).

Officers 1971-72

Patroness,
Mrs. A. H. O'Neil.

Hon. Life Member,
H. R. H. Princess Alice.

Hon. Life President,
Mrs. G. M. Ambrose.

Hon. Vice-Presidents
Mrs. W. W. Davis
Mrs. G. F. Arnold.

Immediate Past President,
Mrs. A. G. MacIntosh, 48 Beechwood Drive, Truro, N.S.

President,
Miss Miriam Morris, 2438 Brunswick St., Halifax, N.S.

Vice-Presidents,
Mrs. A. MacKeigan, 68 Reserve St., Glace Bay, N.S.

Mrs. P. N. McIvor, 8 Lakeview Point, Dartmouth, N.S.

Mrs. J. E. Lane, 91 Hazelholme Drive, Halifax, N.S.

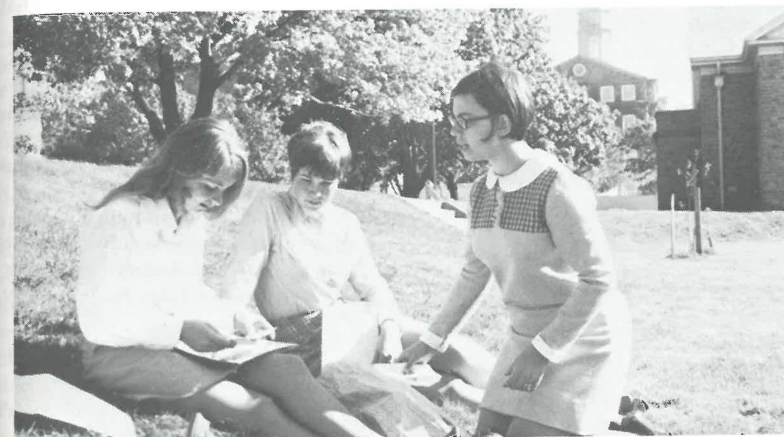
Mrs. C. A. Orford, 86 Kent St. Charlottetown, P.E.I.

Mrs. E. R. McCordick, 72 Church St., Saint John West, N.B.

Recording Secretary,
Mrs. H. B. Wainwright, 3077 George Dauphinee Ave., Halifax, N.S.

Corresponding Secretary,
Mrs. D. L. Walker, 92 Crichton Ave., Dartmouth, N.S.

Treasurer,
Mrs. W. F. Palmer, 1652 Chestnut St., Halifax, N.S.



*Conferred during the session

**In absentia

Degrees Conferred

Doctor of Civil Law (*honoris causa*)
Robert Hartshorne Morris

Doctor of Divinity (*honoris causa*)
Arthur Edward Lampay Caulfeild

Bachelor of Sacred Letters

Howe, The Reverend Bruce Herbert Warren,
Halifax, N.S.

Bachelor of Sacred Theology

Arnold, The Reverend Donald Feversham,
Halifax, N.S.

Bachelor of Arts

*Adams, Joanne Louise, Whitefield, New
Hampshire, U.S.A.

Andrew, Victoria, Ottawa, Ont.

Archibald, Bruce Parkinson (First Class
Honours in Sociology and Political Science),
Bedford, N.S.

Arnold, Donald Feversham, Halifax, N.S.

Bevans, Linda Jean, Halifax, N.S.

Blake, Carol Ann, Halifax, N.S.

Burgoyne, Jane Elinor, Mahone Bay, N.S.

Campbell, Lawrence Wayne, Hammonds
Plains, N.S.

**Christian, Heather Alma, Timberlea, N.S.

Clemo, Cyril Edwin, Halifax, N.S.

*Conrad, Borden Loraine, Eagle Head, N.S.

*Cornish, James Christopher (Honours in
Economics and Political Science), Halifax,
N.S.

Deakin, Ian Edward, Dartmouth, N.S.

*Domenie, Thomas James, Halifax, N.S.

*Donovaro, Edward Daniel Cogger, Revere,
Mass., U.S.A.

Dorey, Anne Louise, Hubbards, N.S.

Elliott, Kenneth Patrick, Pugwash, N.S.

Evans, Joan Diane, Halifax, N.S.

Fiske, Linda Margaret, Birch Cove, N.S.

French, Joan Marion Clara, Halifax, N.S.

*Glazier, Prentiss Cummings, Wilton, Conn.,
U.S.A.

Godfrey, Sylvelin Joy, Hantsport, N.S.

*Hamilton, James Brian, Halifax, N.S.

*Hatcher, John Keith, New Haven, N.S.

Haughn, Susan Rosemary, Halifax, N.S.

Hayter, William Alton, Sydney, N.S.

Heffler, Cheryl Ruth (Coates), Bedford, N.S.

*Howe, Donna Margaret (Clare), Halifax, N.S.

*McLean, Lina Katherine Margaret, Calgary,
Alberta

*Marks, Barbara Frances, Dartmouth, N.S.

Parsons, Elizabeth Margaret Joan, Tangier,
N.S.

Pratt, Kathleen Agnes, St. John's, Nfld.
Ring, Nancy Ellen (Brimicombe), Dart-
mouth, N.S.

*Robart, Gregory Dale, Halifax, N.S.

Rowan, Margaret Jean, Dartmouth, N.S.

*Shupe, Frances Elizabeth, Bedford, N.S.

**Smiley, Gregory Ronald, Toronto, Ont.

Smith, Terrance Garnet, Pugwash, N.S.

Taylor, Glenn Edward, Willowdale, Ont.

Taylor, Margaret Louise (Sherman), Windsor,
N.S.

Teasdale, Patricia Ann, Dartmouth, N.S.

**Thomson, Allan Richard, Sydney, N.S.

*Wainwright, Evelyn Lorraine (Arnold),
Sydney, N.S.

Wainwright, John Wesley, Sydney, N.S.

Bachelor of Science

**Colavecchia, Robert Gene, St. Catharines,
Ont.

*Dillon, James Fraser, Glace Bay, N.S.

Edwards, Robert Henry, Halifax, N.S.

Ellis, Peter Knox, Hamilton, Bermuda

*Francis, Michael MacDonald, Glace Bay, N.S.

Hudston, Ranulph Michael, Saint John, N.B.

Lewis, Margo Louise, Louisbourg, N.S.

**MacFarlane, John Malcom, Victoria, B.C.

Matchett, Brian William, Newcastle, N.B.

Sherwood, Ralph Andrew, Norton, N.B.

Wenaus, Douglas John, Dartmouth, N.S.

Class Life Officers -- 1970

Honorary Life President,

The Reverend Canon J. H. Graven.

Honorary Life Member,

Mrs. Helen Crawford.

Life President,

Bruce Parkinson Archibald.

Life Vice-President,

Anne Louise Dorey.

Life Secretary,

Patricia Ann Teasdale.

Life Treasurer,

Ian Edward Deakin.

Encaenia Awards

Arts and Science

The Governor General's Medal, Bruce Arch-
ibald.

April Fund Scholarship, Madeline Schnare.

President's Scholarship (Third year), Donald
Banks.

President's Scholarship (Second year), Susan
Ross.

President's Scholarship (First year), Robert
Anthony.

Alexandra Society Scholarship, Madeline
Schnare.

Stevenson Scholarship, Kenneth Tutty.

Lawson Prize, Rebecca Strople.

Dr. M. A. B. Smith Prize, Keith Hamlin.

Bishop Binney Prize, Keith Hamlin.

Beatrice E. Fry Memorial Prize, Sharon Munro.

Zaidee Horsfall Prize in Mathematics, Robert
Anthony.

Almon-Welsford Testimonial Prize, David
Seegmiller.

McCawley Classical Prize, Keith Hamlin.

Binney Bursary, Robert Anthony.

Charles Cogswell Bursary, Irene Taylor.

Harry Crawford Memorial Prize, Irene Taylor.

Jackson Bursary, Robert Anthony.

Divinity

The Canon W. S. H. Morris Scholarship, The
Rev. Bruce Herbert Warren Howe.

The William Cogswell Entrance Scholarship (B),
Kenneth John Wissler.

The George Sherman Richards Proficiency
Prize, Kenneth John Wissler.

The McCawley Senior Hebrew Prize, The Rev.
Bruce Herbert Warren Howe.

The McCawley Junior Hebrew Prize, Malcolm
Garth Maxwell.

The Archdeacon Forsyth Prize, Kenneth John
Wissler.

The Shatford Pastoral Theology Prize, James
Theodore Irvine.

The Prince Prize in Apologetics, Brenda Jean
Pierce, Don Robert Shipton.

The Kenelm Eaton Memorial Scholarship,
Robert David Price.

The Dr. C. Pennyman Worsley Prize, Robert
David Price.

The Florence Hickson Forrester Memorial
Prize, Kenneth John Wissler.

The Ott Reading Prize, Kenneth John Wissler.

The Ott Preaching Prize, The Rev. Bruce
Herbert Warren Howe.

The Canadian Bible Society Book for the
Reading of Holy Scripture, Stuart Wayne Allan.

The George M. Ambrose Proficiency Prize,
Malcolm Garth Maxwell

Susanna Almon Scholarship
Carol-Ann Elizabeth Hutchinson

Alumni Living Endowment Scholarship

John Vincent D'Orsay,
Cathy Bernice Meisner.

King's Foundation Scholarship

Berton Alexander Balcom.

Halifax-Dartmouth Entrance Scholarship

Susan Jane Edwards,
Susan Rae Goodwin,
Stephen William Hall,
Susan Elizabeth Harris,
Mary Susanna Alicia Semenick,
Dorothy Ann Tozer,
Susan Elaine Wagner
Susan Dawn White.

Nova Scotia Light & Power Scholarship

Roderick Noel Mitchell.

Alumni Scholarship

Patricia Kathleen Lewis.

Winfield Memorial Scholarship

Carol Anne Brown.

Walter Lawson Muir Bursary

Martha Louise Mowbray Elliott.

Keating Trust Scholarship

Pamela Lourene Boehk,
Carol Anne Brown.

Naval Bursary

Barbara Louise Hodgson.

Deihl Bursary

Roderick Scott MacLean,
David Charles Nauss.

University Bursary

Carolyn Jean Campbell,
Ann Marie Drohan,
Martha Louise Mowbray Elliott,
Stephen William Hall,
Geraldine Anne Lathigee,
Marilyn Louise Catherine Webster.

NOTE

The following pages contain information about the programmes of study leading to the Degrees of Bachelor of Arts and Bachelor of Science and are reprinted, with permission, from the Calendar of Dalhousie University. Students enrolled at King's in Arts and Science are admitted to the same programmes and classes as students enrolled at Dalhousie University (see p. 12). The sections dealing with programmes leading to other degrees (such as Bachelor of Commerce, Bachelor of Education, Engineering, etc.) are also included for information, but only students enrolled at Dalhousie University may enter these other degree programmes.

- Bachelor of Arts
- Bachelor of Science
- Bachelor of Commerce
- Bachelor of Education
- Uniform Bachelor of Science for Engineering
- Bachelor of Science in Engineering Physics
- Bachelor of Music Education
- Diploma in Education
- Architecture
- Certificate in Public Administration

tion 401, 402; Commerce 101, 102; Religious Studies 100. Properly qualified students may take certain classes in Oceanography as electives having obtained the permission of the Director of the Institute.

Classes within the groups may also be taken as electives.

45.1 / Subject Grouping for Degree Courses

In the curriculum, subjects offered as essential parts of the degree programmes are grouped as follows:

A Languages	B Humanities
French	Classics
German	Comparative Literature
Greek	English
Hebrew	History
Latin	Philosophy
Russian	Music
Spanish	Theatre
C Social Sciences	D. Sciences
Economics	Biochemistry
Political Science	Biology
Psychology	Chemistry
Sociology	Geology
	Mathematics
	Physics

Specific regulations indicate the minimum number of classes which must be selected from each group. Classes are offered also in other subjects, which may be taken as electives where no particular group is specified in the requirements. These subjects are: Art History; Educa-

45.2 / Numbering of Classes

Classes are numbered in order to indicate their general level and to suggest the year of study in which they might first be taken. Classes in the 100 + series are introductory and can usually be taken by fully matriculated students without any special prerequisites. Completion of a 100-level class is normally a prerequisite for admission to further classes in the subject. Classes numbered in the 200 + series are second level (second year) classes, 300 + third level and 400 + fourth level. Classes numbered in the 500 + and 600 + series are normally regarded as graduate classes; however, some may be open to senior undergraduates. Classes numbered in the 250 +, 350 + and 450 + series are open only to honours students and may not be taken by students in the general degree programmes, except with special permission.

The letters A, B and C suffixed to a three-digit class number indicate a half-credit class, i.e., a class having one-half the value of a full class in determining the standing of students. The letters indicate the terms during which the classes are offered, as follows:

A: First term only, final examination before Christmas vacation.

B: Second term only, final examination after close of lectures in Spring.

A/B: Given in the first term, examination before Christmas vacation; repeated in the second term, examination in Spring.

C: Spread over both terms, final examination in the Spring.

Points for half-credit classes will be awarded amounting to one-half the value for a full class of equivalent standing.

Classes with numbers below 100 do not carry credits but may be prerequisites for entry to

credit classes for students whose matriculation backgrounds are deficient.

45.3 / Experimental Classes

1. Experimental classes, on any subject or combination of subjects to which the arts and 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 of faculty members.

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

3. 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.

4. The classes may be of one-year length or half-year length.

5. 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, and in the case of one half-year classes when a class in the other one-half year is available.

6. 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 Programme; if they are formed later, they shall be announced (a) in the Dalhousie Gazette, (b) in the Newsletter, (c) on a central bulletin board set aside for this purpose.

7. One faculty member taking part in each experimental class shall be designated the *rappporteur* of the class. It shall be his responsibility (1) to advise the Curriculum Committee of the formation and content of the class; (2) to obtain 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; (3) to report to the Registrar on the performance of students in the class; and (4) to report 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).

8. A student 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.

46 / Degree Programmes

46.1 / General Bachelor of Arts

The General Bachelor of Arts degree requires fifteen classes.

1. First-year Requirements (common to general and honours courses)

Every full-time student planning to take a B.A. degree will in his first year take five classes as follows: one class from each of three of the Groups A, B, C, D, together with sufficient classes chosen from these groups to make a total of five.

2. Requirements for the Second and Third Years

The ten classes making up the course for the second and third years shall consist of:

(a) Six classes beyond the 100 level in two subjects, one of which must be declared by the student as his major area of concentration and

the other as his minor. (The designation of a *major* is intended to bring students into closer contact with the department concerned and with one another, and to assist departments in giving such students guidance in designing their programmes.)

(b) Four classes, normally in subjects other than the two offered to satisfy requirement 2(a) above, at least one of the four to be beyond the 100 level in the subject treated. The subjects may be chosen from Groups A, B, C, D, or from Art History; Education 401, 402; Commerce 101, 102; Religious Studies 100. (Students who wish to offer, under section 2(a) above, a subject begun only in the second year may, by exception, offer the introductory class in that subject as one of the four classes required in section 2(b).

Students making progress in a language begun for the first time at the University are strongly advised to take a second class in the same

language in order to consolidate what they have learned.

For details of classes in the various departments see section 47 / Programmes of Study.

An honours class may be taken by students who are not in an honours course, if approved by the department.

All students contemplating entry to the teaching profession after graduation are required to consult the Chairman of the Education Department, before registration, concerning their programme of study. Students contemplating music education should similarly consult the Chairman of the Department of Music.

For honours courses see section 47 / Programmes of Study where each department gives the contents of its honours programmes.

46.2 / General Bachelor of Science

1. First Year Requirements (common to general and honours courses)

Every full-time student planning to take a B.Sc. degree will in his first year take five classes as follows: one class from each of three of the Groups A, B, C, D, together with sufficient classes chosen from these groups to make a total of five.

2. Requirements for the Second and Third Years

The ten classes making up the course for the second and third years shall consist of:

(a) six classes beyond the 100 level in two subjects chosen from biology, chemistry, engineering, geology, mathematics, physics, psychology;

(b) four classes normally in subjects other than the two offered to satisfy requirement 2(a) above, at least one of the four to be beyond the 100 level in the subject treated. The subjects may be chosen from Groups A, B, C, D, or from Art History; Education 401, 402; Commerce 101, 102; Religious Studies 100. (Students who wish to offer, under section 2(a) above, a subject begun only in the second year may by exception, offer the introductory class in that subject as one of the four classes required in section 2(b).

For honours courses see section 47 / Programmes of Study where each department gives the contents of its honours programmes.

46.3 / Honours Courses

Students of ability and ambition are urged to take a course leading to the bachelor's degree with honours. These courses entail (a) a number

of advanced classes, (b) a higher quality of work than that required for the general bachelor's degree, and (c) a four-year programme from Senior Matriculation. There are two types of honours courses: concentrated, involving a *major* concentration in a single discipline or a *combined* concentration in two related disciplines; and unconcentrated, involving breadth of study in several related disciplines. It will be observed that in all cases the honours programmes satisfy the requirements for the general degree so that a student may transfer from the honours to the general programme without serious inconvenience. *Students considering an honours course are advised to consult as soon as possible — preferably before their first registration — with the departments in which they may wish to do their advanced work.*

The following are general rules relating to honours courses:

1. Twenty classes are needed for the B.A., B.Sc. or B.Com. degree with honours.

2. At the end of a concentrated honours course, a student must pass a comprehensive examination covering his honours work and he must attain an average of not less than B— in the classes in the two disciplines in which he has concentrated; attainment of an average of at least A— in this examination and these classes is required to obtain *First-Class Honours*.

3. At the end of an unconcentrated honours course, a student must obtain a grade of B— or higher on an honours essay or a comprehensive examination regarding his honours work. In addition, he must attain an average of B— in the required advanced classes which comprise his honours programme. Achievement of an average of at least A— on the honours essay or examination and in the required advanced classes is required to obtain *First-Class Honours*.

4. Honours students in a concentrated programme must be accepted by the major department concerned, which will supervise their whole programme of study. Concentrated honours programmes are set out in section 47 / of the Calendar headed *Programmes of Study*. Honours students in an unconcentrated programme must be accepted by the Committee on Studies, which will appoint an interdisciplinary advisory committee of two or more Faculty members to supervise the programme of study.

5. Application for admission to an honours course must be made in triplicate on forms that are available from the Registrar's Office. Students desiring to pursue a concentrated programme must submit these forms to the head of the department concerned. Those desiring to

follow an unconcentrated honours course should make application to the Chairman of the Committee on Studies.

46.4 / Honours Programmes

1. The regulations for the first year of study are the same as for the General B.A. or General B.Sc. degree.

2. The *overall requirements* are the same as those for the General B.A. and General B.Sc. degrees respectively.

Concentrated Honours Programmes

(a) Honours in a *major programme* are based on the general requirement that the 15 classes beyond the first year of study comprise:

- (i) nine classes beyond the 100 level in one subject (the major subject);
- (ii) two classes in a minor subject satisfactory to the major department; and
- (iii) four classes not in the major field.

(b) Honours in a *combined programme* are based on the general requirement that the 15 classes beyond the first year of study comprise:

- (i) eleven classes beyond the 100 level in two allied subjects, not more than seven classes being in either of them;
- (ii) four classes in subjects other than the two offered to satisfy requirement 3(b)(i) above.

Details of specific departmental honours programmes will be found under departmental listings of *section 47 / Programmes of Study*. It may be noted that there are occasional minor departures in detail from the general regulations given above; these programmes have been given specific approval by the Faculty of Arts and Science.

Unconcentrated Honours Programmes

(a) Honours in the unconcentrated programmes are based on the general requirement that the fifteen classes beyond the first year of study comprise:

- (i) twelve classes beyond the 100 level in three or more subjects. No more than five of these may be in a single subject; no less than six and no more than nine may be in two subjects.
- (ii) three other classes.

(b) Requirements for an Unconcentrated B.A. (Honours)

At least ten classes of the twenty required must be selected from Groups A, B, and C. (*see 45.1*)

(c) Requirements for an Unconcentrated B.Sc. (Honours).

At least eight classes of the twenty required must be selected from biology, chemistry, geology, mathematics, physics and psychology, and at least six additional classes must be selected from groups C and D.

5. The regulations pertaining to the honours programme leading to the Bachelor of Commerce degree may be found in *section 47.6* of the Calendar of the Faculty of Arts and Science.

46.5 / Bachelor of Commerce

Courses are offered leading to a General and to an Honours Bachelor of Commerce degree.

For 1970 and subsequent years new students will enter a revised programme which may permit some concentration in one of several fields of business studies. Students planning to follow a concentration programme should consult the Department of Commerce prior to registration.

1. The Institute of Chartered Accountants in most provinces in Canada offers exemptions to graduates in commerce of Dalhousie who are candidates for the Diploma in Chartered Accountancy.

2. The Society of Industrial and Cost Accountants offers exemptions to graduates in commerce of Dalhousie who are candidates for the Diploma in Registered Industrial Accountancy.

Details of the curriculum for the General and for the Honours degree course are given under *Commerce in section 47.6 / Programmes of Study*.

46.6 / Bachelor of Education

There are two courses which lead to the degree of Bachelor of Education:

1. a four-year integrated course in which classes in education are taken concurrently with classes in arts and science; two degrees are awarded on the completion of this course, the B.Ed. and the B.A. or B.Sc.;

2. a one-year sequential course in which classes in education are taken only after completion of all classes in arts and science. Candidates for admission to this course must have received the degree of B.A., B.Sc. or B.Com. from a college or university recognized by the Senate for the purpose.

By arrangement with the Nova Scotia Department of Education, students completing either of these courses in education may receive a

Teacher's Certificate (Class 5). Both B.Ed. courses are divided into two types, Elementary and Secondary.

Diploma In Education

Award of the Diploma in Education for the Integrated (Elementary) course will be discontinued following the Spring Convocation 1973.

46.7 / Uniform Bachelor of Science for Engineering

The work of the Uniform Bachelor of Science for Engineering covers three years. Students who complete the course successfully receive a General Bachelor of Science degree from Dalhousie and qualify for admission to the junior year of the Nova Scotia Technical College. Students who plan to continue their studies at a college other than the Nova Scotia Technical College should consult the department before they first register.

Details of the curriculum for the course are given under *Engineering in section 47.10 / Programmes of Study*.

46.8 / Bachelor of Science in Engineering Physics

This is a special four-year course designed to give students more training in physics and mathematics than is usual in the ordinary engineering course. Students are also given the opportunity to specialize in such fields as electronic systems engineering, semiconductor engineering, communications and underwater acoustics. Completion of the course is excellent preparation for graduate work in physics, engineering or earth sciences.

Details of the curriculum for the course are given under *Engineering in section 47.10 / Programmes of Study*.

46.9 / Bachelor of Music Education

This is a special four-year course. By arrangement with the Nova Scotia Department of Education, students completing the course are awarded a Teacher's Certificate (Class 5).

Details of the curriculum and requirements for admission to the course are given under *Music in section 47.17 / Programmes of Study*.

46.10 / Architecture

Qualification for entrance to the School of Architecture at the Nova Scotia Technical College is the satisfactory completion of at least two years at any university or equivalent institution of recognized standing. A university course in mathematics is prerequisite, except that the applicant may instead be required to take a written examination in this subject.

Providing it has been undertaken at a recognized university, virtually any course of studies, including arts, fine arts, engineering and other technologies, science, agriculture, social sciences, education, medicine, is acceptable.

A candidate for admission to the first year in architecture should submit to the Registrar of the Nova Scotia Technical College by July 2, the following documents; a) an application form obtained from the Registrar, NSTC; b) an official transcript of his university record; c) a letter of recommendation from some person of academic rank with close personal knowledge of his academic background.

46.11 / Certificate in Public Administration

A programme leading to the Certificate of Public Administration is available to persons who meet the admission requirements of Dalhousie University and who neither hold a first degree nor are enrolled in a programme leading to a first degree. Those not meeting the formal admission requirements may apply for admission under the *section 42.1 / Special Cases* provision. The Department of Political Science will review applications for admission under this provision and make recommendations thereon.

Prerequisite Requirement

Standing in Political Science 100 or its equivalent.

Programme Requirements

1. Government of Canada (Political Science 202);
2. a class in economics
3. Public Administration (Political Science 311);
- 4 and 5. two other classes in the social sciences chosen in consultation with the Department.

Normally four of the five classes in the programme must be taken at Dalhousie University. Except for the prerequisite class, credit will normally be given only for classes taken after the student has registered in the programme.

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 award of the Certificate.

The degree programme and the Certificate programme cannot be taken concurrently. A person registered in a degree programme cannot also be registered in a Certificate programme, nor can a Certificate in Public Administration be awarded for work taken as part of a degree programme.

47.1 / Art History

Classes Offered

Art History 101A Survey of the History of Art (Palaeolithic to end of 18th Century), Lecture 2 hours

Art History 101B Survey of the History of Art (19th and 20th Centuries), Lecture 2 hours

A survey of painting, sculpture, architecture and allied arts from the earliest times to the present.

Student having a credit for Art History 101 are eligible to take any of the following classes offered to the Nova Scotia College of Art and Design on various aspects of Art History.

Art History A201A Nineteenth and Twentieth-Century Art I (First term), followed by
Art History A201B Nineteenth and Twentieth-Century Art II (Second term).

This is a class designed to reveal similarities in formalist values between the art of past cultures and the expressions of the nineteenth and twentieth-centuries.
Prerequisite: Art History 101.

Art History A202A Canadian Art (second term).

The development of Canadian art and cultural heritage with special emphasis upon nineteenth and twentieth-century painting.
Prerequisite: Art History 101.

Art History A203A Oriental Art I (first term)

Art of the Orient, pre-Buddhist art of India, China and Japan, the rise of Buddhist art in India and its expansion to China, Japan and Southeast Asia, the rise of national Indian and Indonesian styles.
Prerequisite: Art History 101.

Art History A203B Oriental Art II (second term)

A continuation of Oriental Art I, the development and interrelationships of Chinese and Japanese national styles.

Art History A204A Special Problems (first term)
Art History A204B Special Problems (second term)

An opportunity for the student to investigate an area of special concern. May be repeated, with a different topic, for credit.
Prerequisite: Consent of the instructor.

Art History 305A Art Now (first term)
Art History 305B Art Now (second term)

A seminar class concerned with the examination of recent developments in the fine arts. May be elected one term each year for credit.
Prerequisite: Art History A201B.

47.2 / Biochemistry

Professors
C. W. Helleiner (Head)
L. B. Macpherson
S. J. Patrick
D. W. Russell
S. D. Wainwright

Associate Professor
A. H. Blair

Assistant Professors
F. I. Maclean
C. Mezei
F. B. Palmer
L. C. Stewart
J. A. Verpoorte
M. W. Gray
M. W. Spence

Lecturers
M. S. DeWolfe
E. S. MacFarlane

Biochemistry, the study of the structure and behaviour of the molecules of living things, is a new science: most of what we know has been discovered since 1945, so that even elementary textbooks are changed and added to constantly.

Structure can be investigated in various degrees of detail. Scientists have progressed from study with the naked eye (gross anatomy) to examination of the whole specimen or parts of it with light and, in recent years, electron microscopes (microscopic anatomy). These optical methods led to the discovery of such minute particles that it became necessary to apply methods of chemistry and physics. Thus, the biochemist of today studies the structure of small molecules by the well-known methods of organic chemistry. Study of the larger molecules which are characteristic of living organisms and the measurement of their physical properties requires special methods. Old methods must be expanded and adapted, and new ones evolved, to study even larger molecules — in some cases with the return to the use of the electron microscope.

Biochemists also try to explain, in chemical terms, the behaviour of the living organism — how it becomes what it is and maintains itself. An organism takes its food from the environment and converts it, by the process of metabolism, into its own molecules and larger structures. Biochemists have provided most of our knowledge of this complex and important series of reactions, largely by tracing the sequence of changes in chemicals labelled with radioactive isotopes.

Biochemical genetics (the biochemistry of heredity) is concerned with the mechanism by which a cell specifies the structures not only of its own molecules but also those of its daughter cells. A recent major break-through was the elucidation of the structures of DNA and RNA; this, together with even more recent knowledge of the action of viruses, has resulted in our present understanding of the chemistry underlying heredity.

Biochemists are also concerned with the study of enzymes: most of the chemical reactions in living things would proceed very slowly, or not at all, if these specific catalysts were lacking. Studies now in progress are investigating the properties of enzymes and the ways in which they function in the many, varied types of organic material.

The results of biochemical research are applicable in almost every aspect of life. The biochemist relates the structure of soil and the functioning of its micro-organisms to the needs of agriculture and of animals, and helps to design pesticides and fertilizers, additives and substitutes. The drug, fermentation and food-processing industries, to name but a few, rely heavily on biochemical techniques and knowledge. Much of fundamental biology is best understood in biochemical terms, and problems relating to such apparently remote areas as ecology and psychology are being referred, more and more often, to the biochemist. Medicine turns to biochemistry for explanations of hereditary and metabolic disorders and for an understanding of the actions

of drugs, and is on the threshold of explaining some psychiatric conditions in biochemical terms.

Where are biochemically trained people employed? In Canada, most of them work in universities, in agricultural research, or in government or hospital laboratories; some are employed in industry. Training to the B.Sc. level enables one to work as a technician or research assistant; more-responsible positions usually require a higher degree. Graduates in biochemistry can go on to further training in medicine, pharmacology, physiology, and various other branches of the biological sciences.

The Biochemistry Department is located in the Sir Charles Tupper Medical Building. Although administratively the department is in the Faculty of Medicine, it is also an integral part of the Faculty of Arts and Science; its members take an active part in teaching in both faculties, and most of the research work is as relevant to biology in general as to medicine. The department has exceptionally up-to-date equipment, and almost all current biochemical interests can be handled.

Degree Programmes

The study of biochemistry requires a prior knowledge of elementary biology, mathematics and physics, and a good grounding in organic and physical chemistry. Accordingly, the honours programme in biochemistry is planned in such a way that these subjects are covered in an orderly fashion before students begin the study of biochemistry proper. Students who are not majoring in biochemistry, but who wish to include a class in biochemistry in their programmes, should plan to do so in their third or fourth year. They should ensure that the necessary background is provided in their earlier years. The outline of the honours programmes will serve as a guide in this respect. It should be noted particularly that a class in organic chemistry is a prerequisite for the elementary class in biochemistry, and that one in physical chemistry is strongly recommended.

B.Sc. with Honours in Biochemistry

The honours programme in biochemistry aims to provide the student with the background necessary for graduate work in biochemistry and allied fields. It is also a suitable preparation for the study of medicine or dentistry. Because the chemical content of all branches of biology is rapidly increasing, biochemistry can be recommended as a starting point for a career in many fields of biology.

Three major programmes in biochemistry are outlined below, with minors in biology, physics and mathematics. Honours students must pass a comprehensive examination in biochemistry at the conclusion of their period of study.

Year I

1. Elective (group B or C)
2. Language 100.
3. Mathematics 100.
4. Chemistry 100.

Minor in Biology

5. Biology 101.

Minor in Physics

5. Physics 110.

Minor in Mathematics

5. Biology 101.

Year II

6. Chemistry 230.
7. Chemistry 242.

Minor in Biology

8. Elective.
9. Physics 110.
10. Biology 200.

Minor in Physics

8. Biology 101.
9. Physics 211.
10. Physics 231.

Minor in Mathematics

8. Elective.
9. Physics 110.
10. Mathematics 200.

Year III

11. Biochemistry 302.
12. Chemistry 210.
13. Additional chemistry class.

Minor in Biology

- 14-15. Two biology or Microbiology classes of which at least one must be chosen from Biology 203, 204 or 205.

Minor in Physics

14. Elective.
15. Additional physics class.

Minor in Mathematics

14. Elective.
15. Additional mathematics class.

Year IV

16. One of Biochemistry 403, 404 or 408.
17. Biochemistry 406.
18. Biochemistry 407.
19. Additional chemistry class.

Minor in Biology

20. Additional mathematics or physics class.

Minor in Physics

20. Additional biology or microbiology class.

Minor in Mathematics

20. Additional biology or microbiology class.

Classes Offered

302 Introductory Biochemistry Lecture 2 hours; laboratory 6 hours, A. H. Blair/C. W. Helleiner/F. B. Palmer

This class is designed to introduce the student to the various aspects of the general field of biochemistry.

Approximately half the class is devoted to a study of the structures and chemical and biological properties of the molecules of which living things are composed. These include the biological macromolecules: polysaccharides, proteins and nucleic acids. The properties of enzymes as catalysts and the basis of their activity are discussed.

The remainder of the class deals with intermediary metabolism: the pathways of transformations which molecules undergo in the living organism. These pathways provide for the generation of usable energy, and for the utilization of this energy for the synthesis of new molecules characteristic of the organism. Finally, the class includes an introduction to biochemical genetics: the means by which the living cell specifies the structures of the molecules to be synthesized by itself and by its descendants.

This class, or an equivalent one, is a prerequisite to more advanced classes in biochemistry. Enrolment is limited to about 40.

Prerequisite: A class in organic chemistry; it will be assumed that students are familiar with the structures and reactions of the major classes of organic compounds. A basic class in physical chemistry is very desirable. The prospective student will be much better prepared for this class if he has some prior knowledge of chemical equilibrium, pH and elementary chemical kinetics.

403 Topics in Intermediary Metabolism Lecture 2 hours, M. S. DeWolfe/F. I. Maclean/C. Mezei/F. B. Palmer

This class is intended to expand and complement the study of intermediary metabolism begun in the introductory class. Topics previously introduced are studied in greater detail and complexity. These are supplemented by a selection of more specialized topics of particular interest. The material is taken from the recent scientific literature and is principally concerned with aspects of carbohydrate, lipid and amino acid metabolism in animals, plants and micro-organisms. Emphasis is placed on the interrelationships between the different metabolic systems and, wherever possible, both cyclic and non-cyclic systems are examined for mechanisms by which the control and direction of metabolism are achieved. The structure and metabolism of biological membranes, particularly the myelin of nerves, is dealt with in some detail. Also discussed are the biochemical aspects of transport across membranes and synaptic transmission in nerves. A study of energy generating systems and the metabolism of their more important components is included. In addition to the details of the oxidative phosphorylation and photosynthetic systems, the diversity of different energy yielding systems which occur throughout nature is presented.

Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry.

404/504 Biochemical Regulatory Mechanisms (offered in 1971-72 and alternate years) Lecture 2 hours, S. D. Wainwright

This advanced class deals with biochemical aspects of gene inheritance, properties and mechanisms of gene expression, the mechanism of protein synthesis and regulatory processes, including selected aspects of embryonic development.

Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry.

406 Advanced Instrumentation Techniques Laboratory 6 hours, J. A. Verpoorte

Instruction is provided for advanced students in the use of modern instrumentation. The principles and operation of the equipment will be discussed. This includes spectrophotometers, ultracentrifuges, spectropolarimeters, flame spectrometers and column chromatographic equipment.

Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry.

407 Physical Biochemistry Lecture 2 hours, A. H. Blair/J. A. Verpoorte

Selected aspects of the chemistry of biological macromolecules, mainly proteins, are discussed.

47.3 / Biology

Professors

- M. L. Cameron
- F. R. Hayes
- K. E. von Maltzahn (Chairman)
- I. A. McLaren
- J. C. Ogden
- E. C. Pielou (Killam Professor)
- L. C. Vining

Professors (Oceanography)

- C. M. Boyd
- G. A. Riley

Associate Professors

- L. M. Dickie
- R. W. Doyle
- J. Farley
- E. T. Garside
- M. J. Harvey
- O. P. Kamra
- W. C. Kimmins
- R. H. Mann
- H. Schwassmann

Associate Professor (Oceanography)
E. L. Mills

Assistant Professors
E. W. Angelopoulos
R. Brown
A. R. O. Chapman
J. V. Collins
L. E. Haley
B. K. Hall
G. S. Hicks
R. P. McBride

Senior (Killam) Fellow
D. P. Pielou

Research Associates

- D. Brewer
- J. S. Craigie
- R. F. Shaw
- A. Taylor

The programme in biology is designed to provide the student with an understanding of living things. Understanding of the biological world is so important for us because we are part of it. We carry to a large degree the responsibility for the state of the biosphere and we can act responsibly only if we understand it and relate ourselves to it.

The programme offered by the Department gives also 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, bioengineering and education; in agriculture, aquaculture, forestry and environmental architecture and engineering.

Degree Programmes

The Department offers classes leading to the General B.A. and B.Sc. degree in biology and to a combined and major Honours B.Sc. programme in biology. A student intending to study biology as his main subject is asked to consult the Department early in his course so that a proper programme can be worked out.

For entrance to the Graduate School, an Honours degree or equivalent background is required. Students should remember that if they enter Graduate School, they will be expected to have a reading knowledge in one or more of French, German and Russian.

General B.A. or B.Sc. with concentration in Biology.

Students reading for a General degree with concentration in biology should arrange their classes in consultation with the Chairman of the Department. They should arrange their classes in the following pattern:

Year I

1. Biology 101 or 200 (see note below).
2. One other introductory science or mathematics class.
- 3-4. 2 classes in humanities, social sciences and languages.
5. One other class.

Year II

6. Biology 200 if not taken in Year I; if taken in Year I, another biology class.
7. Two half-classes of Biology 201-206.
8. Class from humanities or social science groups.
9. One additional class in science or mathematics.
10. One class not in science.

Year III

- 11-12. Normally four remaining half-classes of Biology 201-206 (or two of these and one biology 300-level class).
13. One additional class in the minor science or mathematics.
14. One additional class in science or mathematics.
15. One class not in science or mathematics.

Prospective pre-medical students are advised that many medical schools prefer that candidates obtain a sound background in basic science and arts subjects.

B.Sc. with Honours in Biology

Students reading for a Bachelor of Science degree with honours in biology must satisfy the general requirements for honours degrees and arrange their course programme as early as possible in consultation with the Department. The following course programme is recommended:

Year I

1. Biology 101 or 200.
2. Chemistry 100.
3. Mathematics 100 or Physics 100 or Geology 100.
4. One class in a foreign language.
5. One class in humanities or social sciences.

Year II

6. Biology 200 if not taken in Year I; if taken in Year I, another biology class.
7. Two half-classes of Biology 201-206.
8. Mathematics 100 (if not taken in Year I); otherwise one of Physics 100 or Geology 100.
9. One other class in science or mathematics.
10. A second class in the foreign language of Year I or a class in the humanities or social sciences.

Year III

- 11-13. Normally four remaining half-classes of Biology 201-206 and one Biology 300-level class (or two half-classes at this level).
14. One class in mathematics or science beyond the 100-level.
15. One class from Groups A, B or C (see section 45.1).

Year IV

- 16-19. Four classes from the Biology 300 and 400 group, of which one should normally be Biology 490.
20. One class in the minor field.

Honours students must pass a comprehensive examination at the conclusion of their period of study.

Combined Honours

Students interested in taking honours in biology and another science as a combined programme and those interested in taking honours in biology and an arts subject as a combined programme should consult the Chairman of the Department, through whom a suitable course of study can be arranged.

Classes Offered

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" (See section 45.2).

Introductory Classes Offered

Introductory classes are mainly for first and second-year students.

All students registering for a biology class for the first time should read the following regulations carefully before completing registration.

- a) Students who do not have Senior Matriculation credit (or its equivalent) in biology will take Biology 101 as a first class in biology to be followed by Biology 200.
- b) Students who have Senior Matriculation credit (or its equivalent) from a programme representing a cellular approach may proceed directly to Biology 200 as a first class in biology. (Most students having Senior Matriculation in Nova Scotia belong to this group.)
- c) Students who have Senior Matriculation (or its equivalent) from a programme emphasizing the diversity of organisms similar to that outlined for Biology 200 below may take Biology 101 or two of Biology 201-206 as a first class in biology and omit Biology 200 from their course of study.

d) Students who are doubtful about the application of these regulations to their own cases are invited to discuss their programmes with the Chairman of the Department.

The following two classes are the introductory classes in biology for science students intending to major in biology, to take biology classes at a higher level, or to enter a professional programme for which biology is a prerequisite (see explanatory notes above).

101 Principles of General Biology, Lectures 2 hours; tutorials 1 hour; laboratory 3 hours, R. Brown/M. L. Cameron/L. Haley/R. P. McBride.

The purpose of the class is twofold: to acquaint the student with the disciplines and methods of formal, experimental science, and to prepare the student for classes at a higher level in biology and in related subjects. To achieve these aims, the class is presented from the experimental evidence on which are based all the theories and hypotheses discussed. The cell is taken as the unit of study and the topics discussed are: the scientific method as applied to biology; the structure of the cell; the functions of the cell as a living unit; the structures and functions of the cell organelles; the structures and functions of organic molecules (proteins, carbohydrates, nucleic acids); the replication of cells (the basic theories of inheritance, genetics and cell division); the functions of DNA and the known mechanisms of protein synthesis; the cell as a unit in higher organisms; the higher organism as an integrated unit (a typical plant and a typical animal are examined); the individual organism as a unit in a bioecological organization; theories of natural selection and evolution; theories of the origin of life on the earth; the implications of these theories for the organisms presently on the earth; a brief survey of taxonomic and systematic principles.

The laboratory programme is arranged to follow the lecture programme as closely as possible.

200 Diversity of Organisms, Lectures 3 hours; laboratory 3 hours; M. J. Harvey/I. A. McLaren and others.

One reason for the complexity of biology, and certainly one of the causes of confusion to the beginner, is the enormous number and diversity of organisms. Present estimates are that nearly three million living species have been named, with thousands more being discovered every year. It is this that makes biology both fascinating and difficult.

The class is put early in the biology programme because all aspects of the subject require some knowledge of the diversity and classification of organisms in order that inductive generalizations may be made.

It is obviously impossible, given the vast number of organisms, to treat the subject completely; the approach used in lectures is to study one or a few species from each of the major groups, starting with the viruses, bacteria and protozoa, and ending with the flowering plants and vertebrates. In each group the life history and morphology of "representative" species are studied, and comparisons are made between groups in discussing their geological history and evolutionary relationships. Different groups are also used to express certain broad biological themes, e.g. symbiosis, homology, neoteny.

The laboratory work provides training in the handling, preparation and identification of organisms so that, theoretically at least, the student should be able by the end of the year to assign any previously unseen organism at least to its phylum and to comment on its structures and functions using some technical terms. To this end, fresh, preserved and slide-mounted materials are made available, matching the lectures as often as possible.

The class is intended to complement Biology 101 by emphasizing the diversity and structure of organisms. The best prior preparation, apart from surveys that might have

been given in high school, is an ability to recognize and name plants and animals in the wild, a naturalist's curiosity.

The purpose of the class is to give brief exposure to the diversity of life to those who will not be further concerned with diversity as such, but who cannot pursue other biological subjects without some knowledge of the organisms to which these subjects apply. For others it may be an introduction for the advanced classes in diversity offered at the 300 level (microbiology, the various lower and higher plants, invertebrates and vertebrates). We also hope that students will carry away an appreciation of the value of preserving this great biological diversity in an increasingly man-dominated world.

The following three classes are for students who do not intend to major in biology. A student may want to take more than one of these classes.

210 Man, the Animal, Lecture 1 hour; tutorials 3 hours, J. Farley.

This class examines man, as an animal subject to impersonal natural laws. The organism as compared with other organisms, the means by which he perpetuates himself, the origin and evolution of man, human diversity and race, disease and its implications past and present, the impact of such ideas on human society.

The class should be of interest to students in the humanities and health professions, with or without previous study in biology. There will be no formal laboratory periods and emphasis will be placed on class tutorials, assignments and other means of continuous assessment.

240 Inheritance and Evolution, Lecture 1 hour; tutorials 3 hours, J. V. Collins.

The twin studies of genetics and evolution which are central to an understanding of the forces that shape the structure of living organisms and their relationships are emphasized, with some bias towards an attempt to understand man's place in the biological world.

The class is conducted as a series of tutorial sessions during which students discuss a number of topics on which they also write essays. A few introductory lectures will be given at the beginning. The principal aim of the course is to encourage individual study, and to develop a close personal acquaintance with the subject.

260 Environment and Man, Lecture 2 hours; tutorials 1 hour; laboratory 3 hours, J. G. Ogden and members of staff.

This class considers some topics in the ecology of man and culture: Human populations past and present, production of human substance, effect of disturbance on ecosystems, resources, pollution and garbage. An attempt is made to develop an ecological view of economic man.

The following classes are core classes in the general biology programme. Students concentrating their studies in biology may want to complete all of the six half-classes below during their course; honour students must complete these within their programme.

201A/B Molecular Biology, Lectures 3 hours; laboratory 3 hours, W. C. Kimmins/L. C. Vining.

Biological organization from the atom to the community may be seen as various combinations and rearrangements of quasi-identical structures. That is, a box-within-box arrangement not unlike the more classical "great chain of being".

The commitment in this class is to discuss how the properties of each box emerge from the properties of atoms and the forces between atoms.

Application of this principle to the three boxes of lowest magnitude (atom, molecule, molecular assemblies) constitutes the discipline of Molecular Biology.

In addition to lectures there will be opportunities to participate in laboratory projects and seminars. Background in chemistry is essential.

202A/B Cellular Biology, Lecture 2 hours; discussion 1 hour; laboratory 3 hours, E. W. Angelopoulos/J. V. Collins.

Correct use of microscopes (light and phase) is stressed in practice and theory. Mitosis and meiosis are treated in detail in lecture and laboratory work, using slides and living material.

The class studies cells and cell systems and the relationships between structure and function of these systems. Standard laboratory techniques are included in lectures, laboratories or as demonstrations.

203A/B Genetics, Lecture 3 hours; laboratory 3 hours, L. E. Haley/O. P. Kamra.

The class sets out to show at the introductory level how inherited characters are transmitted from generation to generation. The mechanics of inheritance are the core of the class, and the principles of inheritance are derived from a study of the biological experiments that revealed them. Many types of organisms are dealt with, viruses, bacteria, fungi, plants and animals, including man. In addition, recent theories on gene structure, mutation and function are considered, and the relevant biochemical evidence is brought in.

The class will be concerned with the following topics: the history of genetics, the laws of Mendel, mitosis and meiosis and the chromosome theory of inheritance, life cycles, linkage and chromosome mapping. A study is made of sex determination in many organisms from bacteria to man, and the cytological proofs for crossing over are followed by a more chemical approach. The evidence identifying DNA as the genetic materials is then considered, and the molecular basis for mutation is studied. A study of how one of the two X chromosomes in the mammalian female is made inactive completes the term's work.

A study is made of how crossing over within a gene has revealed the fine structure of the gene in bacterial viruses down to the molecular level. From gene structure, the subject turns to how genes function. How a gene specifies the structure of a polypeptide via the genetic code and how some genes are switched on and off by other genes in bacteria are among the topics considered at this time.

The evidence for non-Mendelian non-nuclear inheritance is reviewed. At this stage an introduction to the use of the computer in genetics will be given. Then a study of the inheritance of quantitative characters such as height, intelligence, crop yields is followed by a study of how genes behave in populations, and how changes in gene frequencies occur because of mutation and selection.

204A/B Evolutionary Biology, Lecture 2 hours; discussion 1 hour, R. W. Doyle.

The results of evolution are manifest in other classes given by the Department. This class is concerned with mechanisms. After a brief consideration of the nature of adaptation, the nature of species and modern approaches to classification as a reflection of amount of evolution, the elements of population genetics (the influence of chance, mutation, and selection on gene frequencies in populations) occupy the core of the class. The origin of species as a key evolutionary step is then considered against this background. A number of special topics, such as biogeography, the "strategy" of life histories, sex ratios, polymorphism, mimicry, are examined in search of certain "rules". Current controversies about rates of evolution and "group selection" serve as a review of what has been learned. The class

closes with an enquiry into the operational meaning of evolutionary "progress" and with a consideration of the general nature of evolutionary systems.

205A/B Developmental Biology, Lecture 3 hours; laboratory 3 hours, B. K. Hall/G. S. Hicks.

This class discusses the principles of both plant and animal development, emphasizing the experimental approach. Opportunity is given in the laboratory to carry out some experimental analysis of development. Topics covered include: factors initiating development; embryogenesis; typical developmental patterns; analysis and regulation of growth; cell specialization and its possible reversal.

206A/B Principles of Ecology, Lecture 2 hours; laboratory 3 hours, I. A. McLaren/J. G. Ogdén III.

In the study of environment, as in the arts, appreciation increases with understanding. Among the many problems of the present are burgeoning world populations, increasing inadequacy of renewable resources, decline of non-renewable resources, and widespread deterioration of environmental quality. Ecology is that branch of biology which considers both the theoretical and practical aspects of these problems. Just as banana trees do not grow in Nova Scotia, moose are not found in Central America, where banana trees form dense forests. A moose might possibly enjoy bananas, but he is not likely to get the chance to find out. The distribution of plants and animals in both space and time is not random, and environmental stability is a delicate balance between organism and environment, between prey and predator, between producer and consumer.

The effects of environmental change, whether caused by natural forces, such as climate and land-form, or by man are a central focus in the class. This class provides an introduction to the concepts and methodology of ecology as well as consideration of its social relevance. Lecture discussions are supplemented by comparative ecosystem studies in the laboratory. Applications of Fortran Programming to ecological and biological problems will be presented in laboratory exercises. Each student completes a project dealing with some aspect of a local ecosystem. Although a working knowledge of the main groups of plants and animals is quite useful, students with backgrounds in social or earth sciences are welcome.

Intermediate Classes Offered

Intermediate classes are mainly for second and third-year students. Biology 200 is prerequisite for all of these classes. They may be taken before completion of the core of six half-classes. The classes 311-323 represent a more thorough study of the biology of the groups of organisms specified.

311A Bacteria, Viruses and Fungi I, Lecture 2 hours; laboratory 3 hours, R. Brown.

A comparative study.

311B Bacteria, Viruses and Fungi II, Lecture 2 hours; laboratory 3 hours, R. Brown.

Study of their physiological and ecological characteristics. Admission to 311B requires the completion of 311A. The object of Biology 311 is to acquaint students with the "microbial world". In so doing, the following three questions are considered:

What are micro-organisms? In deciding what microbes are, one must compare them with other living organisms and with each other. Consequently, a comparative study of microorganisms based on morphological, physiological, developmental and chemical considerations is made in the first term. The object is to delimit the "microbial world".

Where are micro-organisms found? For an answer to this question one turns to microbial ecology. Microbial interac-

tion with other organisms is important because of their saprophytic and/or parasitic nature. To demonstrate this interaction, topics such as symbiotic nitrogen fixation, ruminant digestion, and disease are discussed.

Finally, what do microbes do? Birds sing, eat insects and seeds, etc. Without seeing them, how do we know that micro-organisms are present? To illustrate the diversity of microbial action, selected metabolic activities of micro-organisms are considered at the molecular level.

Students entering this class should have taken classes in organic chemistry and cell physiology, although students taking these subjects concurrently will be admitted.

Prerequisite: Normally Biology 201A/B, 203A/B, 202A/B.

312A Algology, Lecture 2 hours; laboratory 3 hours, A. R. O. Chapman.

This course is designed to introduce a broad spectrum of topics covered in algal biology. These will include morphological diversity presented from a developmental viewpoint, fine structure, marine benthic ecology, plankton ecology and economic importance.

312B Lichenology and Bryology, Lecture 2 hours; laboratory 3 hours, A. R. O. Chapman.

The lichenology section of this course examines the remarkable symbiotic association of lichens. The anatomical and physiological relationships of the symbiotic portions will be explored and some account will be given of the special problems which result from the symbiotic association.

The bryology section of this course examines various aspects of the biology of liverworts and mosses, notably morphological diversity in relation to controversial theories of evolution within the group, relationships with vascular plants and the algae, the part played in terrestrial ecology.

313A Vascular Plants I: A Study in Structural Biology, Lecture 2 hours; laboratory 3 hours, K. E. von Maltzahn.

External and internal architecture of higher plants. Its development at the organ, tissue and cellular levels.

313B Vascular Plants II. A Study in Systematics, Seminar 1 hour; laboratory/seminar 3 hours, M. J. Harvey.

The course is intended to give a few basic ideas on the evolution of the vascular plants and will include topics such as the possible origin of the flowering plants, biosystematics and evolutionary strategies, systems of classification and computer processing of information including automated identification and key construction.

After a few basics have been considered, the rest of the course will be determined by the participants and might include any of a wide range of topics such as the history of exploration, famous people, botanical art, drug plants, crop origins, pollination mechanisms, etc. The course will be largely run on a seminar basis and the writing of a few essays and active participation in discussion will be needed.

321 Invertebrates, Lecture 2 hours; laboratory 3 hours, C. M. Boyd and E. L. Mills.

This class gives a survey of the invertebrate phyla, with strong emphasis on laboratory work. Knowledge of the basic structure and classification of the phyla will be gained in the laboratory, whilst lectures will deal with such aspects as phylogeny, functional morphology, comparative physiology, etc. There will be some field work during the class in local marine areas. Geology students may enter this class without fulfilling the normal biology.

Prerequisites after consultation with the instructors.

322A Entomology, Lecture 2 hours; laboratory 3 hours, D. P. Pielou.

A survey of the important groups of insects with particular attention to structure, habits and physiological peculiarities. Field trips and a collection of identified insects will be required. Students will be encouraged to choose a project which will form a considerable part of the laboratory requirement of the class.

322B Animal Parasitology, Lecture 2 hours; laboratory 3 hours, E. W. Angelopoulos.

The class is intended to give students an understanding of parasitism, diversity and ubiquity.

Although the class gives a survey of parasites from parasitic protozoa to vertebrates, the emphasis is not on taxonomy and morphology. Instead, one or more representative species from each group are discussed in detail and used to demonstrate the life cycle as well as the host-parasite relationships. Morphology and physiology are brought into the study of specific adaptations to the environment during free-living and parasitic stages. Problems of the reproduction and transmission of parasites are stressed. Different hypotheses of the origin of parasitism and recent trends in evolution are considered.

323 Vertebrates, Lecture 2 hours; laboratory 3 hours, E. T. Garside/F. R. Hayes.

The main purpose of this class is to acquaint the student with the current state of knowledge and speculation concerning the evolution of vertebrate animals from an invertebrate ancestral line at least 500 million years ago.

The structure of vertebrates and their sequential deposition as fossils in progressively more recent formation of the superficial crust of the earth form an unparalleled and unequivocal exposition of organic evolution, the gradual, natural development, through the long expanse of time, or progressively more complex organisms. Those vertebrates which have survived the stresses imposed by the restless environment 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 programme is given to an analysis, by procedures of comparison and contrast, of these changes and their relevance in the synthesis of the evolutionary pathway of vertebrates.

The laboratory study of a broad array of vertebrates provides the core of this class and serves to familiarize the student with the gross anatomic features of these animals while giving instruction in the traditional approach to comparison and contrast. The background which is required for this study is not particularly extensive but should incorporate the rudiments of animal form and function and an introduction to the principles of evolutionary biology. Although this class is often considered to belong at the intermediate level, it can be mastered by any diligent student who has completed a basic class in biology.

An appreciation of the classification, structure and evolution of vertebrates is essential to considerations of the development and functional capacities of vertebrates and of their relations with their surroundings and with each other. While man is not given any special position in this strictly zoological treatment, the opportunity exists nevertheless for the student to evaluate his personal philosophy in the light of our knowledge of vertebrate evolution. In this respect the class should be of value to those entering the social sciences, theology, teaching and the health professions. Various agencies of government employ personnel to conduct research in areas of fish and wildlife research and management; the content of this class forms an important segment of the necessary training for these pursuits.

The following classes have prerequisites beyond Biology 200 and they represent extensions of the six half-classes of the core of the programme.

330A Bioenergetics, Lecture 2 hours; laboratory 3 hours, W. C. Kimmins.

Bioenergetics: a study of biological transformation of energy in living organisms. Consideration of this topic will be confined to the cellular level. (Students who have taken Biology 203 in 1967-70 will have covered much of this subject and are advised not to take this class.)

Prerequisite: Biology 201A/B.

331B Animal Physiology, Lecture 3 hours; laboratory 3 hours, J. V. Collins.

The theme of the course is regulation at all levels from cell to organism. Problems facing the organism in the control of its internal environment and the solutions to these problems are examined with equal emphasis on vertebrate and invertebrate animals. Transport and regulation of intracellular and extracellular fluids, and the co-ordination of body functions are considered in detail. Selected topics are investigated in depth by the student.

Prerequisites: Biology 201 or 202.

332B Plant Physiology, Lecture 2 hours; laboratory 3 hours, G. S. Hicks.

Internal regulation of plant growth and development by hormones; light and temperature effects; uptake and movement of water, translocation of assimilates. The laboratory consists of a project which will explore the interactions between the embryo and endosperm of germinating seeds.

Prerequisite: Biology 201.

350A Development and Morphogenesis in Animals, Lecture 2 hours; laboratory 3 hours, B. K. Hall.

This course assumes the material of Biology 205A/B as background, and stresses the mechanisms underlying the control of development, morphogenesis and growth in animals. Topics studied include: descriptive embryology of invertebrates and vertebrates; mammalian development and its hormonal control; histogenesis and morphogenesis of tissues and organs; regeneration of lost body parts; growth; concepts of cellular differentiation.

The laboratory classes emphasize the experimental approach to illustrate lecture topics.

Prerequisite: Biology 205A/B.

351B Development and Morphogenesis in Plants, Lecture 2 hours; laboratory 3 hours, K. E. von Maltzahn/G. S. Hicks.

Descriptive and experimental analysis of form development in plants and its regulation.

Prerequisite: Biology 205A/B.

360 Population Ecology and Ecosystem Dynamics, Lecture 2 hours; laboratory 3 hours, I. A. McLaren.

This class attempts to explain some of the rules governing the distribution and abundance of organisms. The subject is introduced by a survey of elementary equations and models of population growth and the attendant controversies about control of population size. These ideas are extended by considering effects of the physical environment, food, behavioural interactions, and genetic change on dynamics of single-species populations, and by a consideration of the ecological and evolutionary strategies of life-history characteristics. The complexity of nature is then introduced through study of pre-predator interactions and competition between species. Understanding of the dynamics of ecosystems is approached through extension of ideas on predation to food chains and food webs and of ideas on competition to the division of resources among species. Problems of biogeography, ecosystem stability, etc. can then be partially understood.

363A Plant Ecology and Biogeography, Lecture 2 hours; Saturday excursion, M. J. Harvey.

The intention is to cover briefly a wide variety of topics and then allow the student to concentrate on some particular aspect by producing a report or essay. Topics will include the following: interaction of climate, vegetation and soil on a world scale; the history of the northern hemisphere during and since the Ice Ages; peculiarities of distribution connected with long-term events such as continental drift; experiments on competition between plant species; Nova Scotian vegetation.

Saturday field trips and a long-weekend in Cape Breton at Thanksgiving will be an integral part of the course.

Special Classes Offered

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

400 Ethology, Lecture 2 hours, F. J. Mortenson/H. Schwassmann.

The behaviour of animals may be considered from a theoretical or an empirical standpoint. In this class both approaches will be examined through a survey of contemporary schools of thought concerning animal behaviour and a review of trends in field and laboratory research. This overview of the science of animal behaviour will be supplemented by observations of animals in both natural and experimental settings. Such observations will illustrate techniques employed to study animal behaviour and allow the student to evaluate some of the theoretical formulations.

The format and the content of the course are somewhat variable and depend on the composition of the class. For example, topics or species of particular interest to the students may be examined in depth through discussions, paper presentations, or direct behaviour observations.

Prerequisites: The class is usually restricted to honours and qualifying-year students, but others may be admitted with the permission of the instructor.

401 Biometrics, Lecture 2 hours; problem session 1 hour, E. C. Pielou.

The class studies the application of mathematical models to biological systems and the experimental design and the statistical handling of biological data.

402B Special Topics in the History of Science, Seminar 3 hours, R. Ravindra/J. Farley.

The intention in this class is to discuss in detail some specific issues concerning the development of scientific knowledge and its impact on society. The proposed topic for 1971-72 is "The Scientific Revolution of the 16th and 17th Centuries".

Prerequisites: At least two classes in natural sciences and two in history or philosophy. Others may be admitted by permission of the instructors. Some acquaintance with history of science will be presumed.

412 Physiology of Marine Plants, Lecture 2 hours; laboratory 3 hours, J. S. Craigie.

A comparative study of the physiology and biochemistry of the various algal classes will be conducted. This will include studies of carbohydrates, proteins, fats, pigments and nutrition.

Permission of instructor is required.
Prerequisite: Normally Biology 201, 330A and 332B.

415 Biochemistry of Plants and Microorganisms, Lecture 2 hours; laboratory 3 hours, L. C. Vining.

Prerequisite: An introductory class in biochemistry. Permission of instructor is required.

417 Influence of Chemical Agents on Living Organisms, Lecture 3 hours; laboratory 3 hours, C. R. Dean/D. J. Ecobichon.

A study will be made of chemical agents which affect various physiological and biochemical processes in man and other animals.

418 Physiological Mechanisms and Animal Behaviour (Sensory Physiology), Lecture 2 hours; laboratory 3 hours, H. Schwassmann (Psychology).

This laboratory class provides first-hand knowledge of sensory mechanisms in perception and in nervous conditions of behaviour. Emphasis is on understanding of fundamental neurophysiological principles and application of modern electrophysiological techniques to the studies of sensory systems.

Prerequisite: Consent of instructor.

419 Human Physiology, Lecture 3 hours; laboratory 3 hours, B. Issekutz.

A class dealing with the physio-chemical basis of the physiological processes in man.

Prerequisites: Introductory classes in chemistry and physics. Permission of instructor is required.

421A Biological Effects of Radiation, Lecture 2 hours; laboratory 3 hours, O. P. Kamra.

The class consists of a survey of the current knowledge of the effects of ionizing radiation on biological materials on three levels: physical, chemical and biological. In addition, methods of dosimetry, autoradiography, somatic and genetic effects, radiomimetic chemicals and biolasers are discussed.

423B Cytogenetics, Lecture 2 hours; laboratory 3 hours, O. P. Kamra.

Detailed consideration of certain genetical and cytological mechanisms in relation to chromosomal modifications, gene mutations and evolution.

Prerequisite: Biology 202 and 203.

440B Molecular Genetics (1972-73), Lecture 2 hours; laboratory 3 hours, L. E. Haley.

The replication, transmission and control of genetic information in various organisms from viruses to higher cells.

Prerequisite: Biology 203A/B.

445A/B Population Genetics, Lecture 2 hours, R. F. Shaw (limited to 15)

The first part of the class is devoted to the concepts and theorems of population genetics. So far as possible illustrations are taken from man.

In the second part of the class the students do special problems. These consist of computer runs simulating real or hypothetical populations. Those interested in hereditary disease in man can explore methods of estimating mutation rates for dominant or X-linked genes; they may calculate whether and how fast certain diseases may increase or decrease under new social and medical conditions. Or, assuming certain familiar but genetically puzzling diseases to be of constant frequency from one generation to the next, some students may wish to experiment to see what modes of inheritance, mutation rates, etc. are consistent and which inconsistent with such constant frequency. Those interested in natural populations of vertebrates can calculate the degree of heterozygote advantage that would suffice to explain certain balanced polymorphisms; those whose interests are in plants or invertebrate animals can investigate the evolution of separate sexes in hermaphrodite populations, of unisexual broods in dioecious populations, and the like.

Prerequisite: Biology 203.

453A Developmental Genetics (1971-72), Lecture 2 hours; laboratory 3 hours, L. E. Haley.

will deal with those aspects of gene action which are involved in developmental processes, especially differential gene activity.

Prerequisite: Biology 203A/B, 205 A/B, and preferably 440B.

457 Theoretical and Experimental Embryology, Seminar 2 hours; laboratory projects, B. K. Hall.

Advanced reading and project study in animal development, morphogenesis, differentiation, regeneration, growth.

Prerequisites: Biology 205A/B and 350A or their equivalent.

464A Pleistocene Biogeography, Lecture 2 hours; laboratory 3 hours, J. G. Ogdin III.

Lecture, discussion, and laboratory experience in the reconstruction of environmental change since the retreat of the last ice sheet. Particular attention to the environmental history of the Maritime region, including environmental changes caused by man. In addition to field and laboratory work in pollen analysis, techniques of geochemical and isotopic dating will be explored.

Prerequisites: Biology 360 and/or a class in geology is desirable.

465A Trophic Ecology and Biogeochemical Cycling (1972-73), Lecture 2 hours, K. H. Mann/J. G. Ogdin.

Analysis of ecosystem dynamics on the basis of productivity studies and biogeochemical cycling. Energetics of ecosystems. Interactions between populations and their trophic levels and their exploration by means of mathematical models and systems analysis techniques.

Prerequisites: Biology 360 or permission of instructor.

466B Microbial Ecology, Lectures 2 hours; laboratory 3 hours, R. P. McBride.

A format of directed reading, essays and discussions will be used to introduce the following topics: microorganism populations; the functioning of microorganism communities; interactions between microbes and macroorganisms; and the use of microorganisms to examine ecological theory. A laboratory project will be chosen to suit the student's interest and background.

Permission of the instructor is required.

467B Introduction to Biological Oceanography, Lecture 2 hours, E. L. Mills.

A survey of marine populations and their relationships with their physical environment and with each other.

Permission of the instructor is required.

468 Advanced Biological Oceanography, Lecture 2 hours, G. A. Riley/C. M. Boyd/E. L. Mills.

Physiology and ecology of marine organisms with particular reference to community structure and population dynamics; seasonal and regional variations in populations, interrelations with the physical and chemical environment.

Prerequisite: Biology 360. Permission of the instructor is required.

469 Seminar in Advanced Topics in Ecology, Discussions 2 hours, members of staff.

Permission of the instructor is required.

471 General Virology (1972-73), Lecture 2 hours; laboratory projects, R. G. Brown/W. C. Kimmins.

Permission of the instructor is required.

472 Bacteriology, Lecture 2 hours; tutorial 1 hour, R. G. Brown and members of staff.

Study of selected topics in advanced bacteriology.

Prerequisites: Biology 311A and 311B. Permission of the instructor is required.

473A Mycology, Lecture 2 hours; laboratory 3 hours, R. G. Brown.

A basic knowledge of fungi will be assumed. This class will consider structure of fungi especially in relation to morphogenesis. This will be covered at the biochemical level and proceed to a general discussion of fungal physiology. Biosyntheses which are unique to fungi will be discussed as well as systems where fungi have special significance.

Prerequisite: Biology 311 or Microbiology 302.

475 Advanced Algology (1972-73), Seminar 2 hours; laboratory 3 hours, plus field trips, A. R. O. Chapman.

Algology which covers all of algal biology is obviously a vast field. No attempt will be made to offer a comprehensive review of this field, rather, some fundamental approaches to algology will be explored in a seminar series which will constitute the theoretical part of the class. Obvious seminar topics on the applicability of the methods of higher plant terrestrial ecology to the attached marine algae, taxonomic procedures in view of algal life histories and the marked morphological plasticity of these organisms. The major part of the practical work for this class will consist of a small research project designed to introduce the student to some of the current methods used in studying algal ecology, taxonomy and development.

Prerequisite: Biology 312A.

479B Ichthyology. (1972-73), Lecture 3 hours, E. T. Garside.

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

Prerequisite: Biology 323.

480 Special Topics in Biology, Members of staff.

490 Honours Research and Thesis, Members of staff.

590 M.Sc. Thesis

690 Ph.D. Thesis

Combined Honours in Microbiology

The Departments of Biology and Microbiology offer an honours programme for students interested in microbiology. The programme consists of classes which will allow the student to deal with the subject in depth. These classes are as follows:

1. Biology 311, Microbiology 302.

Two classes are planned for beginning microbiologists. These will be considered as equivalent classes and will differ in their basic approach to the subject. One will be given in each department and although differing in their approach, a common pool of lecturers will be employed. Students planning on taking 400-level classes will be required to have satisfactorily completed one of these classes.

2. Microbiology 303B.

A half-class in ultrastructure. The laboratory programme will center around the electron microscopic unit of the Microbiology Department and lectures will deal with suitable topics in microbial structure.

3. Microbiology 403/Biology 472/572.

A class for advanced students in bacteriology. Two of three topics will be chosen and covered in depth.

4. Microbiology 404/Biology 471/571.

A class for advanced students in virology. All types of viruses will be considered - animal, insect, plant and bacterial. Structure, replication, natural history and classification will be included in the class coverage.

5. Microbiology 405.
-A class for advanced students in immunology. This class is limited to 12 students.
6. Biology 415/515.
A class for advanced students in microbial chemistry.
7. Biology 473/573A.
A half-class in mycology. It would ordinarily be paired with Microbiology 303B (Microbial Structure) or Biology 322B (parasitology).
8. Biology 322B.
A half-class in parasitology. It would ordinarily be paired with Biology 473A/573A (Mycology) or Microbiology 406A (Microbial Genetics).
9. Microbiology 406A.
A half-class for advanced students in microbial genetics. It would ordinarily be paired with Microbiology 303B (Microbial Structure) or Biology 322B (Parasitology).
10. Biology 401B.
A half-class in statistics which ordinarily would be paired with either Microbiology 406A (Microbial Genetics) or Biology 473A/573A.

Courses in Each Year
Microbiology and Biology Honours (four years)

Year I

1. Biology 101 (Principles of Biology) or Biology 200 (Diversity of Organisms).
2. Chemistry 100 (General Chemistry).
3. Math 100 (Differential and Integral Calculus).
4. Foreign Language (100 series).
5. Elective (Humanities or Social Sciences, 100 series.)

Year II

6. Microbiology 302 or Biology 311.
7. Chemistry 242 (Intro. Organic Chemistry).
8. Physics 110 (General Physics).
9. Biology 202A/B (Cytology); Biology 203A/B (Genetics).
10. Elective (Language, Humanities or Social Science).

Year III

11. Biochemistry 302 (Introductory Biochemistry) or Biology 201A/B (Molecular Biology).
12. Microbiology 404/Biology 471 (Virology) or Microbiology 403/Biology 472 (Bacteriology).
13. Microbiology 406A (Microbial Genetics) or Biology 473A/573A (Mycology). Microbiology 303B (Microbial Structure) or Biology 322B (Parasitology).
14. Elective (Humanities or Social Science beyond 100 series).
15. Elective (Science beyond 100 series).

Year IV

16. Microbiology 407 or Biology 490 (Thesis).
17. Microbiology 404/Biology 471 (Virology) or Microbiology 403/Biology 472 (Bacteriology).
18. Choice of Microbiology 405 (Immunology) or Biology 415/515 (Microbial Chemistry).
19. Biology 401B (Statistics), Choice of Microbiology 406A (Microbial Genetics) or Biology 473A/573A (Mycology).
20. Biochemistry 400 series or Chemistry beyond 100 series.

Classes to be Given Annually

Biology 311 – General Microbiology
Microbiology 302 – General Microbiology
Microbiology 403/Biology 472 – Bacteriology
Microbiology 404/Biology 471 – Virology
Biology 322B – Parasitology
Biology 401B – Statistics

Classes to be Given in Alternate Years Starting 1970/1971.
Microbiology 405 – Immunology
Microbiology 406A – Microbial Genetics

Classes to be Given in Alternate Years Starting 1971-1972.
Microbiology 303B – Ultrastructure
Biology 415/515 – Microbial Chemistry
Biology 473A/573A – Mycology

47.4 / Chemistry

Professors

D. E. Ryan (Chairman of Department)
W. J. Chute
O. Knop
P. J. Wangersky

Associate Professors

T. P. Forrest
R. W. Frei
K. E. Hayes
J. W. S. Jamieson
W. E. Jones
K. T. Leffek
L. Ramaley

Assistant Professors

G. A. Dauphinee
J. B. Faught
J. S. Grossert
D. L. Hooper
J. C. T. Kwak
C. H. Warren

Postdoctoral Fellows

T. Bergendahl
K. S. Bhatia
T. Bidleman
A. N. Kardos
T. C. Loder
M. Walter
P. Price
F. Snape
D. J. Stewart
J. W. Thorpe
P. H. Tremaine
R. Vivilecchia

Chemistry is one of the physical sciences and the language of physical science is mathematics. Any student who does not enjoy mathematics should not contemplate embarking on an honours programme in chemistry. We say honours programme advisedly, for the honours B.Sc. is the minimum professional requirement for a chemist – the general B.Sc. with a major in chemistry has no professional standing. Most students with an honours degree in chemistry will undertake further studies in the subject, working towards the degrees of M.Sc. and Ph.D. A postgraduate degree is essential for those who wish to engage in independent original research or in university teaching.

The first class in chemistry is an introduction to the discipline. Non-science students who elect to take chemistry to fulfill requirements for a degree will find that the subject provides a good insight into the scientific method, through once again it should be stressed that because chemistry is a physical science, the laboratory and class work stresses mathematics more than does that of a life science such as biology. Many students who do not intend to become professional chemists are required to take introductory chemistry and may be required to take second and third-year classes in the subject as well. This group of students can include those taking courses in engineering, pre-medicine, pre-dentistry, dental hygiene, nursing and pharmacy. Engineering students contemplating chemical engineering should consult the Department of Engineering for advice on desirable classes in chemistry. All students intending to take classes in chemistry beyond the first year

level should include classes in mathematics and physics in their first year, and final grades in these classes should not be less than 65%. 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 in the laboratory to the four areas of specialization into which chemistry has been traditionally subdivided. 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 primarily devoted to the study of the nature of chemical reactions and is undoubtedly the most purely mathematical area of chemistry. 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.

Because advances in chemistry have been and continue to be published in many languages, those who look forward to postgraduate study and research are urged to acquire a reading knowledge of at least two foreign languages. These are usually chosen from among French, German and Russian. The student is referred to the regulations of the Faculty of Graduate Studies regarding language requirements for advanced degrees.

Degree Programmes

General B.Sc. with Major in Chemistry

A candidate for this degree must satisfy all of the general requirements. To major in chemistry he will take Chemistry 110 in the first year. In the subsequent two years he may undertake as many as five classes chosen from Chemistry 210, 230, 242, 320, 330, and 340. It is essential that Mathematics 100 be secured as a prerequisite to Chemistry 230. Mathematics 200 is a prerequisite to Chemistry 330. Physics 110 should be included in the course.

B.Sc. with Honours in Chemistry

This programme is intended to provide a good training in chemistry while at the same time it makes provision for the individual interests of students. All students are required to consult annually with the Chairman of the Department, and to obtain his approval of their course selection.

Year I will normally consist of:

1. Chemistry 110
2. Mathematics 100
3. A foreign language at 100 level.
4. One of Biology 101, Geology 100 or Physics 110.
5. Elective

Years II, III and IV must include:

- (a) Six classes from Chemistry 200 and 300 levels
- (b) Three classes from Chemistry 400 level
- (c) Mathematics 200 (a prerequisite for Chemistry 330)
- (d) Five other classes. These must be chosen as follows:
 - (i) If Physics 110 or a foreign language were not taken in Year I, they must be taken in Years II – IV.
 - (ii) Two classes beyond the 100-level must be taken in a minor subject. Minor subjects allowed for this degree are biochemistry, biology, geology, mathematics or physics.

It is suggested that these five other classes be chosen according to the future plans of the students. For example: those planning future study in physical chemistry should take additional mathematics and physics classes; those planning future study in organic chemistry should take one or more biology classes; those planning future study in geochemistry should take one or more geology classes.

In all cases it is in the interests of the student to consult with the Chairman and other professors in the department.

This may be done at any time during the first year. Experience indicates that March is the most suitable time for discussion of a future programme.

Classes Offered

100 and 110 General Chemistry Lecture 3 hours; laboratory/tutorial 3 hours, W. J. Chute/G. A. Dauphinee/J. B. Faught/D. L. Hooper/J. W. S. Jamieson/J. C. T. Kwak.

These are introductory classes in college chemistry with lectures and tutorials on a number of topics in physical and structural chemistry. Included are stoichiometry, acid-base and oxidation-reduction reactions, gases, liquids, and solids, solutions, thermochemistry, equilibrium, chemical kinetics, and atomic and molecular structure.

Chemistry 100, intended for those students who wish or require only a single chemistry class, provides a less rigorous introduction to all these topics than does Chemistry 110, which is planned as a preparation for advanced classes in Chemistry. *Chemistry 100 will not serve as a prerequisite to second-year chemistry classes.*

In both Chemistry 100 and Chemistry 110 emphasis is placed on the formulation of theories which will be useful in the correlation of experimental facts, rather than on the memorization of the facts themselves.

Wherever possible, such a theory is derived using standard mathematical methods from basic physical principles. In tests and examinations the student is expected to demonstrate his knowledge of the basis of these theories and of their limitations and to show a logical approach to the solution of numerical problems.

It is assumed that students entering this class will have some knowledge of elementary chemistry, mathematics and physics. The minimum background in chemistry is the equivalent of Nova Scotia Grade XI with emphasis on its numerical aspects. It is important that students be able to use exponents and logarithms, proportionality and variation, and be able to solve quadratic and simultaneous equations.

It should be noted that Mathematics 100 is prerequisite to enrolment in Chemistry 210 or 230.

Texts: (1970-71) Dickerson, Gray and Knight, *Chemical Principles*, Benjamin, 1970; *Relevant Problems for Chemical Principles*, Butler and Grosser, Benjamin, 1970.

105 Chemistry (for dental hygiene students) Lecture 3 hours; laboratory 3 hours, G. A. Dauphinee

This class is taken by dental hygiene students in their first year. It will not serve as a prerequisite to second-year chemistry classes. Organic chemistry is discussed in the second half of the year, since the regular programme of the students does not include further study of chemistry. The subjects discussed in the first term include atomic structure, solution equilibria and simple inorganic chemistry. Laboratory experiments are integrated with the material discussed in lectures. Quantitative aspects of chemistry are not emphasized in this class.

210 Analytical and Inorganic Chemistry Lecture 2 hours; laboratory 3 hours, R. W. Frei/J. B. Faught

The first term will be concerned with Chemical Equilibria. An intensive discussion of chemical equilibria (solubility, acid base, redox, metal complex) with and without the use of approximation will be given. Correlation to qualitative and quantitative analytical chemistry, such as competing equilibria, titration of weak and polyprotic acids, is attempted. The laboratory work will involve modern physical separation methods [ion exchange, thin-layer chromatography and quantitative analysis (precipitation, titration)].

The second term will concentrate on Inorganic Chemistry and will include a discussion of electronic structure of atoms and molecular orbital theory. These principles will then be applied to the chemistry and structure of the compounds of the first and second row representative elements and the first transition series. Organometallic chemistry will also be discussed. The preparation and analysis of inorganic compounds will be the laboratory assignments.

Prerequisite: Chemistry 110 or equivalent.
Texts: To be determined.

230 Physical Chemistry I Lecture 2 hours; laboratory 3 hours, W. E. Jones

This class is designed to give a theoretical and practical background in the fundamentals of physical chemistry. The lecture periods include discussions of the following topics: properties of real gases, liquids and solutions; atomic structure; molecular structure; thermodynamics; thermochemistry; electrochemistry; chemical kinetics.

With the exception of topic (a), where background knowledge in the properties of the ideal gas is assumed, the discussions begin at an introductory level. A knowledge of simple calculus will be assumed.

The laboratory sessions will give students an opportunity to perform experiments which illustrate many aspects of the above topics with modern techniques and apparatus.

Prerequisites: Chemistry 110; Mathematics 100.
Text: (1970-71) Barrow, *Physical Chemistry*, 2nd. ed., McGraw-Hill, 1966. *This text will not necessarily be used in 1971-72.*

241 Introductory Organic Chemistry Lecture 2 hours; laboratory 3 hours, K. T. Leffek

This class will normally include students from pharmacy courses and those other students not intending to complete a B.Sc.

A general introduction is given to the chemistry of carbon compounds including the shapes of molecules and bonding, characteristic reactions and the way in which they take place, and the application of spectroscopy to organic chemistry.

Required knowledge: A good knowledge and understanding of the principles studied in Chemistry 110. In particular, a student is required to understand the relation between carbon and the other elements of the periodic chart; valence, covalent and ionic bonding; electronic orbitals; orbital hybridization and the principles of molecular geometry which arise from all types of s and p orbital hybridization; electronegativity, physical chemistry of solutions; chemical equilibrium; velocities of reactions; oxidation-reduction; acids and bases. An examination on some or all of these topics may be given during the first week of the term.
Text: (1970-71) Kice and Marvell, *Modern Principles of Organic Chemistry*, MacMillan, 1966. *This text will not necessarily be used in 1971-72.*

242 Introductory Organic Chemistry Lecture 2 hours; laboratory 3 hours, J. S. Grossert

Chemistry 242 is an introductory class in organic chemistry, which is intended to prepare students for further study in organic chemistry or biochemistry. It will be taken primarily by science students.

The class begins with a review of bonding in simple covalent molecules and how this can be used to discuss their shapes and spectroscopic properties. This is followed by a systematic survey of the properties and reactions of a series of different carbon-containing compounds. Continued emphasis will be placed on the correlation of properties and reactions with molecular structure and electron distribution

within molecules. An introduction to organic synthesis will also be given.

Concurrently, the laboratory section of the class is designed to give instruction in the recognition and preparation of pure compounds. A number of reactions are then studied in order to illustrate material from lectures, as well as some simple organic syntheses. Honours students and more advanced students will be given the opportunity to do some more demanding synthetic work.

Required knowledge: A sound background of elementary inorganic and physical chemistry, as covered in a modern freshman class, is essential. This should include the properties of gases, liquids and solids, basic thermodynamics and thermochemistry, solutions, electrolytes, pH, stoichiometry, equilibria and kinetics, oxidation-reduction, periodic table; familiarity with acid-base theories, modern atomic theories, atomic and molecular orbitals, and orbital hybridization will be assumed.

Prerequisite: Chemistry 110 or equivalent.
Texts: (1970-71) Roberts and Caserio, *Basic Principles of Organic Chemistry*, Benjamin, 1965 (also used in 340); Benfey, *The Names and Structures of Organic Compounds*, Wiley, 1966. Roberts, Gilbert, Rodewald and Wingrove, *An Introduction to Modern Experimental Organic Chemistry*. *These texts will not necessarily be used in 1971-72.*

320 Analytical Chemistry Lecture 2 hours, laboratory 4½ hours, D. E. Ryan/L. Ramaley

Chemistry 320 provides an introduction to the techniques and methods that provide answers to the question "how much" with respect to the chemical composition of a sample of matter. The laboratory work is primarily concerned with the final laboratory operation in the determination of the amount of a particular constituent in a sample; classical (gravimetric, volumetric) and instrumental (electroanalytical and optical) methods are used.

Consideration is given to rational methods of approach to the mathematical aspects of analytical chemistry. An intelligent appraisal of the factors necessary for obtaining meaningful results requires considerable chemical knowledge and it is with this knowledge that we are concerned.
Prerequisites: Chemistry 210. Essential to the class is the ability to handle stoichiometric problems, familiarity with electrons, atoms, bonds and molecules, solution equilibria, acid-base and oxidation-reduction reactions is assumed.
Text: (1970-71) Skoog and West, *Fundamentals of Analytical Chemistry*, Holt, Rinehart, Winston, 1969. *This text will not necessarily be used in 1971-72.*

330 Physical Chemistry II Lecture 2 hours; laboratory 3 hours, K. E. Hayes

The first part of this class develops the laws of thermodynamics in the classical manner and applies them to ideal the real systems of chemical interest. Extensive use of the chemical potential is made. The second part is devoted to a study of the kinetic theory of gases from the classical Maxwell standpoint, followed by the development of thermodynamic functions by using the methods of statistical thermodynamics.

The laboratory, where students must complete six or seven experiments through the year, is open at all times. The laboratory work is designed to help the student gain confidence in results that he may obtain in any laboratory. Four of the experiments will be written up during the year as formal reports, following the format of the Canadian Journal of Chemistry.

Prerequisites: Mathematics 100 and 200; first and second year chemistry, particularly Chemistry 230.
References: Glasstone, *Textbook of Physical Chemistry*; van Nostrand, 1946; Moore, *Physical Chemistry*, 3rd. ed., Prentice-Hall, 1962; Castellan, *Physical Chemistry*, Addison-Wesley, 1964. *All classes, and particularly the advanced classes, are required to consult references beyond the minimum stated in this list.*

340 Intermediate Organic Chemistry Lecture 2 hours; laboratory 3 hours, T. P. Forrest

This is an intermediate class in organic chemistry. The main purpose of the class is to develop in the student an understanding of the principles of organic chemistry which may be applied to future problems and situations.

The first section of the lectures gives a basic outline of the methods of testing to be used in the laboratory. The laboratory section of the class involves the determination of structures of unknown substances by chemical testing and spectroscopic methods. Each student has individual problems in the laboratory and is given freedom to use his initiative in solving these.

The second section of the lectures is devoted to an outline of the principles of organic reaction mechanisms and their use in the prediction and understanding of organic reactions. The application of these principles to synthetic organic chemistry is next considered with the purpose of developing in the student a facility in designing schemes for the synthesis of organic compounds. Examples are used from a variety of fields in order to familiarize the student with a large number of classes of compounds.

Students taking the class are expected to have a knowledge of the nomenclature of organic compounds. They should also be familiar with the functional group classification of organic compounds and the basic reactions of these functional groups, and with the basic concepts of kinetics and thermodynamics as applied to chemical reactions.

Prerequisites: Chemistry 110 and 242 or equivalents.
Texts: (1970-71) Roberts and Caserio, *Basic Principles of Organic Chemistry*, Benjamin, 1965 (also used in 242); Shriner, Fuson and Curtin, *The Systematic Identification of Organic Compounds*, 5th ed., Wiley, 1964. *These texts will not necessarily be used in 1971-72.*

440 Theoretical Chemistry Lecture 2 hours, C. H. Warren

This class consists of an introduction to quantum mechanics and its application to various aspects of atomic and molecular electronic structure such as the multiplet structure of atoms, molecular orbital theory, valence bond theory and ligand field theory.

Prerequisites: As many classes as possible in chemistry, mathematics and physics.
Text: (1970-71) I. N. Levine, *Quantum Chemistry Volume I: Quantum Mechanics and Molecular Electronic Structure*, Allyn and Bacon, Inc., 1970. *This text will not necessarily be used in 1971-72.*

References: Hanna, *Quantum Mechanics in Chemistry*, Benjamin, 1969; Pauling and Wilson, *Introduction to Quantum Mechanics*, McGraw-Hill, 1935; Coulson, *Valence*, Oxford University Press, 1961; and Pilar, *Elementary Quantum Chemistry*, McGraw-Hill, 1968. *References beyond this minimum list will also be consulted.*

440 Advanced Inorganic Chemistry Lecture 2 hours; laboratory 3 hours, O. Knop

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 of the constituent elements. They can only be studied by methods that do not destroy or modify the crystal structure. The aim of this class is to acquaint the student with the methods most frequently employed for this purpose and with the principles of structural inorganic chemistry in general.

Prerequisites: Chemistry 320 and 330 (or equivalents) or consent of instructor.
Texts: (1970-71) Evans, *An Introduction to Crystal Chemistry*, 2nd. ed., Cambridge; Wells, *The Third Dimension in Chemistry*, Oxford. *These texts will not necessarily be used in 1971-72.*

420 Instruments in Chemistry Lecture 2 hours; laboratory 3 hours, R. W. Frei/D. E. Ryan/L. Ramaley.

Instrumental measurements are used primarily for identification purposes or for determining how much of a particular constituent is present in a sample. In practice, one finds that most problems fall into distinct types; common problems include elemental analysis, functional group analysis, identification and structure determination, trace determination, etc.

Initially, Chemistry 420 involves an introduction to electronics for chemists which is closely related to chemical instrumentation problems; two experiments in building and analyzing electronic circuits are required and corresponding reports written. The remainder of the class is devoted to a discussion of various instrumental techniques and their utility. Techniques discussed include arc-spark emission spectroscopy, flame photometry, atomic absorption, reflectance, infrared, ultraviolet-visible spectroscopy, nuclear magnetic resonance, mass spectrometry, x-ray, fluorescence, gas chromatography, polarography. Each student will be required to solve three problems by instrumental techniques.

Members of the chemistry department who have specialized knowledge of particular techniques will participate in the class and will be available for problem discussion.

Prerequisite: Chemistry 320.
Text: (1970-71) Reilly and Sawyer, *Experiments for Instrumental Methods*, McGraw-Hill, 1961. *The text will not necessarily be used in 1971-72.*

430 Physical Chemistry III Lecture 2 hours; laboratory 3 hours, K. E. Hayes/J. W. S. Jamieson/W. E. Jones and other staff.

The first part of this class deals with the development of the principles of reaction kinetics, the treatment of experimental kinetic data and the derivation of kinetic mechanisms for homogeneous and heterogeneous reactions. Simple and complex reactions are studied. The theory of absolute reaction rates is introduced and applied to systems of interest. Student participation in lectures is considered to be essential.

The second portion of the class deals particularly with calculations and research topics in homogeneous gas phase kinetics in flow systems. Students are expected to do several assignments. References to the literature are used rather than texts.

Other topical subjects will be added.
References: Current and bound journals in the Chemistry Library.

440 Advanced Organic Chemistry Lecture 2 hours; laboratory 3 hours, T. P. Forrest/K. T. Leffek/D. L. Hooper/J. S. Grossert/G. A. Dauphinee/and others

The lecture portion of this class consists of specialized topics in organic chemistry. The topics have included synthetic organic chemistry, applied physical methods, reaction mechanisms, molecular rearrangements, stereochemistry and conformational analysis. The subject list will vary depending upon the interests of the student members and the availability of lecturers.

Laboratory exercises make up a part of the class. These will include more sophisticated syntheses and work on structure determination.

Texts: (1970-71) Hutchinson, *Study Problems in Organic Chemistry*, Addison-Wesley, 1968; Hallas, *Organic Stereochemistry*, McGraw-Hill, 1965; Mislow, *Introduction to Stereochemistry*, Benjamin, 1966; Ireland, *Organic Synthesis*, Prentice Hall, 1969; Williams and Fleming, *Spectroscopic Methods in Organic Chemistry*, McGraw-Hill, 1966. *These texts will not necessarily be used in 1971-72.*

Topics include: discussion of the relationship between structure and biological activity; physical and chemical methods for studying polymers; enzyme kinetics, including the behaviour of enzymes involved in the control of metabolism; structure of the active sites of enzymes.
Prerequisites: Biochemistry 302 or an equivalent class in basic biochemistry, and a basic class in physical chemistry.

408/508 Structure and Function of Nucleic Acids. (Offered in 1972-73 and alternate years.) Lecture 2 hours, C. W. Helleiner/M. W. Gray.

This class is intended to complement Biochemistry 404/504. The structures of nucleic acids are examined from the organic chemical and physical points of view; the experimental basis for currently accepted concepts of these structures is emphasized. The second part of the class deals with the enzymes catalyzing the replication and transcription of nucleic acids, and with the chemical basis of our knowledge of the genetic code.

Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry.

Other Classes

The Department provides instruction to students in medicine, dentistry and health professions. Descriptions of these classes will be found in the relevant Faculty calendars.

Graduate Studies

The department offers graduate classes leading to the degrees of M.A. and Ph.D. 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.

47.5 / Classics

Professors

J. A. Doull (Chairman)
T. E. W. Segelberg

Associate Professors

R. D. Crouse
B. W. W. Dombrowski
M. A. Usmiani
J. P. Atherton

Assistant Professor

R. Friedrich

Killam Senior Fellow

A. H. Armstrong

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 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 much 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 during his university course.

A student taking classics at Dalhousie can approach the study of ancient cultures through literature or through the history and the study of social structures or through the study of Greek and Christian philosophy. Honours courses are offered which concentrate on any one of these three approaches.

The department also offers combined honours courses in Greek and German and in Latin and French. These courses take account of the exceptionally close links between French culture and Latin literature on the one hand and between German and Greek poetry and philosophy on the other.

While students of classics usually learn Greek and Latin, it is possible sometimes to substitute or add a Near Eastern language. Instruction may be had in Hebrew, Coptic, Syriac, Arabic and Akkadian.

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 prepare students for a life of teaching and scholarship in several directions. Now that Canada is no longer a colony culturally but responsible for its own culture, 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 medieval studies in general. Classics leads also to ancient Near Eastern studies (Jewish, Babylonian, Egyptian, etc.) and to archeology.

Degree Programmes

General B.A. and B.Sc.

Of classes offered by the department, Classics 100, 336 (same as Philosophy 336) and 338 (same as Philosophy 338) should be of special interest to students taking a general degree.

B.A. with Honours in Classics

Year I

1. Greek 100 or Latin 100. *This course may still be completed within four years if neither Greek nor Latin has been taken in the first year.*
2. Classics 100.
3. History 100 or Philosophy 100 or English 100.
4. A class in social science.

Students without science matriculation

5. A class in mathematics or a natural science.

Students with science matriculation

5. Greek 100 or Latin 100. *This course may still be completed within four years if neither Greek nor Latin has been taken in the first year, or a second class from History 100, Philosophy 100, English 100.*

Year II

6. Greek 100 or, if already taken, Greek 200.
7. Latin 100 or, if already taken, Latin 200.
8. English 100 or, if already taken, a remaining class from History 100, Philosophy 100.
9. A second social science class.
10. History 100 or Philosophy 100 or (if both have been taken) Latin 200 or Greek 200 (if the 100 class has been taken in Year I) or a Classics 200-level (Ancient History) class or Philosophy 336 (same as Classics 336).

Year III

11. Greek 200 or 300.
12. Latin 200 or 300.
13. A Classics 200-level (Ancient History) class or Philosophy 336 (same as Classics 336).
14. A further class in ancient history.
15. Philosophy 336 or Greek 300 (or 301 or 302) or Latin 300 (or 301 or 302) or elective.

Year IV

16. Greek 300 (or 301 or 302).
17. Latin 300 (or 301 or 302).
18. A second 300-level Greek class or, if taken, elective.
19. A second 300-level Latin class or, if taken, elective.
20. A further Greek or Latin class or an ancient history class or Philosophy 338 (same as Classics 338).

B.A. with Honours in Classics (Ancient Philosophy)

Year I

1. Greek 100 or Latin 100. *This course may still be completed within four years if neither Greek nor Latin has been taken in the first year.*
2. Classics 100.
3. Philosophy 100.
4. A class in a social science.

Students without science matriculation

5. A class in mathematics or a natural science.

Students with science matriculation

5. History 100 or English 100.

Year II

6. Greek 100 or, if already taken, Greek 200.
7. Philosophy 336 (Greek Philosophy, same as Classics 336).
8. History 100 or English 100.
9. Latin 100 or, if already taken, Latin 201.
10. A second social science class.

Year III

11. Greek 200 or Latin 201 (whichever was not taken in Year II).
12. Philosophy 338 (Medieval Philosophy, same as Classics 338).
13. A class in modern philosophy.
14. Classics 221 or 222 or 223 (Ancient History) or History 200 (Medieval History).
15. Greek 300 (or 301 or 302) if Greek 200 was taken in Year II; otherwise, elective.

Year IV

- 16-17. Two of Greek 300, 301, 302 or, if both have already been taken, elective. *At the discretion of the department, a class in another ancient language may take the place of one of the Greek classes.*
18. Classics 461 or 463 or 464.
19. A class in modern philosophy.
20. A further class in ancient or medieval history.

B.A. with Honours in Classics (Ancient History)

Year I

1. Latin 100 or Greek 100. *A student who does not take Latin (or Greek) 100 in his first year but some other foreign language may take the class in his second year. In that case a Latin (or Greek) class beyond Latin (or Greek) 200 will take the place of one Ancient History class, and Medieval History (History 200) will be counted as an honours class for such a student.*
2. History 100.
3. Classics 100.
4. A class in a social science.

Students without science matriculation

5. A class in mathematics or a natural science class.

Students with science matriculation

5. Philosophy 100 or English 100.

Year II

6. Classics (Ancient History) 221 or 222 or 223 (as offered).
7. Classics (Ancient History) 251 or 252 or 253 (as offered).
8. Latin 200 or Greek 200.
9. English 100 or, if taken, Philosophy 100.
10. A second social science class.

Year III

11. Classics (Ancient History) 222 or 221 or 223 (as offered).
12. Classics (Ancient History) 252 or 251 or 253 (as offered).
13. Latin 202 or Greek 301.
14. Philosophy 100 or, if taken, Philosophy 336 or 338 (same as Classics 336 or 338).
15. History 200.

Year IV

16. Classics (Ancient History) 223 or 221 or 222 (as offered).
17. Classics (Ancient History) 253 or 251 or 252 (as offered).
18. A 300-level Latin or Greek class.
19. History 200 or Philosophy 336 or 338 (same as Classics 336 or 338).
20. Greek 100 or Latin 100 or an elementary class in another ancient language. *The second ancient language may be taken in the second or third year if convenient, and, at the discretion of the department, a further class in the second language may take the place of one Ancient History class.*

Combined Honours

Classics may be taken as part of a combined honours programme with French or German. Students interested in either of these programmes should consult with the heads of the respective departments.

Classes Offered Ancient Languages and Literature

Greek

100 Introductory Greek Lecture 4 hours, R. Friedrich

This is the beginner's class in the Greek language, and no previous knowledge is required. The aim of this class is to teach the student to read, not simply translate, 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: in the first term chapters I-VI of the Gospel of St. John; in the second, the first book of Xenophon's *Anabasis*. Thus, the student begins with the simpler Greek of the New Testament, and then proceeds to the more complex Classical Greek of the most important authors of the Greek literature that has been preserved.

At least once a week students will pass in for correction grammatical exercises and/or translations from Greek into English. There will be no lab-work and no oral classes.
Text: Stephen W. Paine, *Beginning Greek*.

200 Intermediate Greek Lecture 3 hours, R. Friedrich

Greek 200 is a continuation of Greek 100. The aim of the class is to develop the student's ability to read and translate prose as well as poetic Greek texts.

At the beginning of the class there will be a brief but systematic review of Greek syntax. This will be followed by the reading of two prose texts and a poetic passage. Other topics, treated by students in short papers, will be the life and thought of Socrates; the political and historical background that led to his trial; the judicial system at Athens; Socrates as a dramatic character in Aristophanes' comedy; and the historical significance of Socrates' condemnation.

Through the reading of one book of the *Iliad*, students will be introduced to the language of Homer's poems; this will also provide an opportunity to deal with the Greek dialects.

The essential knowledge that the instructor assumes students possess at the outset of the class is a thorough knowledge of Greek grammar as far as the declension of nouns, adjectives and pronouns and the conjugation of the Greek verb is concerned. Students should therefore, if necessary, review the respective passages in either Paine's *Beginning Greek* or White's *First Greek Book*. They will most profit from this class if they read or re-read a number of passages from Xenophon's *Anabasis* to be found in either of these two primers.

Prerequisite: Greek 100.

Texts: Plato, *Apology and Criton*; Book VI of Homer's *Iliad*.

300 Greek Drama (Offered in 1973-74).

Prerequisite: Greek 200.

301 Greek Historians (not offered in 1971-72).

Parts of Thucydides and Dio Cassius will be studied. This is essentially a reading class designed to familiarize students with the language and contents of the writings of these two great historians. Students are expected to come to class prepared in advance for every meeting.

Prerequisite: Greek 200.

302/502 Greek Philosophers (Offered in 1972-73) Lecture 2 hours, R. Friedrich

The topic of this class is "Plato and Aristotle on art and literature". Books II, III, and X and a number of other passages of Plato's *Republic* and all of Aristotle's *Poetics* will be read and studied in Greek; in addition, passages of Aristotle's *Rhetorics* and *Politics* will be consulted. The two philosophers' theory of art and literature will be discussed in the context of their philosophy. Furthermore, two modern theoreticians of dramatic art will be dealt with: B. Brecht, who in his own words developed an "anti-Aristotelian" theory of drama, and A. Artaud.

Greek 304/504 Greek Poetry (Homeric Epic), Lecture 2 hours, R. Friedrich.

Homer's *Iliad* and/or *Odyssey* will be studied in Greek and discussed and interpreted as to form and meaning. This will be accompanied by a study of the historical and cultural background of the Homeric poems. Students should be familiar with the history of Greek literature and are therefore advised to study in advance either Bowra's *Greek Literature* or Hadas' *History of Greek Literature* and Chapter III of A. Lesky's *History of Greek Literature*.
Prerequisite: Greek 200.

Latin

100 Introductory Latin Lecture 4 hours

Special (non-credit) classes will be provided upon request for students who wish to begin the study of Latin in the University.

110 Latin Language and Literature Lecture 3 hours, M. A. Usmani

The purpose of this class is: a general introduction to Latin literature through the reading of some basic works of prose and poetry.

In the reading of Latin texts, special emphasis is placed on the handling of Latin language by the authors and on their personal style. For the reading of Latin prose a text of Cicero is chosen because it is the best example of Latin prose and because, by his quotations and literary references, Cicero gives an opportunity for a brief survey of Latin literature before his time. The poems of Catullus and the *Odes* of Horace are studied as an introduction to Latin

prosody as well as for their contribution to Latin poetry in general.

This class is required for any more advanced class in Latin.
Prerequisite: Senior Matriculation Latin or Latin 100.

200 Latin Poetry Lecture 2 hours, M. A. Usmani

This class is the continuation of the second part of Latin 100. Its purpose is to complete the study of Latin poetry for the undergraduate. A selection of Lucretius is read as the best example of Latin didactic poetry. However, the main part of the class is devoted to the study of Latin elegy, its origin and significance for Latin literature. A selection of the best examples of the poetry of Propertius, Tibullus and Ovid is studied, to familiarize the student with these poets and to determine their contribution to Latin literature.

The student is expected to possess good reading knowledge of Latin. Textual criticism is attempted with the study of some problems connected with Latin manuscript tradition.

Students are given weekly assignments for reading and are required to come to class prepared to give a correct translation of the assigned poems. Except for a few lectures given by way of introduction to each section (didactic poetry and elegy), there are no formal lectures and the work in class is conducted seminar style, with informal discussions and commentaries on the poems.

Prerequisite: Latin 100.

201 Latin Philosophical Texts (Offered in 1971-72) Lecture 2 hours, J. A. Doull

The purpose of this class is to give students interested in ancient and medieval philosophy experience in reading philosophical Latin. Various authors will be read from Cicero to the late Middle Ages.

Prerequisite: Latin 100.

202 Roman Historians Lecture 2 hours, J. P. Atherton

This class studies Roman historical texts (writers, inscriptions, and other documents). During the 1971-72 session, selections of Livy and Suetonius will be studied. This is essentially a reading class to familiarize students with the language and content of the writings of these two great historians. Students are expected to come to class prepared in advance for every meeting.

Prerequisite: Latin 100.

300 The History of Roman Satire Lecture 2 hours. (Not offered in 1971-72).

This advanced class is designed primarily for graduate students and undergraduate honours students. By special arrangement the class can also be taken by students from other departments even if they possess little or no knowledge of Latin. They would be permitted to read the texts in translation.

The class follows the development of Latin satire from its origins to Juvenal. The chief representatives of Latin satire that survived are Horace and Juvenal, and a wide selection of their works is read and studied thoroughly. Students are required to read the assignments for themselves and to follow the lectures which are informal and are combined with discussions of problems that arise from the texts. There are also occasional seminars on special topics and problems in the Roman satire.

Additional reading is suggested as an aid and is left to the discretion of the individual student.

Prerequisite: Latin 200.

301 A Study of Vergil Lecture 2 hours, M. A. Usmani

The purpose of this class is to study the development and importance of Vergil's basic themes and ideas that are

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.

Lectures are given and discussions and seminars are held on special topics as they arise in the course of study.

This class may be taken also by students who do not read Latin, by special arrangement.

Prerequisite: Latin 200.

302 Roman Comedy Lecture 2 hours, M. A. Usmani

This class consists of readings of selected plays of Plautus and Terence. As an introduction to reading, a brief survey of Greek comedy is given, and in a few lectures the general lines of Roman comedy are sketched. The class work is conducted in seminar style, students reporting on their readings and impressions of the individual plays.

The class may be taken also by students who do not read Latin.

Prerequisite: Latin 200

Classes Offered Near Eastern Languages

The classes in Hebrew, Coptic, Syriac, Arabic, and Akkadian are available as electives at the discretion of the Department, only in relation to the needs of particular students.

Hebrew

101 Elementary Hebrew and Introductory Readings, J. B. Hardie.

This class is taught at Pine Hill Divinity Hall.

102 Conversational Hebrew, 2 hours (early evening), M. H. Halzel.

All lectures will be conducted in the Hebrew language as it is spoken in Israel today. With the assistance of props, drawings, and mimicry, all students will become involved in conversation right from the beginning. Grammar, tenses, etc. will not be taught separately, but will evolve from conversation. The class generally will follow the Harvard Method as developed by Dr. David Weinstein in his book *Hebrew Through Pictures*.

For those capable of reading the Hebrew language, modern Hebrew short stories will be assigned for reading and translation on their own.

Prerequisite: None.

Hebrew 202 Intermediate Hebrew, J. B. Hardie.

This class is taught at Pine Hill Divinity Hall.

303 Advanced Hebrew, J. B. Hardie.

This class is taught at Pine Hill Divinity Hall.

Coptic

101 Introduction to the Coptic (Sahidic) language and literature, E. Segelberg.

Coptic, representing the last stage of development of the Egyptian language, became the language of Christian Egypt. Knowledge of Coptic is becoming more and more useful, thanks to the recent discoveries of valuable texts. Students of ancient history and near eastern religions find a fair knowledge of Coptic useful, and to some students of the New Testament Coptics is indispensable.

200 Reading of Selections from other Coptic Dialects E. Segelberg

300 Reading of Coptic Texts, Mainly from the Recently Discovered Nag Hammadi Papyri. E. Segelberg

Syriac

100 Introduction to the Syriac Language and Literature E. Segelberg.

Syriac, a Semitic language very close to the Aramaic spoken by Jesus, was and is to some extent still the language of the Syrian churches of the Near East and India, once spread into ancient China and Japan. The Syriac literature represents a rich and partly very independent way of Christian thought.

Syriac is useful for any student of the history and religions of the Hellenistic period and early church history, and for some students of Islamology and Ancient philosophy, the Syrians introducing the ARabs to Aristotle, etc., Syriac is indispensable.

200 Syriac Language and Literature E. Segelberg

Reading of some early writers such as Aphraates and Aphrem, the famous hymnographer.

Arabic

Students wishing to take a class in Arabic must consult with the Department before registering for the class.

100 Introductory Grammar and Reading of Texts

200 Intermediate Arabic

Akkadian

100 Introductory Grammar and Reading of Texts (as required), B. W. W. Dombrowski.

200 Intermediate Akkadian (Babylonian) (as required), B. W. W. Dombrowski.

The major part of this class will be devoted to a close study of the old Babylonian Mari-letters and the Babylonian Epics. Students are expected to be well prepared prior to attendance of their class.

300 Advanced Akkadian (as required), B. W. W. Dombrowski.

The major part of this class will be concerned with the study of inscriptions of Assyrian kings selected from all periods.

400 Advanced Akkadian, B. W. W. Dombrowski.

The major part of this class will be concerned with the study of Mesopotamian documents of the first millennium B.C.

Classes Offered Literature, History and Philosophy

Note: The history and philosophy classes listed below may be given credit as classics classes or as history or philosophy classes respectively.

Classics 100 Classical Literature in Translation, Lecture 3 hours, J. A. Doull/J. P. Atherton/R. D. Crouse/R. Friedrich.

(see also under Comparative Literature)

Classics 100 is intended to introduce the student to the poetry and literature of classical and Christian antiquity, by means of a study, in English translation of some of the greatest works of ancient authors.

The first part of the class will be devoted to a study of Greek Epic and Drama (Homer's *Iliad*, tragedy and

comedy) and Aristotle's *Poetics*. The second part will be given to Roman poetry and literature (Vergil's *Aeneid* and Juvenal's *Satires*). The lectures will conclude with a study of St. Augustine's *Confessions*.

The course will concentrate on the most important literary forms and themes and political and philosophical ideas expressed in these works. Thus, this class should serve as an introduction to both the study of ancient and Christian literature and the study of world literature; it should also be of value to students in other fields of the humanities and social sciences in that it shows the origins and significance of many of the ideas which have been of central importance in the formation of the traditions of Western thought.

As the class is intended as an introductory one, no special preparation is expected, and there is no foreign language requirement.

Classics 221 History of the Ancient Near East, Lecture 2 hours (2 half-classes), B. W. W. Dombrowski.

This class makes an analysis of significant periods of the political and cultural history of the Near East from prehistorical times to the beginning of the Christian Era. 1971-72: The History of Israel from the beginnings into the New Testament Period.

Prerequisite: A history class or a classics class, possibly a class in the social sciences, at the discretion of the instructor.

Classics 222 Greek History. (Not offered in 1971-72).

Classics 223 Roman History, Lecture 3 hours, B. W. W. Dombrowski/J. P. Atherton.

This class will give a survey of the origin and development of Roman political organization and culture, emphasizing special aspects as may be determined from time to time. During the first term, the course of lectures will centre on the establishment of Republican institutions and their disintegration in the process of the territorial and economic growth of Rome. The second term's work will be mainly concerned with an assessment of the stabilizing and dissolving forces within the Roman Empire. Students are expected to read extensively.

Prerequisite: As for 221.

Classics 224 The Bible in Relation to Classical Culture, Lecture 3 hours, R. D. Crouse.

The general subject of this class is the formation of the Jewish tradition in the context of Ancient Near Eastern history and its confrontation with Hellenism in the formation of the traditional Christian theology. Within this general subject, the topics will vary considerably from time to time, depending upon the interests of instructors and students; sometimes the emphasis will be on Old Testamental problems, sometimes on New Testamental and Patristic problems. In general, the object of the class will be to explore the manner in which Judaic and Hellenic traditions come together in antiquity to form ideas and institutions characteristic of Christian culture. Students wishing to register for this class should first consult with the Department.

Prerequisite: Classics 100, or previous work in ancient history or ancient philosophy.

Classics 225/525 History of Religion/Comparative Religion/Ancient World, Seminar 2 hours, E. Segelberg.

This seminar will discuss various aspects of religions in Greece, Rome and the Ancient Near East up to the victory of Christianity. Emphasis will sometimes be laid on the background of Christianity and Islam, sometimes on Hellenistic syncretism and Gnosticism, sometimes on earlier stages of religion in the area.

Classics 251/551 Seminar on Problems of Ancient Near Eastern History, Seminar 2 hours, B. W. W. Dombrowski.

1971-72: The Maccabean Revolt as reflected in Jewish Hellenistic literature.

This class is primarily for honours and graduate students. Others may be admitted at the discretion of the instructor. *Prerequisite:* As for 221.

Classics 252/552 Seminar on Problems of the Hellenistic Period, Seminar 2 hours, E. Segelberg.

This class is intended for honours, graduate and theology students only. 1971-72: The background of Christian baptism and its development during the first three centuries. Characteristics of the Hellenistic Age will be studied in detail as warranted.

Prerequisite: As for 221.

Classics 253/553 Seminar on the Roman Empire and the Rise of Christianity, Seminar 2 hours, J. P. Atherton.

Selected topics from the transition from classical to Christian culture will be studied. Particular attention will be paid to the connection between religious innovation and change in political and social life and the effect of the new beliefs on literature, art and philosophy. (The class is intended primarily for honours and graduate students. Others may be admitted at the discretion of the instructor.) *Prerequisite:* As for 221.

Classics 336 Ancient Philosophy from Aristotle to St. Augustine (same as Philosophy 336), Lecture 2 hours, R. D. Crouse/J. A. Doull.

Classics 336 (Philosophy 336) studies the development of classical and patristic thought from Aristotle to St. Augustine and examines the manner in which the philosophical achievement of ancient Greece came to form, in the thought of the Church Fathers, the intellectual foundation of European culture.

The class will begin with a careful consideration of Aristotle's account of the history of earlier Greek thought, especially that of Plato, and in this connection, parts of Plato's *Timaeus* will be considered in detail. Among the works of Aristotle, the *Metaphysics* will receive special attention, particularly the theology of Book XII. In the second term the class will be concerned with the later history of Greek philosophy, and with the problems of the relationship of the philosophical tradition with Graeco-Roman, Jewish and Christian religious movements. The authors most closely studied will be Plotinus and St. Augustine.

Classroom discussion and occasional seminar papers will focus on a few of the most important texts, while the general continuity of the history will be studied in lectures and supplementary readings.

Classics 338 Medieval Philosophy (same as Philosophy 338), Lecture 2 hours, R. D. Crouse.

Classics 338 (Philosophy 338) studies the development of philosophy in the formative age of European civilization and examines related political, institutional, literary and theological concerns. An attempt is made to show how the legacy of classical and Christian antiquity was appropriated and reformed to constitute the ideology of medieval Christendom.

The class will be devoted mainly to the study and discussion of a few fundamental texts, beginning with Boethius' *Consolation of Philosophy*. Special attention will be given to Anselm's *Proslogion* and the first few questions of Thomas Aquinas' *Summa Theologiae*. It will be the object of lectures to present the continuity of the historical development and to emphasize the broad implications of the philosophical doctrines presented in the texts. In the latter part of the class, some attention will be given to late medieval Platonism and Mysticism, so that something can

be shown of the beginnings of Reformation and modern philosophical and religious thought.

Classics 461/561 Seminar on the Philosophy of Aristotle (not offered in 1971-72), Seminar 2 hours, J. A. Doull

The purpose of this seminar is to determine the original sense of Aristotelean philosophy through the close study of one or more works. Some previous study of ancient philosophy and the ability to read Greek or Latin are assumed. The subject for 1971-72 will be Aristotle's *Metaphysics*, with ancient and medieval commentaries.

Classics 463/563 History of the Interpretation of Aristotle (Not offered in 1971-72), Seminar 2 hours.

Certain of the chief interpretations of Aristotle from the Neoplatonists to Hegel are studied.

Classics 464/564 Seminar on the Philosophy of the Church Fathers R. D. Crouse

The particular subject of this seminar will vary from year to year, concentrating on the works of one or more Greek or Latin authors, or on the development of a particular doctrine. The approach will be philosophical rather than philological, and some preparatory work in ancient philosophy as well as some competence in the appropriate language or languages will be expected. Members of the seminar will be asked to present papers frequently, and to prepare one major essay in the course of the year. Subject for 1971-72: Topics in Augustine, Pseudo-Dionysius and Eriugena.

Classics 465/565 Seminar on Neoplatonism (not offered in 1971-72).

Topics from the history of Neoplatonism and its relation to the theology of the Greek Church will be studied.

Graduate Studies

The department offers an M. A. programme in classical literature, in ancient history and in ancient and medieval philosophy. For details, see the Calendar of the Faculty of Graduate Studies.

47.6 / Commerce

Professors

R. E. George (Chairman)
C. R. Brookbank (Sabbatical Leave)
R. S. Cumming
C. W. Schandl

Associate Professors

R. H. R. Glube
J. R. Hanrahan
J. W. Matthews
J. D. Misick
R. C. Shook

Part-time Associate Professor

R. M. Worrall

Assistant Professors

R. U. Doyle
I. K. Muncaster
R. S. Sandhu
E. W. Scott (Sabbatical Leave)
G. E. R. Zinck

Lecturer

C. H. Chesley (Leave of Absence)

Part-time Special Lecturers

J. A. Dougall
H. A. MacKinley
C. McManus
E. G. Markosky

J. H. Oyler
C. W. Hayward
J. Whittaker (Assistant Prof. NSTC)

The Department of Commerce offers a curriculum designed to equip students for positions of ultimate leadership in business, government and the professions. On the satisfactory completion of a three-year course of study, students are awarded the degree of Bachelor of Commerce. The programme serves the needs of at least four separate groups of students:

1. Those who wish upon graduation to embark immediately upon a business career and who believe that a course offering academic subjects both in arts and science and in commerce is the best preparation for the career objectives they have in view.

2. Those who upon graduation wish to become chartered or industrial accountants and believe that their career will be strengthened by an integrated study of accounting theory at a university.

The Institute of Chartered Accountants in most provinces in Canada offer exemptions to graduates in commerce of Dalhousie who are candidates for the Diploma in Chartered Accountancy.

The Society of Industrial Accountants also offers exemptions to graduates in commerce of Dalhousie who are candidates for the Diploma in Registered Industrial Accountancy. Although exemptions vary as to classes taken, graduates could possibly eliminate two years of the five-year programme of study.

Students who are interested in the details of such exemptions should contact the office of the Institute or Society in the province in which they intend to obtain their diploma in Chartered Accountancy or Registered Industrial Accountancy.

3. Those who want rigorous preparation in a particular field of commerce or in economics. These students are able, beginning in their third year and extending over an additional year, to read for honours.

4. Those who upon graduation wish to pursue further studies in business administration before starting their business career. (Dalhousie has initiated a graduate programme in business studies leading to the degree of Master of Business Administration to which graduates of all faculties who have obtained a satisfactory standing will be eligible for admission.)

The entire undergraduate curriculum is designed to give, throughout the three years of the general degree course, a balanced programme of academic study in the humanities and social sciences, together with studies in the functional fields of business and quantitative methods.

For students entering in September, 1970 and subsequent years, the curriculum has been revised to give recognition to the increasing emphasis on quantitative and behavioural analysis, while permitting the maximum opportunity for each candidate to pursue those areas which appeal to his interests.

Students who entered in September, 1969 may find it possible to transfer to the revised programme without loss of credit. Those intending to do so must consult the Department of Commerce prior to registration. Otherwise, students will continue on the curriculum as outlined in the Calendar in the year of their admission to the commerce degree programme.

In all the commerce classes the underlying purpose is to teach principles. The application of these principles is not stressed but is included in the programme, where appropriate, to illustrate how theory relates to practice. In addition, special discussion on current development in

business, finance, labour and government are held, in which recognized authorities participate.

To summarize, it may be said that the aim of the programme is to produce individuals who have some specialization within a broad background based on general education.

Degree Programmes

Students entering in 1970 and subsequent years.

The Department of Commerce offers courses leading to a General and to an Honours Bachelor of Commerce degree.

General Bachelor of Commerce

The General Bachelor of Commerce degree course takes three years and requires the completion of fifteen classes — nine "core requirement" classes and six electives. Two electives will be from subject areas covered in the core requirements, two will be selected from classes titled other than "commerce" or "economics", and two may be selected without restriction.

Depending on the student's background and/or intended concentration, the sequence in which the following classes are taken may be altered. Consult the Department of Commerce prior to registration to avoid difficulties in later years of the programme.

Year I

I Core requirements:

Commerce 101 and 102.
Economics 100A and 100B
Mathematics 110

II Electives: One class outside the business area (i.e., not titled "Commerce" or "Economics").

Year II

I Core requirements:

Commerce 213A and/or B (1 term)
Commerce 206A and/or B (1 term)
Commerce 204 (was 304 in 69/70)
Commerce 207A and/or B (1 term)
Commerce 208A and/or B (1 term)
Commerce 209B (1 term)
Economics 220 A/B or Economics 221 A/B.

II Electives: One class outside the business area (i.e., not titled "Commerce" or "Economics").

Year III

I Core requirements:

Commerce 302

II Electives: Two classes chosen without restriction, except that overall requirements must be met (see above), and two classes chosen from core requirement subject areas.

Bachelor of Commerce with Honours

The Honours Bachelor of Commerce degree course takes four years and requires the completion of twenty classes.

Unless there are special circumstances, a student must apply for entry into the honours programme not later than the end of his second year.

The programme for a student's last two years shall be designed in consultation with the Department and be subject to the approval of the Department.

All requirements for the B. Comm. general degree must be met. An additional five credits must be obtained, at least three must be in the "core area" (one being an honours seminar) and one must be outside the "core area".

No 100-level classes may be taken in the fourth year.

Students entering in 1969 and Earlier Years

(See 4 for students entered in 1969 who wish to transfer to the new programme.)

Consult the Calendar for the year in which you were first admitted to the commerce programme.

The English 100 requirement listed in earlier calendars is discontinued, but students are encouraged to choose English as an elective class.

Classes Offered

101 Introductory Accounting, Lecture 3 hours; workshop 1 hour, G. E. R. Zinck

Renumbered Commerce 210 for 1970-71 only.

This class gives an introduction to the principles used by accountants in processing financial data and in communicating such data both within and outside the business, and studies the interpretation and use of financial reports for decision-making purposes.

The first half of the term will emphasize principles and their application in what is generally known as financial accounting. In the second half of the term the focus will be on accounting information for management needs.

There are no prerequisites for this class. The number of students who can be accommodated in this class will be limited. Any student who cannot be accommodated will take the class in his second year.

102 Business and Society, Lecture 3 hours; workshop 1 hour, R. S. Cumming

Among the most widespread of man's institutions are those that have been developed in the business and commercial sphere. Their history has probably been at least as long as that of man's legal institutions. Yet, students pass through most school and university curricula without being given any awareness of the historical and philosophical foundations of the system in which the majority will spend their working lives. Consequently, it is hardly surprising that young people enter the business world with some strange assumptions.

The purpose of this class is to give the student an opportunity to understand business as an institution and to relate business to other institutions in society. It is intended that students examine for themselves the evolution of Western attitudes toward business and the philosophical ideas and concepts which have helped to shape business and to affect the interactions between business, society, and the individual. Among the concepts and institutions considered are individual and collective freedom, justice and law, authority and power, pluralism, private property, work and leisure, profit, competition, progress and innovation, and the social responsibility of individuals and organizations.

The class has three parts. One part concerns the rise and development of our business system. The second part consists of an analysis of the dominant features of large-scale business, with its developments of the corporation and the combine, and its complex relations with the worlds of commerce and finance. The third part discusses which features of the operations of industry are desirable and which are undesirable; what general steps might be taken to make business serve society more satisfactorily; what tests might be used to appraise the functioning of business, and how the operation of modern business gives rise to practical problems of public policy in the interest of society.

201 Financial Accounting Concepts and Practices

Renumbered Commerce 310 below.

202 Managerial Accounting and Introductory Finance, (old programme only), Lecture 3 hours. (Not given 1970-71).

Students who require this class in order to complete their degree should consult the Chairman of the Department of Commerce.

203 Legal Aspects of Business (old programme only).

Requirement may be satisfied by completing both Commerce 213 A/B and 214B.

204 Statistics for Economics and Business, Lecture 3 hours; workshop 2 hours, R. S. Sandhu

Topics studies include the definition, functions and sources of statistics; the design and execution of statistical enquiries; statistical tables; graphs and diagrams; measures of central tendency, dispersion, skewness and kurtosis; curve-fitting; probability (estimating mean and proportion in population from samples, and testing hypotheses about means and proportions); quality control; index numbers; time series analysis; elementary correlation.

Background knowledge that is essential for this class includes: algebra at approximately Grade XI level; some experience of constructing and interpreting graphs; the ability to think quantitatively, which is usually gained by the study of geometry and algebra at the high school and university level; familiarity with national accounting concepts.

205A and/or B Computer Applications to Business Problems, Lecture 3 hours, R. S. Sandhu/R. C. Shook

Orientation of the class is toward use of the computer as a problem-solving tool. Practice will be provided in Fortran and Marlan, with emphasis on the use of library subroutines and main programs. Problem selection will be from areas of business applications. Course may be taken concurrently with Mathematics 110, and it must be taken before or concurrently with statistics.

207A and/or B Introduction to Managerial Finance (1 term), Lecture 3 hours, J. R. Hanrahan

This class gives an introduction to the problems faced by business managers in the acquisition and effective utilization of the firm's financial resources and presents analytical concepts for evaluating financial decisions. This necessarily involves consideration of how the firm can achieve successful interaction with its external environment and make an appropriate contribution to the operation of the economy.

Essential background knowledge: An understanding of economic principles and the economic environment in which a business operates, and sufficient knowledge of accounting processes and principles to enable the student to use financial data intelligently.
Prerequisites: Economics 100A and Economics 100B and Commerce 101.

208A and/or B Marketing Management (1 term), Lecture 3 hours, R. H. R. Glube/I. Muncaster.

This class is designed to give the student a basic understanding of the character and scope of marketing and its role in business operations. It focuses upon the concepts and techniques which a business must employ if it is to anticipate and satisfy consumer needs.

Emphasis is placed on the development of understanding and analytical ability in the following areas: the role of the consumer; product-line development; channels of distribution; pricing systems; selling and promotional activities. Case materials are used to give the student insight into the analytical tools used in problem analysis and decision-making.

No previous training in marketing is assumed. Students wishing to concentrate in marketing should plan to take Commerce 208 A/B in their first year.

There are no prerequisites for this class, although some knowledge of accounting would be helpful.

209B Production, Lecture 3 hours, J. Whittaker

This half-class is designed to give the student an insight into the applications of management science as a tool to aid in the decision-making process in production.

The topics which will be covered include: the background of management science, principles of model building, the use of models for resource allocation, control of inventories, simulation, scheduling and control.

213A and/or B Legal Aspects of Business — Contracts (1 term), Lecture 3 hours, R. S. Sandhu.

The meaning and sources of law, the machinery of justice; torts, formation of contracts, capacity of contract; legality of object, mistake, misrepresentation; statute of frauds.

Privity of contracts; interpretation and discharge of contracts; breach of contracts; agency.

214B Commercial Transactions, Lecture 3 hours, R. S. Sandhu

Contract of sale, bailment, employment; negotiable instruments, real property, tenant and landlord, mortgages; partnerships, corporations, their nature and management; devices for securing credit; bankruptcy, mechanics lien, limitation of actions.

Prerequisite: Commerce 213A/B.

301 Cost Administration, Lecture 2 hours, workshop 1 hour, J. Matthews

Cost accounting is studied as an aid to management control and decision-making. The class examines the informational needs of management and the means of accumulating and reporting the necessary information. Cost determination, planning, control and budgeting (cash and capital) are analyzed in relation to the internal needs of the management team.

Essential background knowledge: an understanding of accounting processes and principles and the ability to work with accounting information.

Prerequisites: Commerce 101 and Commerce 310. The latter may, with the approval of the instructor, be taken concurrently.

302 Human Relations in the Work Environment, Lecture 3 hours, J. D. Misiak/R. Doyle.

The purpose of this class is the development of insight into human behaviour in organizations and a capacity for objective analysis of it. Research and text material drawn from the fields of sociology, anthropology and psychology are used as aids in the development of understanding and objectivity. As well as dealing with substantive data from the behavioural sciences, the class pays considerable attention to case material. While the main emphasis is put upon the analysis of this material, time is devoted to the formulation of general solutions and decisions for action.

There are no formal prerequisites for the class, although some background in the behavioural sciences may be helpful.

303 Technological Change and Economic Development, Lecture 3 hours, R. S. Cumming

This class will study the growth of technology in the Western world since 1750 in its relationship to economic and social change, with special emphasis on Canada and the

United States. The student will have an opportunity to investigate a subject of particular interest to himself.

304 Economic Statistics (same as Economics 222).

Renumbered as 204 above.

307A Finance, Lecture 3 hours

A more intensive study of capital budgeting, cost of capital and financial and operational leverage than that of Commerce 207A/B. Special emphasis is placed on the long term capital and the bargain for funds vital in financing the business enterprise.

Prerequisite: Commerce 207A.

308 Marketing: Principles and Problems (old programme only).

The requirements for this class will be satisfied by taking Commerce 208A/B plus one of Commerce 316A, Commerce 317B, Commerce 318A or Commerce 319B.

Prerequisites: Commerce 210, Commerce 102.

310 Financial Accounting, Lecture 3 hours, workshop 1 hour, J. Matthews

This class is concerned with the concepts of external reporting by business firms. The theory and procedures involved in the valuation of resources and obligations are explored. The concepts of income determination are also considered.

This class is the foundation for further study in the area of financial accounting and it should be taken by those students contemplating an accounting career.

Prerequisite: Commerce 101.

316A Marketing — Mass Distribution (1 term) (not offered every year), Lecture 3 hours.

This class will deal with the important types of mass distribution institutions including department stores, supermarkets, mail order companies and specialty stores. Since these various institutions are continually adapting to a changing environment, the approach will principally be the major policy decisions of top management in the areas of basic strategy and marketing mix.

Prerequisite: Commerce 208A/B.

317B Marketing — Sales Management (1 term) (not offered every year), Lecture 3 hours

In this class the student will have an opportunity to apply the management approach to an analysis of the sales executive's job, his duties, responsibilities and the various roles he plays in making marketing decisions. Thus the student will be required to:

1. Achieve an understanding of the role of the salesman in the marketing mix.

2. Sharpen his analytical and planning skill through case study in the design and implementation of selling strategies.

3. Develop some skill in motivating and controlling subordinates and in other problems of sales force direction. This goal will be approached through the use of a sales management game.

Prerequisite: Commerce 208A/B.

318A Marketing Research and Information Systems (1 term) (not offered every year), Lecture 3 hours

Through the use of cases, it is the objective of this class to develop in students the potential managerial skills required to specify and utilize marketing research in defining, solving and evaluating marketing decisions. Emphasis will not be on mathematical formulae but rather on the research process, the problem formulation. Besides the study of research for

special purpose nonrecurring problems, the class will also deal with planned systems for the regular collection, handling, and reporting of marketing information.

Prerequisites: Commerce 208A/B, Commerce 204.

319B Marketing — Advertising and Consumer Behaviour (1 term) (not offered every year), Lecture 3 hours

Advertising is one of the most pervasive forces in the world today. Sometimes maligned, sometimes overpraised and often misunderstood, it is worthy of more serious academic attention than it sometimes receives. Our approach takes the viewpoint of the manager who will be responsible for developing and managing advertising programs or being an advertising executive. Because design of advertising is based on consumer behaviour, we will review the extensive research of behavioural science as applied to the consumer. From this research we hope to generalize various implications and processes for marketers, and through the use of cases assess their practical market implications. We will also deal with the development of advertising theme and media, advertising evolution, budgeting, client-agency relations and public, government relations to advertising.

Prerequisites: Commerce 208A/B, Commerce 204.

320A Taxation, Lecture 3 hours, H. A. MacKinley

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.

Prerequisites: Commerce 101 and Economics 100A and 100B.

350 Special Class for Honours Students

354 Finance and Taxation (old programme only)

The requirements of this class will be satisfied by taking Commerce 207A and Commerce 320B.

450 Accounting Theory and Systems (for honours students), Lecture 2 hours, C. W. Schandl

The class makes independent investigations in the philosophy of accounting and auditing, based on recent literature.

Topics studied include information theory, role and function of "theory", measurement theory; systems, accounting systems; the concept of control; forms of control; theory of auditing; investigation in the nature of "evidence"; current problems of accounting and auditing as they are dealt with in recent publications.

Prerequisite: Commerce 310.

451 Management Control Systems and Auditing, Lecture 3 hours, C. W. Schandl

This class explores the concepts of management control systems, their establishment and review, together with the standards and procedures involved in the attest function (auditing). The role of the computer and statistical sampling in the attest function are examined. The problems of undertaking investigations for special reports are also considered.

This class is required for honours students in accounting and it should be taken by those persons contemplating an accounting career.

Prerequisite: Commerce 310.

452 Advanced Accounting, Lecture 3 hours

The class considers the accounting and reporting theory of business expansion and contraction. Partnerships and consignments are discussed. The theory and problems

involved in business reorganizations and liquidations are also explored.

This class is required for honours students in accounting and it should be taken by those persons contemplating an accounting career.

Prerequisite: Commerce 310.

455 Economic History of North and South America

456 Economic History of Great Britain and the British Commonwealth, R. S. Cumming

These tutorial classes are designed to provide an opportunity for a student to investigate a subject of special interest to himself. The outline of the class, the list of readings, and the topics selected for essays are based upon discussions between the lecturer and the student.

A one-hour discussion period is held each week and every second week an essay is submitted.

These classes are restricted to advanced students.

47.7 / Comparative Literature

The Departments of Classics, English, German, Romance Languages and Theatre offer the following classes in Comparative Literature. Students may select a minor programme in this subject.

100 Comparative Literature

This is an introduction to the history of modern European literature from the Renaissance to the beginning of the 19th century. Works such as Cervantes' *Don Quixote*, Tirso de Molina's *Don Juan*, Moliere's *Don Juan*, Corneille's *The Cid*, Racine's *Phaedra*, Goethe's *Faust*, Kleist's *Prince Frederick of Homburg* will be studied in English translation. Marlowe's *Doctor Faustus* and Shakespeare's *Hamlet* and *the Tempest* will also be studied.

Note: English 100 or Classics 190 is acceptable as an equivalent to Comparative Literature 100. For a description of these classes see the entry under Departments of English and Classics.

204 European Novel

For a description of this class see the entry under Department of English.

254 Myth in Dramatic Literature

This class will examine the use of classical myth in dramatic literature to formulate statements about man, and will explore the paradox of artistic creation through imitation.

Prerequisite: Comparative Literature 100, English 100, or Classics 100.

350 European Romanticism

This class will study the origins, main themes and trends of the Romantic movement in Germany, France, England and Spain, with reference to the works of its most important representatives, e.g., Schlegel, Hugo, Byron, Larra and others. The effects of this movement on contemporary society will also be examined.

Prerequisite: Comparative Literature 100, English 100 or Classics 100.

354 Theory and Practice of Drama: Aristotelian and Non-Aristotelian

This class will study the basic concepts of Greek theory of drama, its effects on the practice and theory of Western drama, and Brecht's non-Aristotelian theory of the theatre as opposed to the tradition of Western drama. Current trends in modern theatre will be discussed in the wider context of the opposition between "drama based on ritual" and "drama based on politics". (Brecht, W. Benjamin).

Prerequisite: Comparative Literature 100, English 100, or Classics 100.

47.8 / Economics

Professors

J. F. Graham

J. G. Head

Z. A. Konczacki

N. H. Morse (Chairman)

Y. Murata

A. M. Sinclair (on leave, 1971-72)

Associate Professors

R. L. Comeau

C. Steinberg

Assistant Professors

J. M. Beauroy

F. M. Bradfield

P. B. Huber

G. A. B. Kartsaklis

E. Klein

C. T. Marfels

C. M. Ouellette

T. A. Pinfold

U. L. G. Rao

Visiting Professor

T. W. Hutchinson (First term, 1970-71)

The aim of social science is to understand how societies function and how they develop. Economics is one of the social sciences and is concerned with a particular set of activities related to the production, exchange and consumption of goods and services. These activities in a region or nation constitute an economy. Economics also studies how incomes are earned in an economy, why the level of economic activity is what it is, and how different economies or countries are related to one another. To understand the operation of an economy is to be able to predict the effects of changes in any of its parts. It is this power of prediction which makes the study of economics relevant to current problems, because economics can deal with certain questions which our society deems significant such as: how can jobs be made available so that young people ready to earn a living can find work, and do rising prices hinder improvements in the standard of living?

To answer such questions, one must employ economic theory. This is a systematic body of principles that has been developed to explain the operation of an economy as a whole as well as the interconnections of its parts. Training in this theory is essential to any study of economics. Over time, economic theory has been refined by applying statistical techniques to test hypotheses about economic behaviour. Because of this use of statistics, and because much of economic analysis can be simply and precisely expressed in mathematical form, the student of economics will find some knowledge of mathematics and statistics helpful.

Economic theory is used for the interpretation and analysis of a wide variety of problems in various fields of study within economics. Some of the more important of these fields are labour economics, economic development, economic history, international trade, money and banking, taxation and government expenditure, and the organization of industry. The programmes of study leading to a B.A. with a major in economics allow considerable flexibility in order to accommodate a variety of interests on the part of students, and it is possible to combine a major in economics with a minor in another related discipline such as political science, sociology, history or mathematics. Students who wish to acquire a more intensive and broadly based understanding of economics than is possible in the General B.A. course should seriously consider taking an honours degree course.

Students graduating with a major in economics find many well-paid and interesting opportunities for employment,

and the demand for students with postgraduate training in economics is large and rapidly expanding. A good record in the General B.A. or Honours B.A. degree course satisfies admission requirements to most post-graduate programmes. Economists with post-graduate training are sought after for teaching, research and administrative positions by universities, business, government and international organizations.

Degree Programmes

The department offers undergraduate and graduate programmes in economics. Students should consult the timetable and the department at the time of registration for changes in or additions to the courses listed here.

General B.A. with Major in Economics (Recommended Programme)

Year I

1. Economics 100A and 100B.
2. Political Science 100 or Sociology 100.
3. History 100 or Philosophy 100.
4. Mathematics 110 (or Mathematics 100).
5. Modern language.

Year II

- 6.-7. Economics 220A/B, 221A/B, 222.
8. One other class in economics.
9. English 100.
10. Sociology 100 or Political Science 100, whichever was not taken in first year; or a higher level class in whichever subject was offered in the first year.

Year III

- 11.-12. Two classes in economics.
13. History 100 or Philosophy 100, whichever one was not taken in first year.
- 14.-15. Two classes beyond the 100 level, ordinarily selected from fields related to economics, such as sociology, social anthropology, political science, history, philosophy, or mathematics.

Notes on General Programme

1. Students considering majoring in economics are encouraged to consult the department about their programme.
2. Although students may offer fewer classes in economics than the six suggested, this number is deemed necessary to provide a basic knowledge of the discipline and should be regarded as the minimum for preparation for a graduate programme in economics.
3. The foreign language and English 100 classes are optional but are recommended as part of a well-rounded programme.
4. Economics 220A/B and 221A/B are basic classes. It is highly desirable that students complete them by the end of Year II in preparation for taking higher level classes.
5. Students must satisfy the overall requirements for the General B.A. degree, as outlined in section 46.1.

B.A. with Honours in Economics

Year I

1. Economics 100A (and 100B as required).
2. Mathematics 110 or 100.
3. History 100 or Philosophy 100.
4. Sociology/Anthropology 100 or Political Science 100.
5. Elective.

Year II

6. Economics 220A/B and 221A/B.
7. Economics 222 (or Economics 322).
8. History 100 or Philosophy 100, which ever was not taken in Year I.
9. Economics 232 or other economic history class.
10. Sociology/Anthropology 100 or Political Science 100 or higher level class in whichever of sociology or political science was taken in Year I.

Years III and IV

- 11.-16. Six economics classes including 327, 320, 321, and 450.
- 17.-18. Two classes in minor field.
- 19.-20. Two electives.

Combined Honours

There are several combined honours programmes:

- Economics and Sociology
- Economics and Political Science
- Economics and Philosophy
- Economics and History
- Economics and Mathematics
- Economics and Psychology

Students interested in any of these combinations should consult with the departments concerned. Combined honours programmes may also be arranged with other departments. For combined honours programmes with economics where the major concentration is in the other discipline, students should consult the other departments concerned.

Notes on Honours Programmes

1. The student's programme will be chosen in consultation with the department and must have the approval of the department.
2. Honours students must pass a comprehensive examination at the end of their fourth year.
3. Students in the major programme will normally be required to take at least three classes in a minor field related to economics (sociology, social anthropology, political science, history, philosophy or mathematics). In any case, of the classes selected outside of economics in the third and fourth year, students must include at least two classes above the elementary level.
4. Departures may be made from the order of classes with departmental approval.
5. 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.
6. The department may require the student to prepare an honours essay under its supervision.
7. Students planning to do graduate work in economics are advised to include Economics 320 and 321 in their programme. It is also most desirable to have at least one modern language.
8. Students must be careful in arranging their courses to ensure that they satisfy the overall requirements for the General B.A. degree stated in section 46.1.

Classes Offered

Economics 100 (and 100A), Lecture 2 hours; tutorial 1 hour, J. Graham/R. Comeau/C. Queltette/N. Morse/T. Pinfold

The Economics 100 class is designed to provide a general introduction to the science of economics and to introduce students to the ways in which economic science can be applied to resolve economic problems. To these ends the class has been designed; first, to give a quick survey of the important principles, terms and methods employed by the economist and, then, in the second half of the year, the basic theory of the first term will be applied and extended by identifying specific economic problems and employing the tools of economics to analyze them and to propose policies for their solution.

In the first segment programmed teaching materials are employed to move swiftly over the most important principles and concepts of micro- and macro-economics.

At the mid-term, students are offered an option for the second term. It is expected that most students will continue with the Economics 100 class which will devote the remainder of the year to economic problems and policy applications. At the completion of Economics 100, students who choose to take further work in economics will have the basic preparation needed for other classes offered by the Department of Economics, while students for whom Economics 100 is the only class in economics they will take should have obtained sufficient knowledge of economics to view economic issues more intelligently.

For those students who, at the completion of the first segment of Economics 100

- (a) have already decided that they wish to do major or honours work in economics; and
- (b) have completed the first segment of Economics 100 with at least second-class standing,

the option is offered either to continue with Economics 100 or to go directly into a first level theory course, Economics 220B or 221B. They will then be accorded credits for Economics 100A and Economics 220B or 221B as they complete the second part. This second choice will permit the student who plans further work in economics to move more swiftly into the main stream of the economics programme and increase the range of choice he has among economics classes in the succeeding year. It must be stressed here, however, that those who choose to continue the Economics 100 option are in no way impeded from continuing on to further economics classes, even as majors or honours candidates - indeed it is hoped that many of those who continue with Economics 100 will find their interest in economics quickened and will be moved to undertake further study in the field of economics.

Economics 220A/B Micro-Economic Theory I, Lecture 3 hours (offered both terms), E. Klein (first term), P. B. Huber (second term)

Microeconomics deals with the economic behaviour of household as purchasers of output and suppliers of input services, and of firms as producers of outputs and purchasers of inputs, as well with the behaviour of groups of households and firms. This class covers material in this area which may be required for other classes in economics at the 300 or 400 level. Geometry and a limited amount of high-school algebra are employed.

In addition to standard topics such as consumer and producer behaviour under various market structures, an introductory treatment of general equilibrium, external economies, and welfare economics is included. Although the major emphasis is on theoretical ideas, application of these ideas are considered, in order to illustrate the range and power of micro-economic theory in dealing with practical economic issues.

Prerequisite: Economics 100 or Economics 100A.

Economics 221A/B Macro-Economic Theory, Lecture 3 hours (offered in both terms), G. A. B. Kartsaklis/Y. Murata

This class is intended to provide a sufficient treatment of macro-economic theory to serve as a basis for other classes in economics which require a knowledge of macro-economics. The class is not mathematical in its treatment of the material. Topics covered include: national income accounting; the theory of employment, interest, money, and prices; and the theory of economic growth. Both "open" and "closed" economies are considered. Major emphasis is placed on the development of the theoretical ideas.

Prerequisite: Economics 100 or Economics 100A.

222 Economic Statistics I (same as Commerce 304), Lecture 3 hours; workshop 2 hours, R. S. Sandhu

Topics studied include the definition, functions and sources of statistics; the design and execution of statistical

enquiries; statistical tables; graphs and diagrams; measures of central tendency, dispersion, skewness and kurtosis; curvefitting; probability (estimating mean and proportion in population from samples, and testing hypotheses about means and proportions); quality control; index numbers; time series analysis; elementary correlations.

Background knowledge that is essential for this class includes: algebra at approximately Grade XI level; some experience of constructing and interpreting graphs; the ability to think quantitatively which is usually gained by the study of geometry and algebra at the high school and university level; familiarity with national accounting concepts.

Economics 231A Comparative Economic Systems: National Economies, Seminar: 2 hours, P. B. Huber.

The object of this class is to sharpen the student's ability to think about problems of economic organization and control, to improve his skills in writing and speaking with respect to these problems, and to provide him with a broad background of institutional material on the structure and performance of a variety of economies. Reading on specific countries provide the basis for several short papers, but there is no written examination.

The student taking this class must understand the inter-related character of economic activity and have a good grasp of the way in which the price system operates. Preliminary reading should have included *The Making of Economic Society* by R. L. Heilbroner.

Prerequisite: Economics 100 or 100A.

Economics 231B Comparative Economic Systems: Economic Organization and Planning, Seminar: 2 hours, P. B. Huber

Initially, this class examines the economic behaviour of organizations and the ways in which this behaviour can be controlled. This provides the basis for consideration of the theory and practice of economic planning at micro-economic and macro-economic levels in various institutional contexts. Readings include selections from Dahl and Lindblom, Galbraith, Mishan, Tinbergen, and Ward.

Prerequisite: Economics 100 or 100A, plus an additional half-class in economics.

232 Canadian Economic History, Lecture 3 hours, N. H. Morse

This survey class is a study of the economic development of Canada from the age of discovery to the present. However, as Canada from the beginning has formed part of a larger system, the approach taken in the class is to present Canadian economic history in relation to the larger system which can be broadly described and analyzed in terms of the relationships between the Old World and the New. The class therefore covers areas of economic history that are considered to be relevant to an understanding of the economic development of Canada. The aim is to make the class a unit as much as possible by using themes of trade, commodity, technology, vested interests, institutions, and so forth, as a means of developing the argument. As the class proceeds, the focus shifts more and more towards Canada, but the general subject matter deals with the penetration of Europeans coming from across the Atlantic and across Siberia into the Western Hemisphere. The class therefore is a study in the formation and breakup or change in empires, the shifting balance of power between countries and regions, the role of the Caribbean areas, the rise of the United States to a position of pre-eminence, and Canadian responses to these changes and to internal problems as well.

More theory is introduced towards the end of the class than is used in the earlier parts, as some theory is helpful in discussing Canadian problems and policies, especially in the twentieth century. However, no strict prerequisites are required, although a class in economic principles and some knowledge of history would be beneficial.

233A Economic Development in Historical Perspective, Lecture 3 hours, J. M. Beauroy

Economics 233A considers the processes of industrialization since 1760 within the general historical development in England, France and Russia. It compares and contrasts the various factors which contributed to the original processes in these three cases up to 1940.

Prerequisite: Economics 100 (or 100A). Students may be admitted by permission of the instructor.

Economics 233B, Lecture 3 hours, J. M. Beauroy

This class defines, analyzes and discusses the problem of Economic Imperialism from 1860 to 1940 in relation to the major European powers. The particular cases of Egypt, China and Japan are examined successively in order to account for and compare the different responses of these countries to the impact of European industrial powers.

One of the two classes each week will be devoted to the discussion of the lecture themes and of papers presented by the students. A comprehensive reading list is distributed.

Prerequisite: Economics 100 or 100A. Students may be admitted by permission of the instructor.

235A Introduction to Economic History of Sub-Saharan Africa, Lecture 2 hours (first term), Z. A. Konezacki

The object of this class is to introduce the student to the most important problems of African economic history and to prepare him for further reading in this area of study.

Topics considered include: methodology of African economic history, some speculations on economic prehistory, economic contracts between distinct ecological regions and different cultures, introduction and spread of agricultural crops, development of landholding systems, mining and metalworking, long-distance trade routes and trade centers, overseas trade, slavery and slave trade, economic aspects of European colonization, economic policies of colonial powers, patterns of economic development during the colonial period, socio-economic impact of European colonialism on Africans, an economic balance-sheet of colonialism.

236B Recent Economic Developments in Sub-Saharan Africa, Seminar 2 hours (second term), Z. A. Konezacki

This seminar centres on the discussion of the impact of colonial heritage, present structure of African economies, problems of economic infrastructure, African agriculture, mineral development, industrialization with particular emphasis on import-substitution, problems of trade: overseas and intra-African, foreign investment and aid programs, economic planning, and prospects for the future of African economic development.

Economics 238 (Also offered as History) Selected Topics in Economic and Social History of France in XVIIIth and XVIIIth Centuries - 1600-1800, J. M. Beauroy, (not offered in 1971-72.)

The problems of the nature of the "Ancien Regime" and of the Revolution are approached from the economic and social-structures of the period. A reading knowledge of French is highly recommended.

Economics students should have Economics 100 or 100A as prerequisite.

Economics 320B Micro-Economic Theory II, Lecture 3 hours, Instructor: G. A. B. Kartsaklis

This class is mainly concerned with the theory of the firm. The discussion centers around managerial motivation and the equilibrium of the firm in theory and practice. Selected topics include the alternatives to profit maximization, break-even charts, cost-plus pricing, and the pricing of factors of production. This is followed by a discussion of

problems of market conduct under oligopoly: collusive behaviour, administered prices, and basing-point pricing are the main issues in this part. The last part of the class covers problems of resource allocation and of welfare economics. This class will be of particular value for students intending to do graduate work in Economics. A knowledge of calculus would be useful.

Prerequisites: Mathematics 110 and Economics 220A/B which may not be taken concurrently.

Economics 321 A Macro-Economics Theory II, Lecture 3 hours, G. A. B. Kartsaklis

This is a class for persons 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 will assume 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.

Prerequisite: Economics 221A/B and Mathematics 110 (or equivalent).

322 Intermediate Statistics, Lecture 3 hours, G. Rao

The student who is familiar with the basic statistical theory can appreciate econometric technique better than one who has had a formal training in statistics, which involves training in computational aspects of statistical measures but which does not give the student any understanding of fundamental theory. The purpose of this class is to equip the student with the basic theory of mathematical statistics. Statistics in its applied form has become a basic tool in all fields; recently, statistical techniques, suited to tackle economic problems, have become increasingly sophisticated. This class is designed as an introduction to econometrics; it is presumed that advanced techniques of econometrics can be understood by the student who has taken this class.

This class concentrates on the Theory of Probability, building from an axiomatic point of view, mathematical expectation, moment generating function, and statistical inference.

Multiple linear regression models will be discussed and a critique of various problems that arise consequent to violations of the assumptions of the general linear model will be presented. This will prepare the student to undertake applied econometric work; besides, it would provide a spring-board for the student to take up advanced econometrics.

The student is expected to have at least a one-year class in calculus (Mathematics 110 or 100) and preferably linear algebra too. Economics 100 (or 100A) is also required.

323 Theory and Problems of Economic Development, Lecture 3 hours, Z. A. Konezacki

The purpose of this class is to introduce the student to the theory and practice of economic development. A theoretical framework is provided for the understanding of the process of economic development in the more and the less developed countries, and particular attention is paid to the analysis of policy issues. The theoretical knowledge of the process of development is then applied to the solution of the problems of economic planning in the less developed countries.

Topics considered include: the process of economic development, involving some basic definitions and distinctions, measurement of economic magnitudes, treatment of the characteristics of the less developed countries, appraisal of selected theories of economic development and non-economic aspects of economic development; the sources of increase in productivity, such as capital formation and technical progress, improvement in labour force quality, and entrepreneurship and scale; resources for investment.

Including discussion of domestic saving, the problem of "surplus" resources, problems of fiscal and monetary policy, and foreign aid; the allocation of resources, with reference to criteria and mechanisms, capital-intensive versus labour-intensive methods, and allocation among sectors; development planning, which considers the process and the typology of planning, plan strategy, planning models, problems of implementation, and some case studies.

Prerequisite: Economics 100 or 100A. Economics 221A/B is desirable.

324 Public Finance, Lecture 2 hours; tutorial 1 hour, J. G. Head

Economics 324 is concerned with the principles of public finance and their application. The first part of the class deals with the objectives of public policy and the reasons for market failure. This section provides the elements of a theory of public expenditure which is illustrated by reference to the major economic functions of government. The second part of the class is concerned with the theory of taxation in relation to the objectives of public policy. This section explores the possible role of a sample of important taxes in the design of a good tax system. The third section examines the role of public finance in relation to economic stabilization. The final section considers the special problems of public finance in a federal system. The analysis of the various sections will be illustrated from and applied to the fiscal systems of Canada and other countries.

There will be three classes each week, one of which will take the form of a tutorial in which students will be required to present papers on topics related to the lectures. The purpose of the tutorials will be to deepen the students' understanding of material presented in the lectures and to sort out difficulties. Readings will be selected mainly in order to elaborate upon lecture topics.

Prerequisite: Economics 221A/B.

Economics 325 Labour Economics, Lecture and seminar 3 hours, C. Steinberg

Some nine million Canadians are directly dependent upon wages and salaries for a living, and their earnings constitute about 65% of the National Income. Over two million of these workers belong to trade unions in critical sectors of our economy. Economic analysis of the factors affecting wages and salaries, employment and unemployment, the conditions of labour, and the labour market is therefore important to an understanding of the economy as a whole.

The subject is introduced by reviewing: the emergence of the labour problem; the development and structure of the labour market; the growth, structure and outlook of trade unions; and the historical and legal foundations of labour relations.

Most of the year is spent in:

- Analysis of the supply of and demand for labour, opening with a review of classical wage theory.
- Examination of the theory and practice of collective bargaining, exploring also the interaction and relative strengths of market (economic) forces, and institutional (government-union-employer) forces.
- Study of labour's share of the national income and the relative effect of unions on it.
- Analysis of the determinants of employment in the macroeconomic sense, and of the measurement and problems of unemployment.

We conclude with a review of public policy with respect to labour, and an effort is made throughout to relate current events to the theoretical framework.

The course structure is intended to be flexible; however, as a base it has two lectures and one seminar (in which student teams of four each provide the materials) each week.

Prerequisite: Economics 100 or 100A and an interest in

social science and its methods. Economics 220A/B and 221A/B are desirable.

Economics 326B Money and Banking, Lecture 3 hours, R. L. Comeau

This class is concerned with tracing the impact of money and financial system on the economy and, in particular, the impact that it has on such aspects of the economy as the level of employment, the rate of inflation and the balance of payments. The principles of the operation of banks and of other financial institutions are discussed, but major emphasis is placed upon the influence of the institutions rather than their detailed modes of operation. Contemporary Canadian institutions form the basis of the course, and Canadian experience in the use of monetary policy to influence the economy is examined. A knowledge of macro-economics is assumed.

Prerequisite: Economics 221A/B.

327 History of Economic Thought, Lecture 3 hours, N. H. Morse (not offered in 1971-72)

The approach taken in this class is to study "the intellectual efforts that men have made in order to understand economic phenomena". A brief survey of medieval and mercantilist literature is followed by an examination of English classical political economy and Marxian economics together with that of other socialists. The focus then shifts to the marginalists, neo-classicists, and the institutionalists. Problems of economic instability and depression, especially in this century, require that some attention be given to Keynesian economics and its extensions. The time allotted to the study of European writers and schools and of various contemporary writers and current topics depends in part on the interests of students. It is recognized that the tremendous expansion of the literature and the emergence of highly specialized fields in economics makes it necessary to select from recent sources only a relatively small sample of writings which relate this class to others which the student may be taking. The links can be forged, nevertheless, by means of a number of topics such as the following: the theory of value, the treatment of money, the theory of economic growth, the theory of distribution, and the relationship between growth and distribution.

Although this class is intended to supply a background for several other classes in economics, it is also true that other classes serve as background for this one. It is considered essential, however, that students in this class have taken a class in economic principles. A class in micro-economics (price theory) and in macro-economics (income determination) would be helpful. The presentation, except for a few specific points, is largely non-mathematical. Therefore, the main requirement of students is an ability to read and assimilate a certain body of literature rather quickly.

Prerequisite: Economics 220A/B and 221A/B are recommended.

328 Industrial Organization, Seminar 2 hours, C. Marfels

Industrial Organization is the application of the models of price theory to economic reality. In a specific industry, the problems of a firm competing successfully with its rivals in order not only to survive but to acquire a higher marketshare are far more complex than those in price-theory where we have to deal with more or less simplified assumptions to find a solution at all. The traditional approach to the analysis of the competitive process in an industry is divided into three parts: market structure, market conduct, and market performance. These are the three main parts of the class. Briefly, market structure refers to the number and size distribution of firms in general and to economic concentration in particular; in market conduct the pricing process is discussed; market performance concerns the problem of the degree of optimality of allocation of resources. The latter part includes a discussion about whether a reallocation of resources is necessary, and this involves looking at the basic elements of public policies directed towards business.

Prerequisite: Economics 220A/B or equivalent micro-economics course.

329 Urban Economics, Lecture 3 hours, T. A. Pinfold

Urban Economics is essentially the application of tools of economic analysis to the problem of urban areas. Urban area is loosely defined so as to include small towns as well as large cities. Topics discussed include: the origin of cities, factors affecting urban economic growth, the goals of an urban area, problems in intra-urban resource allocation, urban transportation, production of public goods in urban areas, and urban planning. Flexibility in selecting course content is considered important. Topics suggested by students are welcome. Students are expected to present papers on topics of their choice.

Prerequisites: It is strongly recommended that students have a sound background in both macro- and micro-economics. Economics 220A/B and 221A/B, or their equivalent would be a minimum. The course is designed as an application of theoretical tools. No theory will be taught. Students will also find a knowledge of calculus useful, but not necessary. If a prospective student is unsure about the suitability of his background, he should consult the instructor.

Economics 330A International and Interregional Exchange, Lecture 2 hours, C. M. Ouellette

This class considers the causes of international and interregional exchange of goods and services and analyzes the effects of international integration on the incomes and growth rates of national economies. 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.

Prerequisite: Economics 100 or 100A and 220A/B, or two full-year classes in economics. The entering student must have a reasonably good grasp of micro-economic theory. In addition, the ability to follow arguments couched in terms of high school mathematics is essential since part of the exposition by the lecturer makes use of algebraic and mathematical techniques.

Economics 332 The Canadian Economy in the Twentieth Century, Seminar 2 hours, N. H. Morse/A. M. Sinclair. (not offered in 1971-72.)

This seminar will investigate selected topics in Canadian economic development.

Prerequisite: Canadian economic history (Economics 232) or its equivalent or consent of the instructors. A class in macro-economics would be helpful.

Economics 422 Econometrics, Lecture 3 hours, U. L. G. Rao

This class attempts to introduce Econometric theory at a fairly advanced level and is designed mainly for one who likes to work on theory or model-building.

A review of the general linear model will be made. Violations of the assumptions crucial for least squares estimation breeds in various problems. The following problems will be discussed in detail: Stochastic regressions, generalized least squares, Autocorrelation, Heteroskedasticity, distributed lags and dummy variables. All these problems are single equation problems.

Simultaneous equation problems occupy an important place in econometric model-building. A critical analysis of the problem of identification and single equation bias will be made.

Limited information methods and full information methods of estimation will be discussed.

Monte Carlo methods as alternatives to analytical techniques will be discussed.

This course requires a high level of work and is open to graduate as well as undergraduate students. Minimum prerequisites for undergraduates will be an undergraduate statistics course and undergraduate work in micro- and macro-economics. The prerequisites are Economics 322 and 220A/B and 221A/B.

Economics 426B Monetary Policy, Lecture 3 hours, R. L. Comeau, (not offered in 1971-72)

This class assumes that students have a basic knowledge of monetary institutions and monetary theory and attempts to develop out of this a critical analysis of the objects and effectiveness of monetary policy, with particular attention to the Canadian experience. The first part of the class deals with the objectives and instrumental role of monetary policy and introduces such problems as the question of rules versus authority, and the question of lags in monetary policy. The second part is concerned with the effectiveness of monetary policy and considers issues such as the structure of interest rates, the elasticity of spending to changes in interest, the availability doctrine, the problems for policy of a fixed versus flexible exchange rate and the discriminatory effects of monetary policy. The last part considers the adequacy of the tools of monetary policy, again particularly in the light of the Canadian money market experience.

Prerequisite: Economics 326A.

427 Philosophy, Politics and Economics, Seminar 2 hours, D. Braybrooke

See Philosophy 340 and Political Science 349.

Economics 431B International Payments, Seminar 2 hours, C. M. Ouellette

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.

A substantial proportion of class time is devoted to the discussion of papers prepared by students. A comprehensive reading list is distributed.

Prerequisites: Economics 330A or 326B and 220A/B. These are strict prerequisites in the sense that they must be completed before the student enrolls in the class.

In addition the ability to follow arguments covered in terms of high school mathematics is essential since part of the exposition makes use of algebraic and mathematical techniques.

432 Regional Economics, Lecture 2 hours, F. M. Bradfield

This class involves the application of economic theory to the problems created by the differential impact of economic change on the regions of a developed economy. The problems are defined by examining the determinants of income, wage, and output levels in a perfectly competitive system and the effects of various imperfections in the system. Specific topics such as migration, location, and transportation theories, rural problems, and resource use are discussed, the amount of detail depending on the interest of the students. Empirical methods of measuring the importance of specific imperfections are considered. The last part of the class analyzes government policies aimed at overcoming regional problems.

Undergraduates who are interested and who have the necessary background in mathematics may attend a weekly graduate class in which the concepts discussed in regular lectures will serve as the basis for developing models.

Prerequisite: Economics 220A/B and 221A/B. Students must have a knowledge of both macro- and price theory, especially the market mechanisms determining factor flows and the production relationships between factor prices, productivities and proportions.

450 Senior Seminar on Economic Policy, Seminar 2 hours, J. F. Graham

This seminar is intended primarily for students in the last year of their undergraduate programme who are majoring or taking honours in economics. It is expected therefore, that the class will be small and that it will be made up of those who have a strong interest in economics and who have sufficient preparation to participate in critical discussions of both general and specific policy issues. The topics

discussed will depend partly on the particular interests of the students in the class.

Prerequisites: A good preparation in macro- and micro-economics. Under the old programme this means Economics 200 and Economics 300. After 1970-71, Economics 320A and 321B will be required. Students may also be admitted with special permission of the instructor.

Graduate Studies

The Department offers a graduate programme leading to the M.A. and Ph.D. degrees. Details of these programmes, 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.

47.9 / Education

Professors

E. Z. Friedenberg
A. S. Mowat (part-time)
H. J. Uhlman (on leave)

Associate Professors

B. M. Engel
E. T. Marriott (part-time)
S. W. Semple (Acting Chairman)
S. S. Sodhi

Assistant Professors

D. Farnsworth
R. Gamberg
W. F. Hare
G. B. Jeffery
P. Keane
D. D. Paré
H. E. Poole (on leave)
J. B. Roald
K. L. Sharma

Lecturers

Sister Kathleen Dalton
W. D. VanZoost

Special Lecturers

D. Aydelott
E. Coles
R. E. Crickmer
V. A. Ellis
B. Jackson
H. P. Moffatt
D. Paull
C. Purcell
M. Ricker
D. B. Roe
K. C. Stickings
G. Walford

Teaching Assistants

M. J. Grant
M. W. Poulter

Research Assistant

P. Smith

Almost everyone nowadays is aware of the importance of the process of education in the modern world. A modern advanced society like our own, when compared with earlier or simpler societies, is characterised by the unparalleled extent and complexity of its social heritage, that is, of the total fund of knowledge, skills, laws, customs and attitudes it possesses. To pass on this heritage (or the relevant parts of it), and to foster conditions under which it may be enlarged and purified, becomes a major task, and all advanced societies recognizing this, have set apart certain persons, teachers, instructors or professors to perform the task and have formally set up certain institutions, schools, colleges and universities to help in its performance.

The task might be made easier if biologically each generation could start the learning process where the last left off, if, for example, the new generation were endowed at birth with speech and the ability to read, write and count. But, whether we might wish it or not, things are not arranged in that way and each generation must start from the beginning. As each generation, taken as a whole, always has more to learn than the last, (and in modern conditions frequently much more), and as there is a continual need for adaptation to changing conditions, it is clear that the problems of modern education are manifold and complex and the challenge severe.

The Department of Education is looking for those who recognise the challenge and wish to take it up, and

addresses itself, as its main task, to helping prospective teachers understand the problems and meet the challenge.

While no one pretends to know all the qualities of a good teacher, some of the needs of the prospective teacher are rather obvious:

1. knowledge of what he is to teach;
2. some understanding of the nature of those he is teaching;
3. knowledge of effective methods of teaching, together with a readiness to try new methods;
4. supervised practice in teaching;
5. an understanding of the educational process and its relationship to life and society, lest those preparing for teaching become mere technicians instead of professionals;
6. an understanding of the paramount need, in our complex society, for differentiation of courses, particularly beyond the elementary level, and the corresponding need for proper guidance of pupils or students.

To meet these needs, the department offers:

1. a four year integrated course at the end of which students are awarded simultaneously the degrees of B.A., or B.Sc. and B.Ed., and
2. a sequential course of one year which may be taken by students who have already completed a B.A., B.Sc. or B.Com. degree course or otherwise fulfill the requirements for admission to the B.Ed. programme, and at the end of which the degree of B.Ed. is awarded.

The instruction offered in the education classes is substantially the same in both courses; in the sequential course, however, all are offered during the same academic year, while 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 B.A. or B.Sc. degree. A student wishing to enter the integrated course must commit himself to it not later than the beginning of his second year.

Education classes have been renumbered so that all classes are shown as 400 level.

formerly	now
Education 101	Education 401
Education 102	Education 402
Education 3-12	Education 403-412

Within the Education courses mentioned above, the needs of the prospective teacher are met as follows:

1. the integrated course ensures by the regulations governing it an academic background suitable for a teacher; the regulations governing the B.A., B.Sc. and B.Com. courses normally ensure this background for those entering the sequential course;
2. the compulsory class in educational psychology (Education 406) is intended to provide a sound knowledge of the nature and needs of the child;
3. the classes Education 403, 404, and 405 provide instruction in methods of teaching;
4. practice teaching is provided under both urban and rural conditions, (Education 408);
5. theory is provided in Education 401 and Education 402, which are open also to non-education students in the Faculty of Arts and Science; and
6. the class Education 407 deals with methods of selection, testing, and mental health.

Both the integrated course and the sequential course are divided into two types, one preparing for teaching at the Elementary level (grades Primary to 6), the other; preparing for teaching at the Secondary level (grades 7 to 12). Differentiation of those courses occurs in the class in educational psychology and in the methods classes. Those preparing for teaching at the Elementary level receive instruction in methods of teaching all subjects at the level (since this is normally what a teacher does at that level); those preparing for teaching at the Secondary level receive instruction in methods of teaching high school subjects of their own choice.

By arrangement with the Nova Scotia Department of Education, students completing either of these courses in education may receive a Teachers' Certificate, Class 5. Students wishing to obtain a B.Ed. (Secondary) and a B.A. or B.Sc. 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 will normally be sufficient to complete this course of study.

B.Ed. Elementary and Secondary
Sequential Course

Entry Requirements

1. B.A., B.Sc., or B.Com. by September, 1971. Candidates with other bachelor degrees should enquire from the Secretary, B.Ed. Programme.
2. Applications from all students are welcomed. A 65% average in the last two years provides a strong academic recommendation. Opportunity to draw attention to strengths is provided by the letter of application.

Selection is Based on

1. Transcript
2. Tests appropriate to intending teachers
3. Interview for selected candidates

Application

1. Form should be sent to the Admissions Office and
2. A letter to the Secretary, B.Ed. Programme, Department of Education, Dalhousie University, listing:
 - (a) Name, address and telephone number,
 - (b) Degree, subjects, University where degree obtained,
 - (c) Type of school in which the applicant is interested in teaching: Elementary, Junior High, Senior High.
 - (d) For applicants interested in teaching in Junior High or Senior High School, the main subject they are interested in teaching, and also subsidiary subjects.
 - (e) Brief details of experience, skills and interests in support of your application.
 - (f) A Friday afternoon date on which the applicant will attend for testing at 2:00 p.m. The Minnesota Teacher Attitude Inventory is used and it assists in giving guidance to applicants about teaching as a career.

Applicants who are unable to take the test in Halifax should indicate the location of the nearest University at which they would conveniently be able to do so. Further instruction would be issued in such cases.

3. Students are responsible for checking that their transcripts are forwarded to the Admissions Office.

Degree Programmes

Education courses in the integrated programme are in the process of being re-distributed. Students registered in integrated courses within the Department are notified individually of their programme.

B.Ed. (Elementary): Integrated Course
Year I

The first year of this course must conform to the requirements for the B.A. degree (see section 46.1) or the B.Sc. degree (see section 46.2) English 100 must be taken.

Year II

6.-8. Education 403, 406 and 408 (practice teaching)
9.-11. Three classes in arts and science.

Year III

12.-15. Education 401, 408, and 414.
16.-18. Three classes in arts and science.

Year IV

19.-21. Education 402, 408 and 407.
22.-24. Three classes in arts and science.

Overall Requirements

A. Six of the classes in arts and science taken in the second and subsequent years must be beyond the 100 level in two subjects. Four must be in one subject taught in Nova Scotian schools, and declared by the student as his major area of concentration; two must be in the other, the minor.

B. The remaining arts and science classes taken in the second and subsequent years shall include at least one which is beyond the 100 level and shall be selected from subjects other than those offered to satisfy the requirement in the previous paragraph. The subjects may be selected from Groups A, B, C, and D, or from Art History, Hebrew, Commerce 101, 102 or Religious Studies 100 insofar as the requirements below permit, (see also section 45.1)

C. At least one class in English beyond the 100 level must be taken.

D. The arts and science classes in the entire course must satisfy the regulations under Paragraph 3, "Overall Requirements" for the general B.A. or general B.Sc. degrees in section 46.1, 46.2.

B.Ed. (Secondary): Integrated Course

Year I

1.-5. The first year of the course must conform to the requirements for the B.A. degree (see section 46.1) or the B.Sc. degree (see section 46.2). English 100 must be taken.

Year II

6.-8. Education 401, 406, and 408 (practice teaching).
9.-11. Three classes in arts and science.

Year III

12.-14. Education 405, 408, and one of 409, 410, 411, 412.
15.-18. Four classes in arts and science.

Year IV

19.-21. Education 402A, 402B, 407, 408.
22.-24. Three classes in arts and science.

Overall Requirements

A. Seven of the ten classes in arts and science taken in the second and later years must be beyond the 100 level in two subjects regularly taught in Nova Scotian schools. One subject must be declared by the student as his major area of concentration, and the other as his minor. The seven classes must be divided so that either five classes are taken in the major and two in the minor, or four in the major and three in the minor.

B. The remaining three arts and science classes taken in the second and subsequent years shall include at least one which is beyond the 100 level and shall be selected from subjects other than those offered to satisfy the requirement in the previous paragraph. The subjects may be selected from Group A, B, C and D in section 45.1 or from Art History, Hebrew, Commerce 101, 102, or Religious Studies 100 insofar as the requirements below permit.

C. The fifteen arts and science classes in the entire course must satisfy the regulations under Paragraph 3, "Overall Requirements", of the General B.A. or General B.Sc. degrees (section 46.1 or 46.2, respectively).

B.Ed. (Elementary): Sequential Course

Candidates for the degree of B.Ed. (Elementary) must complete successfully the following academic classes: Education 401 (if not already completed), Education 402 (if not already completed), Education 403, 404, and 406. If either Education 401 or 402 has been completed previously, Education 405 or another academic class may be taken, subject to the approval of the Department. Candidates must also complete successfully Education 407, 408 (practice teaching) and Education 414.

B.Ed. (Secondary): Sequential Course

Candidates for the degree of B.Ed. (Secondary) must complete successfully the following academic classes: Education 401 (if not already completed), Education 402 (if not already completed) Education 405, 406 and 407. If either Education 401 or 402 has been completed previously, one other academic class in another department may be taken, subject to the approval of the Education Department. Candidates must also complete successfully Education 408 (practice teaching) and any one of Education 409, 410, 411, or 412.

Students planning a B.Ed. (Secondary level) following a B.A., B.Sc. or B.Com. should be aware that at present certain major-minor combinations in the first degree might not easily lead to effective teaching at the secondary level. They are advised to consult with the Chairman of the Department when drawing up the programme for the first degree.

Diploma in Education

On application, a student who has satisfied the requirements below will be awarded the Diploma in Education. By arrangement with the Nova Scotia Department of Education, recipients of the Diploma may receive a Teachers' Certificate, Class 4. Recipients of the Diploma may obtain the degrees of B.Ed. (Elementary), and B.A. (General) or B.Sc. (General) by one additional year of study.

Applicants for the Diploma must:

1. be in a position to complete the requirements of the B.Ed. (Elementary) degree by completing the classes prescribed for the fourth year of the integrated course; thus the education and arts and science classes of the first three years of the integrated B.Ed. (Elementary) course must have been completed;

2. have completed at least four classes beyond the 100 level in subjects regularly taught in Nova Scotian schools; at least one of these classes must be in English.

Award of the Diploma in Education for the Integrated (Elementary) course will be discontinued following Spring Convocation, 1973.

Note: The Diploma in Education course previously offered to students who had completed 10 or more classes towards the degree of B.A. or B.Com. is no longer offered.

Graduates of Teachers' College

Students who have completed a year of professional training at the Nova Scotia Teacher's College, or the equivalent, and who wish to obtain the degree of B.Ed. must obtain from Dalhousie University the degree of B.A., B.Sc. or B.Com. or otherwise fulfill the requirements for admission to the B.Ed. programme, and complete successfully Education 401 and Education 402. If Education 401 or Education 402 has been completed already, another class in Education may be substituted, subject to approval of the department.

Certification of Teachers

According to the regulations of the Province of Nova Scotia, every applicant for a Teacher's License or Profes-

sional 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 Provincial Department of Education or from the Chairman of the University's Department of Education.

Scholarships

Prospective candidates should note that, under certain conditions, the Nova Scotia Department of Education will pay the fees, in the final year, of all candidates for the degrees of B.Ed. or the Diploma in Education.

The Nova Scotia Department of Education also offers scholarships of \$500 to students in education. For further information, application should be made to the Director of Awards or the Chairman of the Department of Education.

Classes Offered

Education 401 and 402 will be offered in alternate years at The Dalhousie Summer School. Education 1a and 2a, previously offered in the evenings, are discontinued. Teachers in service wishing to improve their licence standing should attend the Summer School classes.

Within several of the classes listed below, separate sections have been scheduled in order to accommodate the varied academic backgrounds, specific interests, and future needs of B.Ed. students. The sections thus provide a range of choices within the broad subject area encompassed by the title of the class. A list of the choices available may be obtained on request from the Department of Education at the time of registration.

Education 120 Educational Implications of Growth and Development from Pre-Birth to Senescence

A survey of the physical, physiological and psychodynamic factors in the development of the individual from pre-birth until senescence. Various theories and research methods will be introduced to help explain these norms in development. Models of development will be examined and clinical methods of observation and remediation for developmental deficits will be discussed.

401 General Principles of Education, Lecture 3 hours

This is an introductory class in education which provides for a comparative and historical treatment of recent developments in Canadian education. This class may count toward the degree of B.A. or B.Sc. and may be taken by students in their third or fourth year. It is also a required class for candidates for the Diploma in Education, and for the B.Ed. degree (if not already taken).
Texts: to be arranged.

402 Theory and History of Education, Lecture 2 hours

This class gives a survey of the theories of the great educators and the history of education in Europe and America, followed by a study of modern school systems in selected countries. This class may count as an elective credit towards the degree of B.A. or B.Sc., provided, however, that no student may be allowed to count more than one class in education as such a credit.
Texts: to be arranged.

403 Methods of Teaching, Primary Grade to Grade III, Lecture 2 hours

This is a class in methods of teaching from the primary grade to Grade III with special emphasis on the teaching of reading.
Text: to be arranged.

404 Methods of Teaching, Grades IV to VI, Lecture 3 hours

Texts: to be arranged.

405 Methods of Teaching in Junior and Senior High School, Lecture 4 hours

This class makes a detailed study of methods of instruction in the subjects of the Junior and Senior high school based on the course of study of Nova Scotia. Lectures on method will be given covering English (405C) history (415C), geography (425C), mathematics (435C), science (445C), Latin (455C), and French (465C). Each student will select two subjects, subject to the approval of the Department. Also with the approval of the Department of Education, arrangements may be made for students to take method work in home economics (M405A) or economics (475C), German and business education.
Texts: to be arranged.

4405A Home Economics

406 Educational Psychology, Lecture 2 hours and Seminar
This class will deal with some of the major contributions of contemporary psychologists in the areas of learning and cognition, motivation and individual differences as they apply to education. The class will be divided into sections according to the needs of students, in particular the differing needs of students in the elementary and secondary programmes.
Text: to be arranged.

407 Measurement and Evaluation, and Mental Health, Lecture 3 hours

This class will give students some acquaintance with tests of intelligence, interests, personality and school subjects, and will give some elementary instruction on the theory of examinations and on statistical methods employed in education. It also gives an introduction to aspects of mental health.
Texts: to be arranged.

408 Practical Teaching

Satisfactory work in this class is required of all candidates for the degree or diploma in education. No written examinations will be set, but grades will be awarded, having regard to the student's ability in practical teaching and general suitability for the profession. Approximately 150 hours of practice teaching are required. Every candidate is required to undertake a period (normally one week) of field work in some selected area of the Province of Nova Scotia.

409 Physical Education, Lecture 1 hour; laboratory 2 hours

This class will be given by various members of the faculty in the School of Physical Education. It is intended, firstly, to broaden the student's understanding of physical education by examining its historical, philosophical, physiological, kinesiological and psychological foundations. Secondly, it endeavours to familiarize the prospective teacher with school programmes of physical education and with the specific problems associated with coaching school teams.

The practical laboratory work is intended to encourage the student to specialize in about four activities with the hope that sufficient interest, depth of knowledge and confidence could be developed in coaching. The student is involved firstly as a participant, so that skills can be analyzed and learned, and secondly as a teacher of certain parts of the programme, so that teaching and coaching techniques can be improved.

410 School Art

This is a class in art for schools with special reference to the Nova Scotia curriculum. The class includes theory, methods and practical workshop experience.

411 Drama in Education

This class sets out to show future teachers how drama can help encourage the imagination of children in elementary

and secondary schools. Creative drama, child drama and certain types of formal theatre are explored. Methods and examples are tested so that each student may work out a view of drama in education that will make the experience of teaching vivid and constructive both for the teacher and the pupils.

412 School Music

This is a class in music education which presents philosophy, skill, procedures and material with special reference to the schools in Nova Scotia.

414 Creative Movement

This is a class for elementary trainees, embracing physical movement, music, drama and art.

Graduate Studies

The department offers classes leading to the degree of M.A. in Education. Detailed information is given in the Calendar of the Faculty of Graduate Studies.

47.10 / Engineering and Engineering-Physics

Engineering

Professors

K. F. Marginson (Chairman)
G. W. Holbrook

Assistant Professors

D. M. Lewis
E. N. Patterson

Special Lecturer

J. Strasser

Engineering-Physics

Professors

A. Levin (Chairman)
H. W. King

Assistant Professor

S. T. Nugent

The profession of engineering is today expanding its scope and changing its pattern of activity at an ever-increasing rate; it follows, therefore, that the course of training and education for engineers is adding new classes and changing the emphasis placed on older topics. More sophisticated mathematics, computer application to the numerical solutions of very large sized problems, and the use of recent discoveries in science are now playing major roles in engineering training while conventional topics such as drafting and surveying call for less time and effort on the part of the student. Dalhousie's course of study in engineering closely follows this modern trend and, combined with the subsequent specialized training at the Nova Scotia Technical College, prepares the serious student to play a responsible role in the modern world.

In addition, those students who are keenly interested in the research and development functions in closer association with physics may follow the course leading to the degree of Bachelor of Engineering-Physics at Dalhousie.

The department also offers the first two years of a six-year course in architecture leading to the Bachelor of Architecture degree.

Engineering

The work of the Uniform B.Sc. for Engineering covers three years and should follow quite closely the order indicated below. At the end of his studies, the successful student receives a General B.Sc. from Dalhousie and is qualified for admission to the junior year of the Nova Scotia Technical College. Students do not have to decide at this stage upon the branch of engineering, civil, mechanical, electrical, chemical, mining, metallurgical or industrial, in which they

will specialize although they are encouraged to do so. Students planning to continue their studies at some college other than the Nova Scotia Technical College should consult the department when they first register.

Architecture

Students who plan to study architecture may take the first two years of the course for the Uniform B.Sc. for Engineering, substituting two arts classes for a class in mathematics and a class in chemistry. Having completed the course, they will be admitted without further examination to the Nova Scotia Technical College School of Architecture.

Degree Programme

Uniform B.Sc. for Engineering

Year I

1. Physics 100
2. Engineering 001
3. Mathematics 100
4. Chemistry 102
5. Elective (Arts)
6. Elective

Year II

7. Physics 221
- 8-9. Engineering 200, 220A, 220B
10. Mathematics 228
11. Chemistry 230

Year III

- 12-15. Engineering 230, 310, 320, 330A, 330B, 340A, 340B
16. Mathematics 328

Note:

1. Students going on to study architecture may substitute arts electives for Mathematics 228 and Chemistry 230 in Year II.

2. Students planning to specialize in civil, mining or geological engineering are required to take an additional class in geology (100) and one in surveying (210 and 211).

Engineering-Physics

Engineering-Physics or Applied Physics is the study of physics oriented towards its application to engineering problems. The area is interdisciplinary and the study is suitable for students whose interests involve experimental work in the physical sciences or who contemplate research or development work in industry or resource development. The mathematical content of the course is similar to that of physics with, however, special emphasis on quantitative solutions. The physics content is identical with that of honours physics in the first two years, but has special requirements in the last two years dealing with system design, information and control theory, instrumentation and measurement techniques. The course leads to the degree of Bachelor of Engineering-Physics which has honours standing.

Completion of the course is excellent preparation for graduate work in physics, engineering or earth sciences.

B.Sc. in Engineering-Physics

Year I

1. Physics 110
2. Mathematics 100
3. Chemistry 102
4. Elective (Arts)
5. Elective

Year II

- 6-7. Physics 211 and 231
8. Mathematics 220 or 200
9. Mathematics 200-level class
10. Elective (Science)

Year III

- 11-12. Physics 300, 315

13. Engineering 335
14. Engineering or Physics 200-level class
15. Mathematics 300-level class
16. Elective (Arts)

Year IV

17. Physics 400
18. One other Physics 400-level class
19. Engineering 400-level class
20. Engineering or Physics 400-level class
21. Mathematics 300-level class

Classes Offered

001 An Introduction to Professional Engineering Lecture 1 hour, K. F. Marginson

This class is intended to introduce the new engineering student to some of the broad aspects of the profession. It uses the topic of engineering design as a framework in which to discuss the various formal branches of engineering and the spectrum of engineering functions. The student will begin to acquire some of the skills of his profession; for example, the technique of sketching for use in communication and thought, the creation of simple verbal and mathematical models, and the writing of technical reports. An attempt is made to establish the professional point of view through group discussion of obligations, ethics, and personal relations in the fields of technological endeavour.

200 Graphic Science Lecture 3 hours; laboratory 3 hours, K. F. Marginson

This class gives extensive coverage to the third instrument of thought — the graphic or pictorial. Students entering the class should have completed a class in calculus and have a grasp of the basic vector concept. The work begins with a very rapid coverage of essential drafting techniques, followed by a study of descriptive geometry with extensive applications. Concurrently, students work on conceptual design projects and their graphic presentation. Graphic solutions to the problems of vector algebra are covered parallel with the analytic work of other classes. The same methods are used in the study of graphic calculus, up to and including the solution of differential equations and some of the geometric implications of engineering formula. The class is concluded with a fairly large design project done on a team basis by the students.

Prerequisites: Mathematics 100; Physics 110.
Text: TBA

210 Surveying Lecture 3 hours, E. N. Patterson

This class is an introduction to the fundamentals of surveying. Topics covered include the theory of land measurement, precise leveling, transit, stadia and plane table surveys, traverse computations, adjustments and plotting of results, the determination of meridian, azimuth and latitude based on celestial observation, construction surveying, alignments, curves.
Text: (1970-71) Smirnoff, *Measurements for Engineering and other Surveys*.

211 Survey Field Camp 3 weeks, E. N. Patterson

This is a non-credit class required of prospective civil and mining engineering students.

The survey field camp will normally be held immediately following the final examinations in the spring and will be of three weeks' duration. The use of surveying instruments and equipment will be practiced by all students. Assigned exercises will include the use of hand levels, steel tapes, dumpy, tilting and automatic levels, transits and theodolites and map drawing. Traverse computations will be performed by hand as well as by digital computer methods.
Prerequisite: Engineering 210.

Text: Same as in Engineering 210.

220A Engineering Mechanics — Statics Lecture 2 hours; laboratory 3 hours (one term only), E. N. Patterson

This class is an introduction to the study of engineering classical mechanics. Following a presentation of basic concepts, a brief self-contained treatment of vector algebra will be given. The student will then consider the equivalence, resultant and equilibrium of force systems acting on a particle or on idealized rigid bodies such as trusses, frames and machines. Students will undertake the graphical solution of selected problems.

The class material will correspond very closely to that described in the text.

Prerequisite: Mathematics 100.

Text: (1970-71) Huang, *Engineering Mechanics Volume I — Statics*

220B Kinematics Lecture 2 hours; laboratory 3 hours (one term only), K. F. Marginson

Students taking this class should have taken a class in calculus and should be proficient at dealing with rates of change. A firm grasp of the vector concept is desirable.

The class will cover the motion of particles, lines and rigid bodies. Displacements, velocities, first and second degree accelerations will be discussed graphically and analytically.

Applications of the theory will be made to the motion of various types of mechanism, and the use of the computer in kinematic analysis and synthesis will be considered.

Prerequisites: Physics 100; Mathematics 100.

Text: (1969-70) Huang, *Engineering Mechanics Volume 2*.

230 Introduction to Electrical Engineering, Lecture 3 hours; laboratory 3 hours, G. W. Halbrook

The class is an introduction to electrical engineering. However, it is also a terminal course in this subject for certain engineering disciplines. Consequently, while the analysis of linear circuits is dealt with in some detail, a considerable emphasis is placed upon practical devices and systems. The laboratory periods illustrate the use of electrical measuring devices and introduces the student to conventional methods of testing electronic and electro-mechanical equipment.

Prerequisite: Mathematics 100; Physics 110; Engineering 110 (taken concurrently).

Text: (1969-70) R. J. Smith, *Circuits, Devices and Systems*

310 Engineering Problems by Computer Methods 1 afternoon per week, D. M. Lewis/E. N. Patterson

This is a class which will prepare the student to write his own Fortran IV digital computer programs for the solution of engineering problems. It will consist of a series of case studies of actual engineering problems which each student will execute on the IBM 360-50 computer. Results will be submitted to the instructor. Students will also have an opportunity to use some of the standard application programs which are available, such as COGO, STRUDL, and ECAP.

Prerequisites: Registration in second-year engineering, or consent of instructors.

Text: (1970-71) Murrill & Smith, *Fortran IV Programming for Engineers and Scientists*.

320 Dynamics of Particles and Rigid Bodies Lecture 2 hours; occasional tutorial, D. M. Lewis

This class completes the study of engineering classical mechanics begun in Engineering 220A and 220B. The first term will deal with kinematics and dynamics of single particles and systems of particles, and in the second term these fundamentals will be applied to rigid bodies.

Prerequisites: Mathematics 100; Engineering 220A, 220B, Engineering 310.

Text: (1970-71) Huang, *Engineering Mechanics Volume 2*.

330B Strength of Materials Lecture 3 hours; lab-tutorial 3 hours second term only, D. M. Lewis

This class is an introduction to that aspect of mechanics which is sometimes called mechanics of deformable bodies or mechanics of materials. The class studies the relations between the force system applied to a deformable body of a given material and the resulting deformations and internal forces; the relations between stress and strain for a variety of conditions and materials; and the procedures used for estimating the dimensions of a physical body of a specified material that are necessary for the support of a given load.

The principles and methods used are drawn largely from prerequisite classes in mechanics and mathematics. The class will stress the use of freebody diagrams, the equations of equilibrium and the geometry of the deformed body together with observed relations between stress and strain for the analysis of the force system acting on a body.

Prerequisites: Engineering 220A or the consent of the instructor.

Text: (1970-71) Higdon, Ohlsen, Stiles, Weese, *Mechanics of Materials*.

330A Materials Science Lecture 3 hours first term only, H. W. King

This class is designed to acquaint the student with the terminology applicable to the properties of materials. Following this introduction, the internal structure — atoms, crystals, microstructures and finally, macrostructures — will be considered. The mechanical and physical properties of materials in relation to these internal structures will be studied.

Some class time will be set aside for the investigation of the methods of manufacture and the use that engineers make of some materials. A number of reports will be prepared by students, some of which will be selected for class presentation.

Text: TBA

335 Electronics Lecture 3 hours, A. Levin

The class covers advanced circuit analysis of linear and non linear systems, the physics and resulting properties of solid state devices; the concepts of information and noise and transmission lines and filters. The following topics are treated: network reduction, the 4 terminal network and solutions by matrix methods, non linear systems, modulation, demodulation and rectification; carrier transport in semi-conductors, properties of diodes and transistors; electro-mechanical analogues and analogue computation methods, feed-back and control systems, stability criteria, nature of information and noise, properties of distributed constant lines and filters.

Prerequisites: Physics 231, Mathematics 200 or 220, which may be taken concurrently.

Text: Milman and Halkias, *Electronic Devices and Circuits*.

340A Classical Thermodynamics Lecture 3 hours; tutorial/laboratory 3 hours (one term only), K. F. Marginson

This class covers the theoretical portion of classical engineering thermodynamics. Calculus to the level of partial differential equations is prerequisite. General topics are: first law for open and closed systems, reversibility, enthalpy; second law, entropy, availability and efficiency, psychrometrics. Various real processes and thermodynamic devices will be discussed. This work covers applications other than those involving chemical reactions.

Prerequisites: Mathematics 100; Physics 110; Chemistry 230 (may be taken concurrently).

Text: (1970-71) Van Wylen, *Thermodynamics*.

340B An Introduction to Fluid Mechanics Lecture 3 hours; lab-tutorial 3 hours (one term only), E. N. Patterson

Fluid mechanics is the engineering science upon which such specialties as aerodynamics, gas dynamics, rate processes, hydraulic and marine engineering are based. It deals with the statics, kinematics, and dynamics of fluids.

As this is an introductory class, considerable time will be

devoted to the study of fluid properties, fluid statics and the underlying concepts, definitions and basic equations of fluid dynamics. Laboratory experiments will be carried out to investigate some of these basic aspects.

Prerequisites: Concurrent registration in Engineering 320, or the consent of the instructor.

Text: (1970-71) Streeter, *Fluid Mechanics*.

400 Advanced Physics Laboratory Laboratory 6 hours, A. Levin/S. T. Nugent

This is a physics and engineering-physics laboratory class in which students in groups of two work largely on their own initiative. The experimental work covers nuclear disintegration, gamma and beta spectroscopy and absorption measurements; proton spin quantitative measurements and Planck's constant determination; thermionic emission and ionization experiments using a vacuum pumping and instrumentation system; properties of solid state semiconductors and devices; experiments on the spectral noise distribution of transistors and the use of analysis systems; experiments with a Helium-Neon laser, holography, etc.

Experiments in other areas, such as acoustics, optics and fluid dynamics, are available if requested. A report upon a topic to be agreed with the instructor is required as part of this class.

420/520 Communication and Control Theory Lecture 3 hours, S. T. Nugent

In the first term the class is introduced to the principles of communication theory. Topics discussed include: the time and frequency domain, random signal theory, network analysis and basic information theory.

In the second term the class is introduced to the field of optimal control. Topics discussed include: statistical design of linear systems, state representation of systems, calculus of variations, the maximum principle and dynamic programming.

Texts: TBA

433A Semiconductors Lecture 3 hours, A. Levin

Properties of intrinsic and doped semiconductors; carrier generation and transport, Hall effects and Shockley Haynes experiment; semiconductor diodes, fields and carrier densities, transport equations; special diodes; transient behaviour in diodes; bipolar transistors, properties, limitations and failure mechanisms; the F.E.T., unijunctions, multilayer diodes, tunnel diodes, and thermistors; noise mechanisms in solid state devices.

433B Materials Science Lecture 3 hours, H. King

The properties of materials are examined in terms of their microstructure.

Text: Wert & Thompson, *Physics of Solids*.

47.11 / English Language and Literature

Professors

A. R. Bevan
C. L. Bennet
M. G. Parks (Chairman)
M. M. Ross
S. E. Sprout
D. P. Varma

Associate Professors

R. MacG. Dawson
J. Fraser
A. J. Hartley (On Leave, 1971-72)
S. Mendel
A. N. Raspa
R. J. Smith
H. S. Whittier

Assistant Professors

S. A. Cowan
R. S. Haffer
G. M. Harvey
M. A. Klug
H. E. Morgan
C. J. Myers (On Leave, 1971-72)
R. L. Raymond
H. D. Sproule

Part-time Instructors

Elizabeth Horlock
Elizabeth Sutherland

Dalhousie Visiting Fellow (1970-71)

Michael Griffiths

The central purpose of the study of literature has been well expressed by a distinguished Canadian scholar, Douglas Bush: "Great authors produce great works of art because, given their genius, they have imaginative, emotional, moral, religious experience which they must express and communicate. The richer and more complex such works are the more they are in need of interpretation; and one major difficulty is the fact of the pastness of most of them, of their being scattered over three thousand years. The *sine qua non* of scholarship, criticism and teaching is the effort to understand, and to help others understand, these works, to make them available to successive generations, to make the authors' recreation of their experience an enrichment of our own."

The serious study of literature goes far beyond the undoubted pleasures of reading at random and for enjoyment and relaxation. The study of literature is pleasurable, but it is also exacting because the student, unlike the casual reader, must seek to understand as well as enjoy, must seek a reasoned and coherent knowledge of a literary work in the context of its author's art and thought and in the context of the age in which it was written. The study of older literature is essential because art, unlike science, does not necessarily improve through the ages; it changes but does not build new structures which supersede and replace the old: a Shakespearian play is not untrue, inconsequential or of no application to ourselves and our times because it was written nearly 400 years ago. Therefore, the student of literature by no means limits himself to the present, as the casual reader is apt to do, but applies his mind and sensibility to great works of the creative imagination in whatever age they have appeared. Such study of English literature takes the student over twelve centuries and often involves him in the closely related humanistic disciplines of history and philosophy. Thus the study of English literature introduces the student to the complexities of human nature from several points of view, and helps him to a deeper understanding of himself and of his fellow human beings in almost every aspect of man's varied experience.

In a more down-to-earth way as well, the study of English literature is a vital part of education. It is a study of words, of words in action in the sentence, in the paragraph, and in the whole composition. One might think that reading and writing in one's mother tongue are elementary subjects that most people master before they reach university. But reading and writing, like mathematics, are performed on many different levels. Unfortunately, the general level, the level that is so influential because it is all around us, is low. Much of the supposedly literate language to which we are constantly subjected is muddled or vague or pretentious or even dishonest — the language of propaganda, of advertising, of political persuasion. The study of literature and the practice of writing that is part of that study offer the student the discipline of words, a discipline as fundamental in the humanities as the numbers of mathematics are in the sciences. But there is no short cut to verbal accuracy; it is to the best writers that we must go for the models of professional writing, to the "classics", old or new, which show us the infinite possibilities that there are in words. The study of English literature and language is therefore a

practical study, indeed a practical necessity for the highest development of verbal skill.

At Dalhousie, English is studied on several levels.

1. English 100 is the introductory class. It involves the study of various literary works (novels, poems, plays) and the writing of fortnightly essays. Each section attends three lectures per week; individual attention is available to every student in interviews with instructors and tutors and in small discussion groups.

2. Classes are offered in the second and third years of the General B.A. course for students wishing to concentrate on English as their "major", to study it as an adjunct to their main subject as their "minor", or to choose a class as an "elective".

3. The honours course in English consists of nine classes beyond English 100. It is a comprehensive study of English literature at the undergraduate level. In addition to the standard honours course in English, students have the choice of combinations of English and French, English and German, English and history, or English and philosophy. All of these honours courses offer the serious student an opportunity to study English in breadth and depth.

Degree Programmes

B.A. with Major in English

Students taking a B.A. with English as their major subject will normally choose their four or five classes from the following: English 201, 203, 204, 205, 206, 207, 208, 209, 210, 213, 214, 215. English majors who wish to be admitted to an honours class should consult with the department.

B.A. with Honours in English (Major Programme)

The honours programme in English is designed to offer a wide range of classes to a student who wishes to concentrate on English language and literature at the undergraduate level. The programme is not intended merely as introductory training for future graduate students or high-school teachers, but rather as a stimulating course for students who wish to study English language and literature in depth. In addition, the honours programme can provide the student who intends to proceed to graduate work with the coverage of English literature that is required, in many universities, for subsequently completing in one year the work for the M.A. degree. Students intending to enter the honours English course in Year II must consult the department, preferably before the end of their first year. Students are encouraged to seek the advice of the department in their choice of classes in each year of their course.

The honours programme consists of nine classes 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 (recommended for second year).

Section C. English 251; English 352.

Section D. English 254; English 356.

Section E. English 354; English 457.

Section F. English 453; English 455.

The student may choose his three remaining classes from those not already chosen in Section B to F, or from Section G.

Section G. English 201; English 206; English 452; English 454.

English 250A (Bibliography), a non-credit class which meets one hour per week in the first term, is required of all honours students and is to be taken in the first year of the honours course.

The student must meet the requirements for the General

B.A. degree. He is advised to select a minor from one of the subjects listed under either Group A or Group B in the "Degrees and Courses" section of the Calendar (see section 45/).

B.A. with Combined Honours

There are several combined honours programmes:

English and French
English and History
English and Philosophy
English and German
English and Spanish

Students interested in any of these combinations should consult with the departments concerned. If a student wishes to combine English and a subject other than those mentioned above, he should see the department as early as possible.

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:

- to involve the student in the serious study of literature as a crucial part of education;
- to involve him in the discipline of words so that he will be a more critical and responsive reader and a more exact and imaginative writer.

The subject matter varies from section to section. Detailed syllabi of all sections are available before registration in September. 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 section conduct small discussion groups and personal interviews with students.

Classes for the General Degree Programme

201 The English Language, Lecture 3 hours, H. E. Morgan

English 201 is an introductory class in the study of the English language, designed not only for those intending to specialize in English but also for prospective teachers. The class will include an introduction to English phonetics and intonation, the history of English vocabulary, the rise of modern English, modern approaches to grammar, and the language of modern society.

All students are required to do practical work in phonetics, and to prepare papers on other relevant topics of interest to them.

Prerequisite: English 100.

203 Masterpieces of Western Literature, Lecture 3 hours, H. S. Whittier

This class is intended to provide the student with the opportunity to do intensive reading of selected major works from Western literature. The selections vary from year to year. The intensive reading 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.

Generally, works will be taken up in chronological order. As the class proceeds, inter-relationships and comparisons of theme, form and artistic perspectives in the various works will be developed. Classes generally consist of a combination of lecture and discussion. Voluntary tutorials are held once a week for open discussion in addition to class meetings.

Prerequisite: English 100.

204 The European Novel, Lecture 2 hours, S. Mendel

This class can best be described as a close study of about twelve representative novels of the last two hundred years in translation.

Prerequisite: English 100.

205 Victorian Literature, Lecture 2 hours, C. L. Bennet

In this class the student studies the prose and poetry of the period: Carlyle; Newman; Ruskin; Arnold; Dickens; Thackeray; Tennyson; Browning.

Prerequisite: English 100.

206 American Literature of the Nineteenth Century, Lecture 2 hours, S. A. Cowan

This class is a survey of American literature through representative works by Irving, Bryant, Cooper, Hawthorne, Poe, Emerson, Thoreau, Melville, Whitman, Dickinson, Twain, Crane and Dreiser. The aim of English 206 is to introduce students to major American writers from 1800 to 1900. The class involves some attempt to relate the writers to particular movements and influences in American literary history, but the focus is only in part on the history of literary development. The main emphasis is on the reading and discussion of the works themselves. It is assumed that this approach will familiarize the student with the thought and style of the individual authors, and generally with the literature of the period. Little outside reading will be assigned. The class will be conducted by a combination of lecture and discussion. Students will write either several short papers or one long paper each term.

Prerequisite: English 100.

207 Canadian Literature, Lecture 2 hours, M. G. Parks

This class is a survey of English-Canadian literature with emphasis on poetry and fiction from the 1920's to the present. Some knowledge of nineteenth-century British literature, though not essential, is very useful to the student of Canadian literature. A few representative writers of the nineteenth century (Howe, Haliburton, DeMille, Isabella Crawford, C. G. D. Roberts, Carman, Lampman, and D. C. Scott) are studied briefly in the first term, and essay topics are set on nineteenth-century writing. Twentieth-century novels and poetry are studied in the last month of the first term and throughout the second term.

Prerequisite: English 100.

208 The English Novel to 1900, Lecture 2 hours, D. P. Varma

This class is designed primarily to acquaint students with the chief landmarks of eighteenth and nineteenth-century fiction and to present a survey of the origins and development of the English novel. This involves a thorough investigation of the antecedents and formative influences of fiction and a close examination of some of the chief works of eighteenth and nineteenth-century novelists. The selection of novels will be announced.

Prerequisite: English 100.

209 Twentieth-Century Fiction, Lecture 2 hours, M. A. Klug/A. N. Raspa/A. R. Bevan

English 209 is intended as an introduction to the main thematic and technical trends in the modern English and American novel. The lectures focus on representative novels of some of the major figures of the first half-century and on significant novels of the past two decades.

Prerequisite: English 100.

210 The Poetry of W. B. Yeats, Ezra Pound, and T. S. Eliot, Lecture 2 hours, R. J. Smith

English 210 is a general introductory class in twentieth-century English poetry. The prerequisite for enrolment is a passing mark in English 100. The aim of the class is to introduce students to the reading of modern poetry, and it

is hoped that most classes will be in the form of general class discussions on poems and poets. The development of the student's critical response will be the object of an introductory period during which selected modern poems will be discussed in class. The class will then proceed with a more systematic discussion of the work of Yeats, Pound, and Eliot.

213 American Literature of the Twentieth Century, Lecture 2 hours, R. S. Hafter

The class will study representative poetry, drama, and prose. Some of the authors represented will be James, Hemingway, Faulkner, Frost, Anderson, Fitzgerald, Salinger, W. C. Williams, O'Neill, Tennessee Williams, Arthur Miller, Henry Miller.

Prerequisite: English 100.

214 Shakespeare, Lecture 2 hours, G. M. Harvey

This class is designed for students in the General course who wish to study selected plays by Shakespeare. The aim of the class is simply to discover what the plays are about. Only minimal consideration is given to textual variations, sources, and influences. The course divides into five parts: (1) History plays: *Richard III*, *Henry IV*, parts 1 and 2; (2) Comedies: *The Comedy of Errors*, *As You Like It*, *Twelfth Night*; (3) Problem plays: *All's Well That Ends Well*, *Measure for Measure*, *Troilus and Cressida*; (4) Tragedies: *Macbeth*, *Othello*, *Antony and Cleopatra*; (5) Romances: *The Winter's Tale*, *The Tempest*.

Students are expected to have a thorough knowledge of these plays by the end of the year. One essay of about 3000 words is assigned for each term. There are Christmas and final examinations.

Prerequisite: English 100.

Text: Shakespeare, *The Complete Works*, ed. G. B. Harrison (Harcourt, Brace and World).

215 Poetry of the Romantic Movement, Lecture 2 hours, H. D. Sproule

A class which will focus on the poetry of Wordsworth, Coleridge, Byron, Shelley, and Keats. At the outset some attention will be directed to the pre-Romantic poets and to the intellectual background of the Romantic movement.

Classes for the Honours Degree Programme

250A Bibliography, Lecture 1 hour (first term only), R. L. Raymond

This class is 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 meets one hour a week during the first term only and includes the assignment of an exercise to be done in the library.

251 Sixteenth-Century Non-dramatic Literature, Lecture/discussion 2 hours

This class is a survey of the literature (other than drama) of the sixteenth century in England. The works that will be studied include those that both led towards and grew out of the turmoil that accompanied the reform of the Christian Church during the period. Other works represent the fresh flowering of literature that resulted from the re-discovery of classical culture and ideals. The first term is chiefly

devoted to the prose of reform, biography, history and fiction. The second term is devoted to a study of the development of poetry, principally lyric, but centering upon Books I and II of Spenser's *Faerie Queene*.

Prerequisite: English 100.

252 Shakespeare and the Drama of His Time, Lecture 2 hours, S. E. Sprout

Some fifteen plays by Shakespeare are read in the context of representative plays by his earlier and later contemporaries, especially Marlowe and Jonson. The class is a seminar, intended primarily for honours students though open to others.

An entering student should be able to read a poetic play and write intelligently about it in good English and in standard critical terms.

Prerequisite: Students should have obtained a second-class mark in English 100 or have taken an upper-year English class.

253 Old English, Lecture 3 hours, R. MacG. Dawson

An introduction is given to the Old English language (700-1100 A.D.), followed by a study of some of the prose and minor poems, and, in the second term, of *Beowulf*. Students will also be 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, for those who are not thoroughly fluent in modern English.

Prerequisite: English 100.

254 Restoration and Eighteenth-century Literature, Lecture 2 hours, H. D. Sproule

In this class the emphasis will be placed upon three great satirical authors (Dryden, Pope, and Swift), upon a study of Restoration comedy and tragedy, and upon major works of Samuel Johnson. Since the literature of the period is related exceptionally closely to the men and manners of the age, some time will be spent in class on the contemporary climate of opinion that is 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.

Prerequisite: English 100.

255 Middle English, Lecture 3 hours, H. E. Morgan

In this class, an introduction to literary traditions, 1100-1500, students will become acquainted with Middle English literature through a study of passages representative of the debate, the fabliau, the legend, the chronicle, devotional prose and romance and through a close study of *Sir Gawain and the Green Knight* and of two works by Chaucer.

Prerequisite: English 100.

252 Seventeenth-century Non-dramatic Literature, Lecture 2 hours, S. A. Cowan

This class is a study of representative works of Bacon, Donne, Jonson, Burton, Browne, Herrick, Herbert, Carew, Crashaw, Vaughan, Traherne, Marvell and Milton.

The aim of this class is, through a study of representative writers, to provide the student with an understanding of both the individual and traditional characteristics of the poetry and prose of the period. Classes will be conducted by a combination of lecture and discussion.

Prerequisite: English 100.

254 The Nineteenth-century English Novel, Lecture 2 hours, G. M. Harvey

This class is designed to give the student the opportunity of studying the novels of the period from Scott and Austen to Hardy.

356 Literature of the Romantic Period, Lecture 2 hours, H. S. Whittier

For the first few weeks the class will study the beginnings of romanticism in the literature of the later eighteenth century. It will then proceed to examine the major writers of the Romantic period (Wordsworth, Coleridge, Byron, Keats, Shelley) and, more briefly, selected works of the Romantic essayists and of the novelists Austen and Scott.

452 Nineteenth-century Thought, Lecture 2 hours, S. Mendel

The class is chiefly concerned with ideas, the main currents of thought and opinion that influenced the literature of the Victorian Age. It is hoped that, from studying the texts, students will gain an accurate and fairly complete view of Victorian attitudes on social, political, religious, and scientific issues. The background provided by this class is especially helpful for anyone wanting to understand the imaginative literature of the time, for the great Victorian writers of fiction and poetry were intimately concerned with the intellectual problems of their age.

A set of questions is given to the class on each of the texts studied and from time to time an hour is set aside during which the class is invited to discuss these questions. Answering them is entirely voluntary, and no marks are awarded. Their aim is to encourage class discussion and to help students recognize the kind of questions they should ask themselves about the texts.

Prerequisite: Although English 100 is the formal prerequisite for this class, students should bear in mind that it is designed primarily as an honours class for those with special interests in Victorian studies and that the nature of the texts studied demands considerable analytical powers.

453 Twentieth-century Literature, Lecture 3 hours, J. Fraser

A seminar for senior students. A study of representative works of Hopkins, Conrad, Yeats, Forster, Joyce, Pound, Lawrence, Eliot, and Woolf. Summer reading is advisable.

Prerequisite: English 100.

454 Literary Criticism, Lecture 2 hours, R. S. Hafter

This class is intended for senior honours students. It studies the history, theory, and practice of literary criticism from Aristotle to the present.

455 Twentieth-century American Literature, Not offered in 1971-72

457 Victorian Literature, Lecture 2 hours, M. M. Ross

This is a class in the major poets and prose writers (other than novelists) of the Victorian period. Emphasis will be placed on the poetry of Tennyson, Browning, and Arnold; some attention will be given to Rossetti and Swinburne. Selected prose works of Carlyle, Ruskin, Newman, Arnold, and Pater will also be studied.

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 above. Students should consult the Department or the Associate Registrar before registration, when revised class and text lists will be available.

Graduate Studies

The Department offers graduate classes leading to the degrees of M.A. and Ph.D. 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.

47.12 / Geology

Professors

H. B. S. Cooke (Carnegie Professor)
M. J. Keen (Chairman)
G. C. Milligan
A. Volborth (Killam Professor)

Associate Professors

J. M. Ade-Hall
R. A. Gees
F. Medioli
P. E. Schenk

Assistant Professors

D. B. Clarke
G. K. Muecke

Senior Killam Fellow

F. Aumento

Special Lecturers

G. Davidson
J. F. Jones
L. H. King
B. D. Loncarevic
D. H. Loring
B. R. Pelletier

Did you know that eastern Canada was covered by sheets of ice a few thousand years ago? Do you worry that this ice will return? Can you imagine the economic impact on Nova Scotia if oil is found offshore? Or the even greater impact if uranium is found within one of the poorer countries of the world. Did you know that the Atlantic Ocean was barely big enough to bathe in three hundred million years ago? And at that time the equator passed through Nova Scotia, with the day then only twenty hours long? Geology deals with problems such as these. It is the study of the earth and planets — their present nature and their development in time.

Geology can be pursued by people with many varied interests. Volcanoes are spectacular but are only the surface expression of rock melted within the outer parts of the earth. Earthquakes cause great loss of life — can their occurrence be predicted? Earthquakes and nuclear explosions have told us much of what we know about the inside of the earth. Evolution which has led to Man is shown by animal and plant remains now found in rocks as fossils. What atmosphere did these beasts breathe? How salty was the sea at the time they lived? How was the salt at Pugwash formed? Or Cape Breton's coal?

Old beaches, formed shore-lines, are found now far above present sea-level around Hudson Bay and Newfoundland. Can a geologist describe conditions at the surface of the earth at any time in the past? Or the temperature inside the earth at these same times? Or even now? How do mountains form? Perhaps the Himalayas rose when India and Russia collided. Perhaps the Rocky Mountains are the crumpled leading edge of our continent sailing, as it were, across the Pacific Ocean. Our means of subsistence, food, raw-materials, and energy required for a growing population must be obtained from the outermost rim of the earth. It is one task of the geologist to find these resources.

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 protozoans. 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 and production of raw materials such as metals, petroleum and water. Geologists competent in mathematics, or indeed mathematicians with some background in geology, might be involved in processing and analysing data using digital computers; those interested in going to sea might work with the Federal Government's marine institutions. The federal and provincial government employ geologists in their geological surveys and Departments of Mines; the Canadian government is responsible for supplying geologists to agencies such as UNESCO to work in under-developed countries. A graduate with a geology degree and a reasonable background in other sciences would find teaching in high school challenging.

The tables on the pages which follow are only a guide to classes, and are not rigid requirements. Any student who feels that he or she would like a different combination is welcome to consult the Geology staff members, and in particular the Chairman, and ask their opinion and advice. A student who intends to take a degree in geology should consult the Chairman as soon as possible. Students who intend to make their careers in geology, or intend to pursue graduate studies, should consider taking an honours course and, if possible, take an introductory class in geology in their first year.

Table I: General Degree

Year I	Geology 100 Physics 110 or Chemistry 110 or Biology 101 Mathematics 100 Two classes chosen from Languages, Humanities or Social Sciences
Year II	Geology 201A and 201B Geology 202A and 202B Two classes from Physics, Chemistry, Biology or Mathematics, one preferably a 200 or 300 level class An elective
Year III	Three 200 or 300 level classes in Geology (for example, Geology 301, 302, 303; or 301, 303, 306; or 203, 301, 302) One class in Biology, Chemistry, Physics or Mathematics An elective

Note:

- (1) If only one class in Biology is taken, Biology 321 is relevant to Geology students, and may be taken by them with no prerequisites.
- (2) If two 200 level Physics classes can be taken, Physics 221 and 230 are sensible choices.
- (3) Chemistry 201 is a sensible second class in Chemistry.
- (4) Mathematics 200, 220 or 228 are all sensible second classes in Mathematics — but note any restrictions there may be on 220 or 228 as prerequisites, if further classes in Mathematics are planned.
- (5) Although the general requirements do not demand a class in Mathematics or a foreign language, students should note (a) that any one planning a scientific career may be severely handicapped if he has not taken at least one class in Mathematics, and (b) that many graduate schools demand reading ability in a foreign language.
- (6) Any student who is not sure of a suitable program to plan is invited to consult with the Chairman of the Department.

Table II: Honours (Major)

	I Economic Geology	II Geophysics	III Geochemistry	IV Petrology	V Stratigraphy
Year I	Geology 100 Mathematics 100 Two classes chosen from Languages, Humanities and Social Sciences				
	Phys. 110	Phys. 110	Chem. 110	Chem. 110	Biol. 101
Year II	Geol. 201A and 201B Geol. 202A and B Geol. 203B Engin. 210 and 211 Math. 200, 220 or 228 Elective	Geol. 201A and 201B Geol. 202A and B or 203A and B Physics 211 Math. 200, 220 or 228 Elective	Geol. 201A and 201B Geol. 202A and B or 203A and B Chem. 210 Phys. 110 or Biol. 101 Elective	Geol. 201A and 201B Geol. 202A and B or 203A and B Phys. 110 Chemistry 230 or Math 200, 220 or 228 or Biol. 100	Geol. 201A and 201B Geol. 202A and B Biology 200 or 204A/206B Chem. 110 or Phys. 110 or Math. 200, 220 Elective
Year III	Geol. 301 Geol. 302 Geol. 303 Geol. 304 Chem. 210 or 230	Geol. 301 Geol. 306 Geol. 202A and B or 203A and B Phys. 231 Elective	Geol. 301 Geol. 302 or 303 Geol. 202A and B or 203A and B Chem. 230 Elective	Geol. 301 Geol. 302 or 303 Geol. 202A and B or 203A and B Chem. elective Elective	Geol. 301 Geol. 302 Geol. 203 or 305 Biol. 321, 323 or 360 Elective
Year IV	Geol. 306A Geol. 404 Geol. 406 Math. 330 Elective	Geol. 303 Geol. 304 or 401 Geol. 405 Geol. elective (e.g. 460, 445) Math. or Phys. elective (e.g. Phys. 416 or 335)	Geol. 304 Geol. 401 Geol. 454 Geol. 459 Phys. or Biol. elective	Geol. 407 Geol. 408 Geol. 460 Geol. 304 or 454 Elective	Geol. 303 Geol. 304, 305, 405 or 461 Geol. 455 Geol. elective Phys. Chem. or Math. elective

Table III: Honours (combined)

	I with Physics	II with Chemistry	III with Biology
Year I		Geology 100 Mathematics 100 Two classes chosen from Languages, Humanities or Social Sciences	
	Physics 110	Chemistry 110	Biology 101
Year II		Geology 201A and B Geology 202A and B or 203A and B Elective	
	Physics 211 Mathematics 200, 220 or 228	Chemistry 210 Mathematics 200, 220 or 228	Biology 200 A class in Chemistry, Physics or Mathematics
Year III		Geology 301 Elective	
	Physics 231 Physics 315 or 335 Geology 202A and B or 203A and B	Chemistry 230 Chemistry 320 Geology 202A and B or 203A and B	Biology 321 Biology 323 Geology 202A and B 203A and B
Year IV	Geology 303 Geology 306 Geology elective Physics 320, 416 or 445 Mathematics 200, 220 or 228	Geology 401 Geology 454 Geology elective Physics or Biology elective Chemistry 410	Geology 401, 456 or 457 Geology 302 Geology elective Biology elective Physics 221 or Mathematics 200, 220 or 228

Note:

- (1) A student who intends to concentrate on geophysics might consider auditing Geology 452 in his fourth year.
- (2) All students are encouraged to attend one or more non-credit computer programming classes.
- (3) A student who intends to concentrate on paleontology should consider obtaining Geology 305 and 456 in his third and fourth years respectively.

Classes Offered

Classes in Other Departments

Students doing the major part of their work in geology should be aware of relevant classes in other departments. They change from time to time, but the following guide may be helpful.

Biology

321 Invertebrates I
360 General Ecology
403 Man in Ecosystems
405/406 Advanced Classes in Ecology.

Chemistry

510 X-ray Crystallography
512 Crystal Chemistry

Mathematics

206A Probability and Mathematical Statistics (with
Geology 521)
220 Applied Mathematics
227 Numerical Methods and Fortran Programming
228 Applied Mathematics for Engineers I
328 Applied Mathematics for Engineers II

Oceanography

511A, 512A, 513B, 514B Introductory classes.
522, 523, 524, 525 Advanced classes.

Physics

335 Electronics
440 Waves in Layered Media
445 Geophysics
645 Advanced Geophysics

Geology 100 and Geology 101

The study of the earth is based upon observation of natural phenomena, upon experiment and inference. In the last few years intensive study of the rocks of the ocean-floor has led

to a revolution in our ideas about the processes responsible for the development of continents and ocean basins; it has led, in a sense, to a new geology. Let us illustrate one aspect only. We know that a huge mountain chain is buried beneath the Atlantic Ocean, running many thousands of miles and rising above sea-level at islands such as St. Helena and Iceland. This Mid-Atlantic Ridge is the place where rock is slowly brought from the interior of the earth, increasing the area of the Atlantic Ocean; the Americas slowly move westwards away from this Ridge, and Europe and Africa slowly move eastwards. One consequence of this as a theory is that the youngest rocks will be found in the middle of the Atlantic, and the oldest on either side. This turns out to be true. But ask yourself questions of this sort: how would you find the ages of these rocks? or how would you make a map of the rocks of the ocean floor or of Nova Scotia for that matter? Animals living in the sea die and their remains are found in the mud on the sea-floor. They provide the record of evolutionary changes; it is only by the study of fossils that we can trace the rise of man from primitive organisms living billions of years ago.

But topics such as these are only a part of a study of the earth. How are landscapes formed? Or where would you seek oil? Or why does a compass point north? Does the earth's magnetic field reverse? What happens to living organisms when it does? What did Nova Scotia look like five hundred million years ago?

100 Introduction to Geology Lecture 3 hours; laboratory 3 hours, H. B. S. Cooke

This is an introductory class for students intending to take a degree or a minor in geology, and for engineers. An attempt is made to guide the student to an understanding of the development and present state of the earth and planets, and to give groundwork for further classes. A text will be prescribed, and texts and reference books in the library will be recommended at appropriate times in the class. Laboratory work is conducted in the field during the

fall and meets at 2 p.m. in the fall term because of early darkness in November. The field exercises result in the production of a geological map of a small area.

101 Introduction to Geology Lecture 3 hours; laboratory 3 hours, (alternate weeks), H. B. S. Cooke

This is an introductory class for students in Arts and Science. It is intended as a science elective for students from disciplines other than geology. It emphasizes the concepts and major ideas which concern the development and present state of the earth and planets, and the influence of geological history upon the human environment. There are demonstration periods and field trips. A text will be prescribed, and reference made to books and reference material in the library at appropriate times.

102 Introduction to Geography Lecture 3 hours; laboratory 3 hours every two weeks, H. B. S. Cooke/G. C. Milligan and staff (not given in 1971-72)

This class is intended primarily for students already enrolled in the B.Ed. programme, and other students interested in it as an elective must obtain the permission of the instructor. An attempt is made to provide an understanding of the relationships which exist between man and his physical environment. An outline is given of the principles of cartography and the use of maps for representation of data. Basic concepts of meteorology and climatology provide background for consideration of processes of erosion and landscape development, and also for the ecological environments. The environment affects human development and is changed by man through exploitation of resources. Various aspects of human settlement, urbanization and industrialization are considered. The laboratory classes are devoted mainly to practical consideration of examples and case histories.

140 Introduction to Geology Lecture and demonstration 3 hours, one evening per week, M. J. Keen and staff

This is an experimental attempt to provide a first-year class in geology as a part of an evening programme. The class will probably divide into four parts: rocks, minerals and geological processes; the early history of the earth, particularly as is now known from studies of the moon; the modern earth, drawing upon studies of continental drift and ocean floor spreading; the geology of Nova Scotia. Note that no attempt will be made to present all aspects of lunar geology, for example, hardly possible with beginners; rather, the principles of geology will be illustrated using the moon, the phenomenon of continental drift, and Nova Scotia as examples.

It is not suitable for those who plan to major in geology. It is suitable for those who simply want a first class in geology, for example, high school teachers finding themselves teaching "earth sciences".

Two-Hundred and Three-Hundred Level Classes

These classes were extensively revised for 1971-72. A comparable revision will be made in four-hundred level classes for 1972-73 which will allow a logical progression of classes for students in their third year in 1971-72.

The two-hundred level classes are designed as introductions to specialized studies of the earth. They may be taken by students at any stage in the University who have taken a first-year class in geology, or can demonstrate equivalent background. Consequently, not only are they suitable for second-year students but they are also suitable for, say, physics students in fourth year who intend to specialize in geophysics in their graduate work and want a better background in geology.

A second-year student might expect to do four or six of the half-classes in his second year. He or she might plan to pick up at a later time some of those he was not able to take in second year.

201 Mineralogy Lecture 3 hours; laboratory 3 hours, D. B. Clarke

A rock is an aggregate of physically distinct substances called minerals. Most minerals have characteristic external forms and optical properties which reflect the regular arrangement of the atoms of which the minerals are made. The branches of science which deal with studies of minerals and rocks are mineralogy and petrology. The microscopic examination and description of rocks is petrography. The class is divided into two halves.

201A Introduction to the Study of Minerals (first term), Lectures 3 hours; laboratory 3 hours, D. B. Clarke

Most minerals have characteristic external forms and physical properties which reflect the regular arrangement of atoms of which the minerals are made. This class will deal with the detailed study of these minerals from crystallographic, chemical, economic and genetic points of view.

201B Optical Mineralogy (second term), Lectures 3 hours; laboratory 3 hours, D. B. Clarke

The lectures will cover the theory of determinative optical crystallography and the laboratory involves the practical application of this theory to the identification of unknown minerals with the petrographic microscope.

Note: 201B follows naturally from 201A and the two are normally taken in one academic year. Under exceptional circumstances either 201A or 201B may be taken alone as a half class.

202A Introduction to Stratigraphy and Sedimentology Lecture 3 hours, one of which is pre-lab; laboratory 3 hours, P. E. Schenk

A stratigrapher-sedimentologist should be capable of recreating conditions at the surface of the earth for any area at any selected time in the earth's history. Such conditions include the distribution of land and water, water depth and land relief, temperature, wind-direction, water salinities, run-off from the land, distribution of organisms, relations between both organisms and their environment, and many other factors defining geography. Geology 202A, 302, and 455/505 should lead the student to this capability.

Geology 202A introduces topics considered in greater depth in Geology 302. As such, this survey is designed not only for geology majors but for students wanting a second class in geology as well as for those specializing in some other area of earth science. The class is in four parts: (1) a brief historical development; (2) a survey of the various tools - specifically sedimentology (rock textures, structures, processes of formation, and sedimentary environments); (3) the application of these tools in studying vertical and lateral variations in the earth's crust; (4) the result of such application in a survey of the evolution of North America, specifically Atlantic Canada.

Lecture notes are distributed before class so that class-time is spent in discussion.

Laboratories deal mainly with study of sedimentary rock in order to interpret the nature of source area, means of transportation and deposition and modifications after deposition. Exercises on maps of North America should eventually enable the student to unravel the evolution of fairly complicated blocks of the earth's crust.

A field trip to the Annapolis Valley and a report is required.

Any student may take this class provided she/he has had introductory geology or equivalent.

202B Principles of Palaeontology Lectures 3 hours; laboratory 3 hours, F. Medioli

Fossils provide the record of living organisms during the development of the earth. They were among the keys used in the theory of evolution. They are the basis for correlating sedimentary rocks because major evolutionary changes in organisms are world-wide phenomena. The invertebrates are important because they are very abundant and, as many of them lived in the oceans, they are widespread and well preserved as fossils entombed in sediment.

In this class a survey will be given of the major concepts of palaeontology, including processes of fossilization, taxonomy and nomenclature; ecology and palaeoecology; biocenosis and thanatocoenosis; correlation; biostratigraphy. It will also include a very basic survey of the major phyla of invertebrates.

203A Field Methods Lectures 3 hours; laboratory 3 hours, G. C. Milligan/M. J. Keen and other staff members

This class introduces students to field techniques which will be useful to them in practical work in the field. It is primarily a class in elementary surveying methods. It includes, for example, brief instruction in the use of the plane table, aerial photographs in geological field work and in map making, application and use of geophysical methods. None of the topics can be considered in depth in the time available, but the class should provide a guide for further study, and be useful for students seeking summer employment in the field.

The class may be taken by students in any year who have completed a first-year class in geology, or can demonstrate an equivalent background.

203B Introduction to Structural Geology Lectures 3 hours; laboratory 3 hours, G. C. Milligan.

This class is an introduction to the study of the mechanical aspects of the emplacement of rocks and to their behaviour during deformation. The emphasis is upon the description of these phenomena, rather than upon discussion of their causes. The class will discuss, for example, in sedimentary and volcanic rocks those features which are useful in deciphering later folding of the rocks, the characteristics of salt domes, and the internal movements in igneous rocks during consolidation. The class should provide some understanding of the structural features the student will encounter in his work during the following field season. It can be followed by Geology 303 in a natural way.

The class may be taken by any student who has had a first-year class in geology, or the equivalent background. *Texts:* No text is prescribed. The lectures will follow approximately the content and format of Billings, *Structural Geology*, but additional reading may be required.

204B Principles of Geochemistry Lectures 3 hours; laboratory 3 hours, A. Volborth

This class is an introduction to geochemistry which shows how chemical processes govern many geological processes. It will demonstrate the relevance of classes in chemistry which a student may have already taken, or is taking concurrently, to studies of the earth. The topics considered will include: the composition of the earth; crystal chemistry — fundamental in understanding mineralogy and petrology; the chemistry of igneous, sedimentary and metamorphic rocks; the composition of the atmosphere and oceans — necessary in considering sedimentation processes now, and in the past, for example.

The text will probably be *Principles of Geochemistry*, by Brian Mason. The class may be taken by any student who has taken a first-year class in geology or chemistry, or can demonstrate an equivalent background.

240 Marine Geology and Geophysics Lecture and discussion 3 hours one evening per week

Geology 240 is an experimental class first offered in 1970-71. An attempt is made to present the new ideas concerning the earth which have developed over the last few years largely through studies of marine geology and geophysics. The class is not suitable under any circumstances as an alternative to other second-year classes for students planning to make geology their "major" in a degree programme. It is suitable for those who would simply like a second class in geology. For example, in addition to regular full-time undergraduates it could be of interest to teachers at high schools or interested professionals at government institutions.

Prerequisite: any first-level class in geology.

301 Igneous and Metamorphic Petrology Lecture 3 hours; laboratory 3 hours, D. B. Clarke/G. K. Muecke

The mineralogy and texture of rocks are the products of their environment and mode of formation; thus macroscopic and microscopic investigation of these rocks provide clues to the conditions prevailing at the time of their formation.

Igneous rocks will be discussed under such topics as mineralogical and chemical classification, methods of depicting chemical data, mechanisms and environment of magma production, various mechanisms of magma evolution and comagmatic provinces.

Metamorphic rocks will be considered as the products of thermal and dynamic processes operating on preexisting rocks. Stability relations of minerals under varying temperature-pressure conditions and the concept of metamorphic facies will be stressed.

Prerequisites: Geology 201A and B or equivalent knowledge.

302 Stratigraphy and Sedimentology Lecture 3 hours; laboratory 3 hours, P. E. Schenk

Topics introduced in Geology 202A are studied to greater depth in this class. Lecture notes are distributed before class so that class-time is spent in discussion. Principles detailed in these notes are illustrated by case study. The syllabus is: (1) tools, involving detailed sedimentology, palaeontology, and sedimentary tectonics, leading to tectonic-environmental models; (2) methods, involving problems in vertical and lateral variations, classification, nomenclature, and correlation; (3) results, involving by seminar the evolution of Atlantic Canada.

Laboratories deal mainly with microscopic and macroscopic study of sedimentary rock clasts. A series of problems are presented involving stratigraphic maps and illustrations, emphasizing quantitative, computer-oriented data. Precise on outside reading from current literature are requested. A week-end field trip to northern Nova Scotia is scheduled each fall. Other field trips may be planned.

This class is suitable not only for students specializing in sedimentary rock but also those in other areas of earth science, general course B.Sc., or earth science teachers.

303 Structural Geology Lecture 3 hours; laboratory 3 hours, G. C. Milligan

This class is intended as an introduction to the behaviour of rocks during deformation. The emphasis is upon the geometrical aspects of the rock structures and their interpretation but there is also consideration, in an elementary way, of the mechanics of rock deformation. The laboratory work is essentially a brief course in descriptive geometry. This trains the student to visualize the three-dimensional geometry of rock structures of many problems of a graphic and geometrical character encountered in cartography and other geological work, especially in mining.

Texts: There is no prescribed text for the class. The programme follows approximately the sequence of Billings, *Structural Geology*, but certain aspects are pursued to

greater depth. For this, DeSitter, *Structural Geology* and other texts are useful, and students are also referred to the technical journals.

401 Introduction to Ore Deposits Lecture 3 hours, G. C. Milligan

This class studies case histories of selected mines and districts illustrating the types of a classification of ore deposits and the factors controlling ore deposition. This class is conducted in the same manner as Geology 404.

Prerequisites: Geology 201, 301, Geology 303 may be taken simultaneously. Exceptions are made to meet specific programmes, but the student should consult the instructor and obtain permission.

405 Systematic Palaeontology Lecture 3 hours; laboratory 3 hours, F. Mediolli/H. B. S. Cooke

This class comprises a systematic survey of the major phyla of fossil organisms. The emphasis will be on morphology and taxonomy of invertebrate phyla, but a short survey of the main lines of evolution of vertebrates will be included. The purpose of this class is primarily to enable the student to recognize at sight the members of the various phyla. However, it is intended also that he should learn how to handle invertebrate fossil material so as to classify it accurately when the resources of a library and museum are available.

Prerequisite: Geology 202A.

406A Introduction to Exploration Geophysics Lecture 3 hours; laboratory 3 hours, J. M. Ade-Hall

Canada has major mineral resources in the Canadian Shield, and the sedimentary basins of Alberta, the Arctic and the continental margin contain oil and gas. Exploration geophysics has led in part or in whole to the discovery of many of these. For example, aeromagnetic surveys are used to delineate potentially mineral bearing volcanic rocks on the Shield, and seismic reflection studies in the sedimentary basins are used to map structures in which hydrocarbons are trapped. This class is designed to explain the principles of the main techniques used by exploration geophysicists, the seismic, electrical, electromagnetic, magnetic and gravity methods. Relevant mathematics and physics will be at a level that is reasonable for a student who has taken Geology 100 and 200 classes. Each exploration technique will be illustrated by case histories from actual mineral discoveries and students will be able to try out some of the techniques for themselves during the laboratory.

Students who find exploration geophysics to their interest should take 405A at a later date. This latter class will give a more quantitative approach to exploration geophysics than does 306A.

406B Plate Tectonics Lectures 3 hours, J. M. Ade-Hall

The study of the ocean floors by geologists, and geophysicists over the last 15 years has led to a revolution in our understanding of the way in which the earth's crust is made. The continents are now known to be islands of light material which are carried on enormous plates. These plates are changing in form all the time, being added to at the mid-ocean ridges and lost at the deep trenches of the oceans. The past and present collision of plates has given rise to the fold mountain ranges of the earth. The Coast Ranges, Alps and Himalayas represent active plate collision and older ranges, such as the Appalachians, represent the fossilized effects of former plate collisions.

This class will describe the rapid development of ideas about oceanic geology leading to the current state of the plate tectonic model of the earth's crust. Contributing evidence from many areas of geology and geophysics will be brought together in the current synthesis. This means that the student will be introduced to earthquake seismology, the nature of the earth's magnetism, the radioactive dating of lavas and to the results of the recent drilling into the

ocean floor from the "Glomar Challenger" by the JOIDES team. We shall also be looking at the geology of fascinating areas such as the intersection of the Red Sea — Gulf of Akaba — East African Rift Valley systems, the Gulf of California and the San Andreas Fault and the West Coast of South America. These are all areas where crustal plate interaction is going on today.

The class will be taught so that current concepts, results and problems will be fully discussed. Maths and physics will be kept at the 200 level.

401 Sedimentology and Sedimentary Petrology Lecture 2 hours; laboratory 3 hours, R. A. Gees

This class follows naturally from 301. Students who have not taken 301 will be expected to make up the background themselves. Topics to be discussed include: the origin of sediments, sedimentary textures and structures, the composition of sediments, their classification and nomenclature, the petrography of gravels, sandstones, shales, limestones, and non-clastic sediments. Special emphasis is put on the provenance, the dispersal and the deposition of sediments as well as their diagenesis.

During the laboratory period students work on problems which were discussed during the lectures. They will familiarize themselves with the different types of sediments both macroscopically and microscopically. Students are encouraged to participate in one or two seminars. Two term papers are required. Note that this class will not be given after 1971-72.

403 Advanced Structural Geology hours to be arranged, R. A. Gees/G. C. Milligan

This class will consider the life-history of a mountain range as a theme upon which to base discussion of tectonic processes. It is proposed to use the Alps as the example.

The class is taught as a colloquium and participants will be required to do considerable reading from the relevant journals.

Prerequisites: Permission of the instructors.

404 Ore Deposits, Advanced Class G. C. Milligan (not offered in 1971-72)

This class is designed for graduate and senior undergraduate students interested in mining geology. It is taught by the case history method, in a colloquium, in which each student in turn leads the discussion for a 3-hour session. The case histories are chosen to illustrate the factors controlling the deposition of ores, but considerable flexibility is possible to meet the special interests or requirements of the individuals in the class.

The text material is drawn entirely from the technical journals and reference works, and a considerable volume of reading is required.

This class is complementary to Geology 406, which is also recommended to students interested in economic geology and which may be taken concurrently.

Prerequisites: Geology 201, 301, 303, 304; Chemistry 230. Exceptions with the permission of the instructor.

405A Exploration Geophysics Lectures 3 hours; laboratory 3 hours J. M. Ade-Hall

This class is primarily intended for students with a suitable background of geology, mathematics and physics who intend to specialize in exploration for minerals or oil. It will be assumed that the class has a good knowledge of the principles of exploration geophysics, for example, as given in 306A. We shall be concerned with modern practice in each of the main exploration techniques, in data processing and in the quantitative interpretation of anomalies.

Prerequisites: Geology 306 or other 300-classes. The student should discuss with the instructor whether his maths and physics levels are suitable for the class.

405B Geophysical Studies of the Earth Lecture 3 hours; laboratory 3 hours, J. M. Ade-Hall

This class will give a more quantitative discussion of some of the features of the earth described in 306B. These will include details of deep crustal refraction and reflection seismics, what can be learned about crustal structure from surface wave studies, and about the sense of movement on the great faults of the world from first motion studies. The mechanism for and history of the earth's magnetic field will also take our attention as will the details of plate generation at the mid-oceanic ridges and plate loss at zones of subduction.

Prerequisites: Geology 306 or other 300-classes. The student should discuss with the instructor whether his maths and physics levels are suitable for the class.

406 Examination of Mining Properties J. P. Nowlan

This is a lecture and laboratory class on the evaluation of mineral deposits, and on the use of the physical and chemical properties of minerals in the recovery of metal from ore. It provides graduate and senior undergraduate students with an understanding of the integrated responsibilities of geologists and engineers employed by the mining industry. The seminar will study a "model" property in its successive stages of development from initial exploration to production. Emphasis will be placed upon the design planning by the student of various facets of the operation. No texts are prescribed but extensive use will be made of technical literature from library files.

407 Advanced Igneous and Metamorphic Petrogenesis Lecture 3 hours; laboratory 3 hours, D. B. Clarke/G. K. Muecke

A wide range of igneous rocks will be discussed from a petrogenetic standpoint. The petrogenetic problem for each rock type will be defined and then its origin considered in the light of recent information from the fields of geochemistry, isotopic studies and phase equilibrium studies.

Metamorphic rocks will be discussed as products of physico-chemical processes in open and closed systems. Experimentally determined phase relations of metamorphic minerals will be critically examined and correlated to natural assemblages. The development of metamorphic belts will be studied in relation to the evolution of the continental crust and plate tectonics.

Prerequisites: Geology 301.

408 Advanced Mineralogy and Crystallography Lecture 3 hours; laboratory 3 hours, F. Aumento/D. B. Clarke/G. K. Muecke

Advanced work in crystallography and crystal chemistry precedes a systematic examination of the chemistry, structure and occurrence of the major rock and ore-forming minerals. Laboratory work includes the use of X-ray and other modern analytical techniques in the identification of minerals and determination of their parameters, symmetry and structure.

Prerequisite: Geology 201A, B.

421/521 Statistics, Computers and Geological Problems P. E. Schenk

This class is designed to show how to plan attack on geological problems, and to store, manipulate, and analyze data to solve such problems. Emphasis is on stratigraphic and sedimentologic questions. The class is in two parts: (1) Mathematics 206A (Probability and Mathematical Statistics); and Fortran IV with Watfor (either courses or programmed texts); (2) application of statistics using the machine to help in data information and retrieval, data

portrayal, sampling schemes, data analysis, and simulation of geologic environments using mapped litho/biofacies. Visits to neighbour institutes are planned.

445/545 Physics of the Earth Lecture 3 hours, P. H. Reynolds

This is an introductory class in solid earth geophysics. Topics discussed are: the figure of the earth and gravity; seismology and the internal structure of the earth, the geomagnetic field, paleomagnetism — the pre-history of the geomagnetic field, heat flow and the earth's thermal history, electrical conduction in the earth, radioactive processes and the age of the earth. This class assumes the student will have a reasonable background in physics and mathematics. It is taught concurrently with Physics 445/545.

452/502 Advanced Geophysics One afternoon per week, P. Reynolds/R. Ravindra/R. Hyndman/M. J. Keen

A seminar class concerned with current research topics in geophysics. These may involve the fields of seismology, gravity, earth tides, magnetic fields, electrical conductivity, temperature, palaeomagnetism, continental drift, convection currents, time series analysis. It is held in conjunction with Physics 645. Students may register for it either as a class in geology or as a class in physics.

453/503 Hydrogeology Hours to be arranged, J. F. Jones

This class studies the occurrence, movement and distribution of water as related to earth materials, with emphasis on the exploration, development and utilization of groundwater. The class work includes the physics of groundwater flow, aquifer hydraulics (with problems), well design and completion, water chemistry, hydrologic systems (i.e. groundwater — surface water interaction), and digital modelling.

Students will be asked to present and participate in seminars.

454/504 Geochemistry Hours to be arranged, A. Volborth

Abundance and distribution of elements in the lithosphere, hydrosphere, atmosphere and the cosmos. Discussion of nuclides and isotopes. Composition of meteorites and extra-terrestrial bodies, with some emphasis on the chemistry of the oceans. Students who wish to take this class should see the instructor first. They will normally be expected to have a reasonable background in chemistry or physics or geology.

455/505 Advanced Stratigraphy and Sedimentology Lectures and seminars to be arranged, P. E. Schenk

This class is designed for the fourth-year and graduate student to discuss specific problems in stratigraphy and sedimentology. In general the three main topics of Geology 202A/302 are continued in a case study/seminar fashion. For each topic, a list of possible problems including main bibliography are submitted. A week-end field trip to the famous Arisaig section is scheduled in the fall. A report is required after this trip.

The student should have taken Geology 302 or equivalent.

456/506 Introduction to Micropalaeontology Hours to be arranged, F. Medioli

The class gives a general systematic study of the major groups of microfossils, mainly foraminifers, ostracoda and calcareous nannoplankton. It is intended to provide a survey for those who do not plan to go further with the subject, and to provide the necessary basic knowledge of principles and concepts for those who may wish to continue in stratigraphy, historical geology and micropalaeontology.

Particular emphasis will be put on recent microfauna and techniques for sampling and studying them. The class involves only one hour a week of formal lectures, but at least one afternoon laboratory class. Each student will be asked to present a seminar during the year.

457/507 Principles of Pleistocene Geology H. B. S. Cooke

A seminar class designed to expose the student to the special problems involved in the interpretation of Pleistocene deposits, rather than to a particular study of Pleistocene stratigraphy. The matters covered include: the margin, distribution and nature of snow and ice; movement of glaciers and ice caps; glacial stratigraphy; sea level fluctuations; ocean floor deposits; climatic changes evidenced in non-glaciated regions; theories of ice ages.

Students who are admitted to the class are expected to possess sufficient background to be able to prepare competent seminar talks, which are an essential part of the programme. Although this will normally mean a good background in geology, students with advanced standing in biology may be admitted. Reading forms a substantial part of the class as there is no single text available.

459/509 Analytical Geochemistry Hours to be arranged, A. Volborth

A practical introduction is given into X-ray spectrography, accelerator neutron activation, atomic absorption and optical emission spectrography, with emphasis on classical analytical analysis. Successful completion of this class may enable the student to meet the requirements of Atomic Energy of Canada concerning scientists involved in the operation of particle accelerators.

460A Principles of Isotope Geochemistry Lecture 3 hours; laboratory 3 hours, R. H. McCorkell/G. K. Muecke

The study of naturally occurring isotopes, both radio-active and stable, forms a major and ever expanding field of geochemistry. This class introduces the student to the fundamental concepts of nuclear chemistry such as types of nuclear disintegration, nuclide systematics, nuclear reactions, etc. The role of isotope fractionation in geological processes will be discussed with reference to stable isotopes. Particular attention will be paid to the isotope geochemistry of hydrogen, carbon, sulfur and oxygen.

460B Geochronology Lecture 3 hours; laboratory 3 hours, R. H. McCorkell/P. H. Reynolds

The absolute dating of pre-historic events, be they the dating of tools by ancient man or the formation of the solar system, constitutes a fundamental problem encountered in most geological and geophysical studies. The emphasis in this class will be on methods of age dating based on the radioactive decay of naturally occurring isotopes; other methods will be discussed briefly. The role of radioactive isotopes and their daughters as tracers in geological processes will also be stressed.

Prerequisite: Geology 460A, or equivalent.

461A Advanced Marine Geology Hours to be arranged, R. A. Gees/M. J. Keen/R. D. Hyndman

This part is an introduction to 461B and 462B. The main morphological features of the ocean basins will be considered in some detail.

461B Advanced Sedimentology Hours to be arranged, R. A. Gees

The sedimentological aspects of the marine environments considered in 461A will be discussed in this class. The following topics will receive particular attention: a review of physical properties of sediments; sedimentology of beach and nearshore environments, the shelf platform, the continental slope and rise, and the ocean basins. Additional topics to be discussed are: age determinations in sediments,

the Pleistocene record, deep-sea drilling, and the geological history of the ocean basins.

A student will be presumed to have a background equivalent to the material in 202A, 240 and 302.

462B Marine Geophysics Hours to be arranged, M. J. Keen/R. D. Hyndman

This class is designed primarily for students who are concentrating on geophysics, structural geology and petrology. An account will be given of current ideas concerning the composition and evolution of the ocean basins.

Geology Seminar

Papers are presented by guest speakers, members of the staff and senior students.

Field Courses

Spring Course in Field Geology

In co-operation with Mount Allison, St. Francis Xavier, St. Mary's, and Acadia universities, a field course of approximately two weeks' duration is conducted at Crystal Cliffs, N.S. This course is held immediately following the conclusion of spring examinations. It is compulsory for students specializing in geology, after their third year. A fee of \$50 for full board is payable with the second instalment of university fees.

Course in Exploration Geophysics

A field course of approximately one week's duration is held in the Spring or early Fall. It is not, at present, compulsory.

Graduate Studies

Students with good degrees in any of the sciences or mathematics who wish to study some aspect of the earth are welcome. Graduate work leading to the degrees of M.Sc. and Ph.D. is possible in a number of different fields. These include, for example: Appalachian studies, economic geology, hydrogeology, petrology, geochemistry, mineralogy, geophysics, instrumentation development, marine geology and geophysics, Quaternary studies, micropalaeontology, and sedimentology.

Interdisciplinary studies are encouraged, and there is active co-operation between the science departments and the Institute of Oceanography at Dalhousie University. There are many studies in earth sciences carried out in other departments of the University; for example, geophysical studies are also conducted within the Department of Physics, and Quaternary studies within the Department of Biology. Students are urged to take full advantage of the opportunities this affords. Research is often done in co-operation with government laboratories such as the Department of Mines, Nova Scotia Research Foundation and Bedford Institute. The complex of departments and laboratories in Halifax and Dartmouth concerned with various aspects of the earth makes graduate study in earth sciences very attractive.

For further information see the Graduate Calendar, and write to the Chairman, Department of Geology.

47.13 / German

Associate Professors
Detlev Steffen
Friedrich Gaede

Assistant Professors
Klaus Fricke
Auguste Roulston

Lecturers
Richard Ilgner
Certa Josenhans
Reiner Zeeb

Programmes
of Study
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German

German studies are divided into two different programmes. The first is the study of the German language itself, the second the study of German contributions to the European literary and philosophical tradition.

Many students will take German to acquire knowledge of an important foreign language. German is spoken in Central Europe (Germany, Austria, the major part of Switzerland, and some other areas). German will prove useful in academic fields such as philosophy, music, history and the social and natural sciences. It is also relevant to some of the professions involving international relations in government, journalism and business. Several introductory language classes (German 100, 150, intermediate (200, 201, 202), and advanced (300) language classes are offered by the department. Special aids include a language laboratory and the setting up of conversation groups.

Classes in German literature and thought are offered to students who wish to pursue further studies. German culture has produced some of the greatest achievements in the European tradition, particularly in literature, music and philosophy. The years between 1750 and 1830, to mention just a period of eighty years, produced such figures as Goethe and the Romantics, Mozart and Beethoven and Kant and Hegel, the representatives of German idealism.

Classes offered cover all German literature from the 16th to the 20th century, studied either in the context of cultural periods or as the work of individual writers.

Advanced studies in German will prove useful to high school teachers; they will also prepare students for graduate studies and professions such as those of critic, editor, translator and university professor.

Degree Programmes

General B.A. with Major in German

Students majoring in German must take a minimum of three German classes beyond the 100 level.

B.A. with Honours in German (major programme)

Students considering an honours course are advised to consult the Department of German.

Year I

1. German 100.
- 2-3. Two classes from Classics 100, European Literature 100, History 100, Philosophy 100.
4. A social science class.
5. An elective.

Year II

- 6-8. German 200, 202, 221.
9. One class from Classics 100, European Literature 100, History 100, Philosophy 100.
10. An elective.

Year III

- 11-12. German 301, 303.
13. One class from German 300, 302, 352, 353.
14. A class in the minor subject.
15. An elective.

Year IV

16. German 400.
17. German 401 or 402.
18. One class from German 401, 402, 451, 452.
19. One class in the minor subject.
20. An elective.

Combined Honours

It is possible for students to take an honours degree combining German with French, Russian, Spanish, English or Greek. Any student intending to take such a combined honours degree should consult with the two respective departments to arrange the details of his programme.

Introductory Classes Offered

Introductory classes do not require previous knowledge of German.

100 Comparative Literature (see 47.71), Lecture 3 hours, Members of Romance Languages and German Departments

100 German for Beginners Lecture 3 hours, G. Josenhans/A. Roulston

German 100 is a seminar class for beginners, and no previous knowledge other than a reasonable background of English grammar is required. Its equivalent is two years of German in high school with a final mark of 75% or better. While the texts may be similar to those used in high schools, the University course offers more facilities for learning, such as language laboratories and opportunities for oral work, supplies of books, and magazines and papers in German for study. More independent work is demanded of the student than is customary in high schools.

The class is taught mainly in German, emphasizes the spoken language, and provides the student with the knowledge of basic grammar.

Intensive language laboratory work and attendance at small conversation groups is required.

Text: Schulz/Griesbach: *Deutsche Sprachlehre für Ausländer. Grundstufe in einem Band.* *Glossary: Deutsch-English, Deutsche Sprachlehre für Ausländer. Grundstufe in einem Band.* Hueber Verlag, München.

This class or its equivalent is a prerequisite for all classes on the 200 level.

150 Intensified German Lecture 5 hours; laboratory 2 hours

This class combines the objectives of both German 100 and 200; no previous knowledge of German is required. German 150 counts as two classes, equivalent to those of German 100 and 200; it is thus designed particularly for those students who wish to take German as their first-year elective. Students who wish to acquire firm command of a foreign language may concentrate their efforts in one year; students planning to proceed to advanced language or literary classes will be provided in their first year with the entrance requirements for classes beyond the 200 level.

The final objectives of the class are the same as those of German 200: oral and writing fluency on the basis of expanded knowledge of grammar and vocabulary.

Students will first become familiar with the basic patterns of spoken and written German and will learn to use them through repetition. Students will acquire a vocabulary of about 500 words. In the second stage, instruction will concentrate on systematic grammatical studies, translation and writing skills, while speaking competence will be developed throughout the whole year.

Students will spend an average of two hours a week in the language laboratory to support grammatical studies and to develop aural comprehension. One hour a week will be dedicated to conversational practice exclusively.
Text: Schulz/Griesbach: *Deutsche Sprachlehre für Ausländer.* Max Hueber Verlag, München.

Intermediate Classes Offered

Intermediate classes are based on German 100, high school German or an equivalent basic knowledge.

At the outset of these classes, the student should have a vocabulary of approximately 600 words and the ability to understand simple questions in German, to write a composition of about 80 words and to summarize or retell a simple story. The student should also have a basic knowledge of grammar including declension of nouns and

pronouns, conjugations of verbs, active and passive voice, use of prepositions, declensions of adjectives, syntax — main clauses, dependent clauses, questions, imperatives, direct speech. The knowledge required can be found in books of German 100 or Grade X, XI, XII German, and in German basic work lists.

200 Intermediate German Lecture 3 hours, K. Fricke/G. Josenhans/R. Zeeb

The main aim of this class is to develop in the student a certain degree of speaking fluency as well as writing skills through the improvement of grammatical knowledge and vocabulary. The class is based on German 100, high school German or equivalent basic knowledge. Since considerable progress is placed in this class on oral training, study of grammar will be limited to one hour weekly, given in English; the rest of the time is devoted to oral German.

Language laboratory work is required. Small conversation classes once a week as an aid to speaking fluency are compulsory.

This class will continue to employ learning techniques which students are familiar from their high school instruction and which are designed to teach students how to use a modern vocabulary and common grammatical and syntactical patterns. Students will find that the type of work they have been accustomed to perform in class will now have to be done in the language laboratory, while most of the instruction time in class is dedicated to the development of their language activities.

The class work includes the reading of simple and moderately difficult modern German literature and a complete review of the basic grammar.

Prerequisite: German 100 or equivalent.
Texts: Richmond/Kirby, *Auslese*, MacGraw-Hill; Robert O. Kössler: *German in Review*, Holt, Rinehart and Winston, Toronto.

201 Scientific German Lecture 3 hours, A. Roulston

This is 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. The grammar text used in the class emphasizes those aspects of grammar that must be known to accomplish this. Class work emphasizes chiefly the analysis of typical sentence constructions found in the reading selections, vocabulary building and sight translations. Reading material assigned from many sources in the major scientific fields. Students are encouraged to bring in additional reading material of their own interest to discuss in class. Once a student has sufficient knowledge of grammar and the basic vocabulary of scientific texts, he should have little difficulty in acquiring the special terminology of his own particular field, and be able to translate, even at sight, with reasonable facility and speed.

A reading knowledge of German is a prerequisite for many Ph.D. degrees.

Prerequisite: German 100 or equivalent.
Text: Eichner and Hein, *Reading German for Scientists*, Chapman and Hall, London.

202 Exercises in Translation and Composition Lecture 2 hours, D. Steffen

English texts from various periods and of different types will be translated into German. These translations will 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 will be conducted mainly in German.
Prerequisite: German 100 or equivalent.

203 Introduction to German Literature Lecture 2 hours, K. Fricke

A study is made of selected texts representing major periods of German literature which will be related to the various stages in the development of German civilization. The class also serves as an introduction to literary criticism. At the beginning, Middle High German (in translation) and Baroque literature will be studied. The class will then concentrate on the two outstanding periods of German literature: 1750-1830 (Lessing, Goethe, Kleist), and the 20th. century (Kafka, Brecht).

These texts will also provide the material for a discussion of the characteristics of literary forms: poetry, narrative prose, and drama.

Prerequisite: German 200 or equivalent.

Advanced Classes Offered

Advanced classes are based on German 200 or an equivalent knowledge.

300 German Composition

The aim of the class is to develop in students the ability to express themselves freely and correctly in different styles (e.g., personal and official letters, reports, descriptions) within the vocabulary of present day German social, political, cultural and scientific life. Students will be required to do translations and exercises in syntax, and to write essays on various topics.

The class will also study the various uses of synonyms, idioms, different meanings of similar words, words within changing contexts, and vocabulary within selected word patterns.

Prerequisite: German 200 or equivalent.

301 The Baroque Age, Lecture 2 hours, F. Gaede, (offered in 1972-73)

The class studies German literature between the 16th and the 18th centuries as a direct reflection of the important religious, social and scientific developments in Germany after the Reformation and during Absolutism, particularly the 30 years' war. Poetics, poetry, drama and prose, their origins in Humanism and the Renaissance and their functions for the following literature will be discussed. An introduction will be given to rhetorics, the art of emblemata and allegory, mysticism and mannerism which determine and characterize the European literature of the Baroque Age. The discussion will concentrate on the works of Brant (*Ship of Fools*), Grimmelshausen (picaresque novel), Gryphius (martyr drama, sonnet), Fleming (petrarchism) and Angelus Silesius (mystic epigram). The study of these texts will give the students a thorough understanding of the epoch.

Prerequisite: German 200 or equivalent.

302 German Literature in the Age of Enlightenment Lecture 2 hours, K. Fricke

The European movement of Enlightenment laid the social and philosophical foundations of the modern world. Its literature, predominantly a domain of the socially rising bourgeoisie, is the oldest directly accessible to modern man. The writers of the Age of Enlightenment in Germany were influenced by classical Greek and Latin literature, French and German Baroque writing, Cervantes, Shakespeare and 18th century English literature. There is hardly any other period in German literature that displays such a vivid awareness of the literary productions of other European nations, whether it was to free itself from their dominance or to draw inspiration from them.

The class will examine the nature and extent of these influences as this is essential if the original achievements of the period are to be evaluated. Knowledge of one of these literary fields would enable students to make considerable contributions to the progress of class work. The class includes the study of important criticism of the period as well as the study of single works, in particular the following

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topics - fables (Gellert, Lessing), theoretic writings (Gottsched, Baumgarten, Lessing), poetia forms (odes, epigrams), Anacreontic poetry (Klopstock, Uz, Lessing), the epic (Klopstock), the novel (Wieland, "Geschichte der Abderiten"), drama (Lessing, "Minna von Barnhelm", "Nathan der Weise"). Students will also be introduced to the more important interpretations of particular works and of the literature of the whole period.
Prerequisite: German 200 or equivalent.

303 The Period of Transition: Goethe and his Time Part I
Lecture 2 hours, D. Steffen (offered in 1972-73)

A study is made of German literature and thought of the time which preceded and witnessed the great revolutions of the 18th century. Stimulated by the success of the natural sciences and their rational investigation into nature, the Enlightenment turned against contemporary society, demanding that it be reformed on the basis of reason. The Germans, politically divided, participated in the revolutions not in the form of political action, but in the form of artistic creation and philosophical reflection. German men of letters attempted to understand the tendencies of the age and sought to reconcile the revolutionary spirit with the traditions that the revolution cast aside.

The discussion of major literary and theoretical writings of the time from 1770 to 1800 will first concentrate on later works by Lessing which reflect some of the inherent difficulties of Enlightenment. Following the course of history, the writings of the young Goethe, of Herder, Schiller and their contemporaries of "Storm and Stress" will then be studied. Criticizing Enlightenment, these writers expressed new conceptions of nature, history and individuality. Finally, Goethe's and Schiller's humanism or classicism will be discussed in an attempt to reconcile the individualism of the "Storm and Stress" with the objective forces in both history and nature.
Prerequisite: German 200 or equivalent.

352 German Philosophy: Aesthetic Theories Seminar 2 hours

A study is made of the concepts of the beautiful, the sublime, the tragic and the comic in the aesthetic theories of Winckelmann, Herder, Kant, Schiller, Hölderlin, Hegel, Vischer and Schopenhauer, and a related study of the tradition and development of these concepts in Aristotle, Longinus, Boileau, Shaftesbury, Lessing and Burke. Particular reference will be made to the interpretation given at this time to examples of Greek art, and the influence that this had on the literary works of the epoch.

Historical investigation of aesthetic concepts leads to an understanding of the advantages and limits of a philosophical approach to art and the roots of contemporary art, especially of literary criticism.
Prerequisite: German 200 or equivalent.

353 Kleist and Hölderlin Seminar 2 hours

This class makes a detailed study of two outstanding poets of the transition period between Classicism and Romanticism. Selected examples of poetry, drama, narrative prose and essays in poetical and aesthetic theory of every period of the life of Kleist and Hölderlin will be investigated. The class will examine the evolution of the main themes, motifs, and the various uses of poetical genres, structures and forms in the stages of development of a single poet, and will thus illustrate the special problems experienced by the poet.
Prerequisite: German 200 or equivalent.

400 The Period of Transition: Goethe and His Time (II)
Lecture 2 hours, D. Steffen

The writings of the later Goethe and of Romanticism are studied.

The time from about 1800 to 1830 was marked by the Napoleonic era, the forces of restoration, and a society that

became increasingly conscious of the discrepancy between reality and the ideals inherited from the revolution. Romantic literature and thought are both an expression of and a reflection on these changes. In this class an attempt will be made to trace the various positions of Romanticism. Romantic conceptions of poesy and reality also played a part in the writings of the later Goethe. The study of Goethe will specially consider the reasons for his departure from Classicism, his views on Romanticism, and his relation to the dominant school of German Idealism. An examination of works by Hölderlin and Kleist will add to the student's understanding of the nature of the conflicts experienced by all of these writers.

401 Literature and Society in the 19th century, 1830-1880
Seminar 2 hours, K. Fricke (offered in 1972-73)

Between 1830 and 1880, due to the industrial revolution, Germany experienced profound social and political changes. Literature of this period, summarily characterized as "realistic", reflects the impact of such social forces on literary traditions and theories.

The following works representing the most important tendencies of the era will be examined: Büchner, *Dantons Tod*; Hebbel, *Maria Magdalena*; poems by Heine and Mörike; Keller, *Kleider machen Leute*; Fontane, *Frau Jenny Treibel*.

Extensive additional reading of poetical works, theoretic writings and scholarly studies of the period will be necessary (reading lists will be made available in advance).
Prerequisite: German 200 or equivalent.

402 Modern German Literature Lecture 2 hours, F. Gaede

A study is made of trends in German literature of the late 19th and the first half of the 20th centuries. The course of Europe's history is most sensitively reflected in the development of modern German literature. The insufficiency of the traditional literary forms to express the experience of a new reality resulted in a new literary language. The class will enable students to understand this language. During the first term poetry, drama and prose of Naturalism and Expressionism will be studied, particularly the writing of Gerhart Hauptmann, Franz Kafka and Thomas Mann. In the second term the works of Bertolt Brecht will be discussed.
Prerequisite: German 200 or equivalent.

451 Goethe's Faust Seminar 2 hours

Goethe worked on this play from his youth until the year of his death, transforming the legends referring to the obscure 16th century magician Faust into a symbolical account of all stages and situations of human life. Goethe's personal experiences and views have left their marks on this work as well as the literary movements which he saw passing by or which he helped to shape-Enlightenment, Storm and Stress, Idealism, Romanticism. *Faust* does not lend itself to a one-sided method of interpretation; its complexity demands a variety of approaches.

Its dramatical structure, the body of its ideas, its language and its symbols deserve equal attention.

Discussions will concentrate on the final form of the drama. Various stages in the development of the play and the function of the central motif will also be analyzed.
Prerequisite: German 200 or equivalent; German 303 or 400.

452 German Philosophy: Hegel's Phenomenologie des Geistes Seminar 2 hours, D. Steffen (offered in 1972-73)

The Phenomenology of Mind, 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.

Hegel's philosophy, the summary of the literary and philosophical concerns of two generations of German writers, is particularly important to the study of Romanticism, its critics such as Kierkegaard and Marx, and the school of Historicism.
Prerequisite: German 200 or equivalent.

Graduate Studies

The department offers a graduate programme leading to the M.A. degree. Details of the M.A. programme are given in the Calendar of the Faculty of Graduate Studies.

47.14 / History

Professors

J. E. Flint (Chairman)
P. Fraser
A. C. Gluck
H. S. Granter
C. R. MacLean
P. B. Waite

Associate Professors

E. P. Bonine
P. Burroughs
D. H. Crook
C. B. Fergusson
E. M. Haines
P. D. Pillay
M. Reckord

Assistant Professors

J. E. Crowley
J. Fingard
J. F. Godfrey
L. D. Stokes (leave 1971-72)

History as a Subject for Study at University

A sense of history is primitive, need felt by individuals and by groups. Just as a person needs to know who he is and how he arrived where he is, so human groups, races, classes, states and nations need a sense of their own past as part of their culture. This primitive sense of history is revealed in myths and legends, when peoples embroider what has come to them from the past to create a comfortable set of beliefs about their own previous exploits and origins. There are still those who wish to use history in this way, as a means to soothe doubt and demonstrate the essential rightness of their own beliefs.

The academic study of history, however, is concerned to discover as much as possible of the reality of the past, and to interpret human behaviour throughout 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.

The contemporary world is one of intensive specialization, in which the sum of human knowledge has expanded well beyond the capacity of any individual to command it. 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.

History is the study of how and why changes in human life occur, and with what results.

Aims of Teaching and Study

Many students entering university history classes have difficulty in adjusting to the university levels of study. The ability to repeat what has been heard in lectures and

memorize events which fall between dates at the end of the class title is of little value. Students should *understand* the nature of the problems which have been studied, and *command* the knowledge which has been gained, in the sense of being able to rearrange it in significant patterns and themes, and to allow ideas to come from, and be tested against, such knowledge.

History as a subject for study does not have an "authoritative" body of knowledge, despite the claims made by some authors of textbooks on the subject. History is not "given" or handed down by pundits; it is a matter of interpretation, of offering explanations for events and movements which are subject to constant revision by scholars. Argument, scepticism and controversy are thus the very stuff of history. The history student does not merely acquire a particular mass of information; he learns to think for himself.

At all levels of study in history, students are guided through lectures and tutorials, and encouraged to read books and articles which consider the same problems from different viewpoints. In the introductory classes these readings are selective and wide, but in the more advanced classes the reading is more comprehensive and detailed. Dalhousie has an excellent collection of historical literature and the new Killam Library provides students with good conditions for private study and reading. Students are encouraged to acquire gradually a small, well-chosen personal library from the large number of excellent books published in paperback form.

Degree Programmes

Classes in history are set out below. There are several levels of study. 100-level classes introduce students to study at the university level; 200-level classes cover broad geographical areas within a limited time period; and 300/400-level classes provide opportunity for specialized study and advanced work for the undergraduate.

General B.A. with Major in History

For the general B.A. with a major in history, students choose a 100-level class and five classes at the 200 or 300-level. Students who wish to build up a greater specialization in history than the minimum requirements for the major may do so by taking classes in ancient history from the Classics Department, in economic history from the Economics Department and in contemporary history from classes offered in Political Science. The Biology Department also offers a class in the history of science. Such classes are listed in the Calendar under the heading of the department concerned. (see also 47.15/)

B.A. with Honours in History

For the B.A. with honours in history, students choose a 100-level history class, and nine classes at the 200, 300 and 400 levels in history. The B.A. with honours in history affords considerable flexibility and scope in choosing a programme of study and yet provides for concentration.

Students may choose from several honours programmes:

European: A selection of classes in Medieval, Early Modern, and Modern European history with emphasis, if desired, on the national history of a European country.

North American: A concentration of classes in the history of Colonial North America and in Canadian and United States national history.

African: Classes in African and South African history may be combined with classes in British colonial history.

British and British Imperial: A concentration of classes in the history of England and of the British Empire and Commonwealth.

General: A wide selection of classes from North American, British and Imperial, Africa and Medieval and Modern history.

All programmes include related studies in language, literature, philosophy, economics and political science.

Any student contemplating taking a B.A. with honours in history should consult the department before initial registration.

Classes Offered at the 100 Level

There are two distinct approaches. The first is History 100, a general consideration of the politics and social history of Europe. It is a class for students who may not intend to do further work in history. The second approach is History 199, designed for students who plan to continue in history or closely allied subjects.

100 European History and Civilization, Lecture 3 hours, P. B. Waite

199 Problems of Historical Study and Writing Seminar 2 hours

This class is intended to introduce the student to the problems of historical study, including the nature of historical evidence, how problems are analyzed, what is meant by such concepts as "causes" and "results", and especially how the student can learn to think for himself about historical problems and to express his thoughts in carefully organized written work. No lectures take place; instead, each student registers for a section dealing with the type of history which interests him. The sections are limited to fifteen students and meet once a week. Each student must write a monthly essay. The general techniques of study and writing are thus acquired by consideration of particular problems in a field of special interest to the student.

A full list of the sections to be offered, the names of staff members participating and the problems to be considered in each section will be available at the time of registration.

Classes Offered at the 200 Level

Normally, either History 100 or History 199 provides the appropriate preparation for 200-level classes. Such classes are restricted to the consideration of problems in broad geographical regions and roughly defined time periods. Students will achieve an understanding of the main developments within the period through lectures, tutorials, and general reading.

European History

Within the Department, three classes in European history are offered: Medieval, Early Modern and Modern. In these Europe is viewed, as far as possible, as a whole.

Lectures deal with broad topics common to all parts of Europe, covering comparable events and institutions wherever they may be found. The aim is to analyze changes over a period of time.

In tutorials, students will become acquainted with the sources (in translation) on which our knowledge of European history is based, such as constitutional documents, eye-witness accounts of participants in important events, and the writings of men whose ideas have influenced the way Europeans have thought and acted. They will also be concerned with the background, interpretations, and methods of historians who have written about the topics under discussion.

200 Medieval Europe, from the Fifth Century to the Renaissance Lecture 2 hours plus tutorial sections, R. M. Haines

201 Early Modern Europe and its Expansion Overseas Lecture 2 hours plus tutorial sections, (not offered 1971-72)

205 Modern Europe, from the French Revolution to the Present Lecture 2 hours plus tutorial sections, R. P. Bonine/L. D. Stokes/J. F. Godfrey

209 Economic Development in an Historical Perspective Lecture 3 hours, J. P. Beauroy, (For details see Economics 233)

British and British Imperial History

In English history, the main features of each recognized division, from Anglo-Saxon times to the twentieth century, are given selective treatment and put in historical focus. The emphasis is on the development of a society and culture which, though similar to Western European, has its own particular and peculiar characteristics.

The class in British imperial history examines a series of topics, chosen principally in the period from the American Revolution to the present, and illustrating the character and impulses of British expansion overseas, changing British attitudes and policies towards the empire, and conflicts in imperial relations. Each topic will be covered by a cycle of lectures and tutorial discussions based on independent reading.

210 The History of England Lecture 2 hours plus tutorial sections, H. S. Granter/P. Fraser

213 British Empire and Commonwealth, Lecture 2 hours plus tutorial sections, P. Burroughs/M. Reckord/P. D. Pillay

North American History

History 220 concerns itself with Canadian history from its early beginnings to the present time. The treatment of events will be topical but the order will be largely chronological — the French Colonial Period, the British Colonial Period and the National Period. Some themes pursued in the class include French-English relations, the formation of provincial societies, political parties and protest groups, metropolitanism, Canadian-American relations, and federalism and regionalism. The class is designed to provide the undergraduate with an understanding of the Canadian experience and provide a framework in preparation for more advanced study.

The class in American history acquaints students with the process through which a colonial, then provincial, society became a continental force and finally a world power. Lectures and assigned reading give the student a comprehension of patterns of social, political, economic, and cultural development. The writing of essays and tutorial sessions encourage the mastery of specific knowledge of how those patterns became such. In this way, general themes of American history are the means by which students increase their ability for thinking and understanding.

220 History of Canada Lecture 2 hours plus tutorial sections, J. Fingard/A. C. Gluek/P. B. Waite

222 Canadian Economic History, Lecture 3 hours, N. H. Morse (For details see Economics 232).

230 American History Lecture 2 hours plus tutorial sections, D. H. Crook

Classes Offered at the 300 Level

300-level classes in history are intended for third-year students who have completed work at the 100 and 200 levels. In general, these classes are more concentrated in area and time and allow students to develop interests gained in 200-level classes. The department will probably be offering additional 300-level classes, details of which will be available at registration.

European History

300 Medieval Civilization Discussion/tutorial 2 hours, (Not offered 1971-72)

History 200 provides the appropriate background for this class. Each year a number of topics is chosen, wide enough to be used as central themes in the context of which medieval civilization can be studied; for instance, monasticism, universities, papal government, and architecture. Such topics will be studied in depth, with the help of original documents (in translation) where these are available, and using periodical literature. Students are expected to master the basic work in certain areas, but will also be encouraged to develop special interest of their own. Class discussion will be used to unravel more difficult aspects, and all students will be expected to 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. Suggestions of this kind, with a list of the topics and appropriate explanation and bibliography, will be available well in advance.

301 Rebellion and Revolution in Early Modern Europe Tutorial 2 hours, J. E. Crowley

This class involves a comparative examination of the major political upheavals in early modern Europe — in the Netherlands, England, America, and France — and a consideration of the ways in which they were revolutionary. Several lesser rebellions that occurred during the period, such as the Catalonian revolt of 1640 and the Fronde in France will also be studied. In each case there will be an analysis of the relationship of ideology and social and economic conditions to political developments.

303 Modern Political Ideologies Lecture/tutorial 2 hours, F. P. Bonine

History of 205 provides the appropriate background for this class. It considers the origins and development of political ideologies of the extreme right and left in Europe from the break with traditional logic and literary forms in the eighteenth century to the appearance of ideologically oriented parties and "movements" in the second half of the nineteenth century.

306 France 1848-1940 Seminar 2 hours, J. F. Godfrey

The object of this class is to provide a general political outline of the period. Within this framework social, economic, military, literary, and artistic topics may be discussed, according to the interests of class members. A reading knowledge of French would be helpful.

307 Modern Germany Discussion/tutorial 2 hours, (not offered in 1971-72)

History 205 provides the appropriate background for this class. Selected topics in 19th-and-20th-century German history, which seek to explain why and to what extent political, intellectual and social developments in Germany differed from those of other western European countries, are examined. Among the topics treated are German nationalism and liberalism, the role of Prussia, industrialization, political parties, and civil-military relations. Extensive reading in primary and secondary sources is required; a list is available in advance from the instructor. In the second term, students will prepare a research paper. A reading knowledge of German is desirable, but not essential.

English History

314 England Under the Tudors and Stuarts, 1485-1714 Lecture/tutorial 2 hours (not offered in 1971-72)

History 210 provides the appropriate background for this class which examines the two great English revolutions in church and state, the Tudor and the Puritan. The theme is how the impact of these two revolutions shaped English society and government and gave it the characteristics which endured until the nineteenth century and which, in certain particulars, still endure.

316 England in the Nineteenth Century Lecture/tutorial 2 hours, H. S. Granter

The nineteenth century was England's century, the Victorian Age, the time of England's greatness. The class is devoted primarily to the study of the making of Victorian England, examining the impact of new machinery and new ideas on an older agricultural aristocratic society.

317 Late Victorian and Edwardian England Seminar 2 hours, P. Fraser

The class will examine selected aspects of political, social and intellectual history, such as the transformation of the Liberal party under pressures from Socialist groups, the Labour movement and the varied forces of Imperialism; ideals the policies of special movements associated with temperance, social reform, imperial federation, tariff reform, women's suffrage, national service and defence; and methods of political organization, whether of central or local government, parties, electioneering or campaigns in the press.

North American History

325 Canada Within the Empire 1760-1896 Discussion/tutorial 2 hours, P. Burroughs

History 213 or History 220 provide the appropriate background for this class, which examines the political, commercial, and cultural relations of Canada with Britain from the conquest to the eve of nationhood; the changing attitudes of Canadians and Englishmen to the developing empire; and the interplay of imperial policies and colonial conditions.

327 History of the Atlantic Provinces Discussion/tutorial 2 hours, J. Fingard

History 220 provides the appropriate background for this class. Students should be interested in research and will be expected to prepare papers in Nova Scotian history using original sources. Both colonial and modern historical problems are treated in class, and particular regard is paid to comparative analysis of population, economy, and social and political institutions.

330 The History of Canadian-American Relations Lecture/tutorial 2 hours, A. C. Gluek

Either History 220 or 230 provides the appropriate background for this class which runs from the American Revolution to the present day. During the first term, lectures and extensive readings will treat such topics as the revolution and its continental consequences; Anglo-American diplomacy, 1783-1825; borderland crises, fence-line problems, and expansionist threats in the 1830's and 1840's; the Civil War and Anglo-Canadian-American questions, 1861-71; Canadian-American problems in the latter 19th century and their ultimate resolution, 1898/99-1914; the emergence of Canada as a North American nation, 1914-1939; wartime partnership, 1939-45; and postwar problems including continentalism, defence, and the threat of Americanization. In the second term, students will prepare, present, and criticize papers dealing with particular subjects in the Canadian-American relationship.

335 Colonial American Tutorial 2 hours, J. E. Crowley

This class examines the development of American society while the colonies were still cultural appendages of Europe. Topics include exploration and settlement, political and economic relationships with the British empire, religious thought and organization, economic and political development, the emergence of a provincial culture, and the relationship of the colonial experience with the American Revolution.

338 Modern America: The Nineties Tutorial 2 hours, D. H. Crook

History 230 provides an appropriate background for this class. By focusing on the decade of the 1890's and by

All programmes include related studies in language, literature, philosophy, economics and political science.

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335 Colonial American Tutorial 2 hours, J. E. Crowley

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338 Modern America: The Nineties Tutorial 2 hours, D. H. Crook

History 230 provides an appropriate background for this class. By focusing on the decade of the 1890's and by

tracing the course of various events back into the mid-nineteenth century and forward into the twentieth century, it will consider to what extent these years characterized the fulfillment of the American Dream and the beginning of the American Nightmare. It will treat such topics as the fall of gentility and formalism and the rise of functionalism; the new radicalism; imperialism – U.S. style; and other American dilemmas.

African History/British Colonial History
340 History of Tropical Africa Lecture/tutorial 2 hours, J. E. Flint

This class considers selected topics in African history. The first term is devoted to the period before 1400, emphasizing the origins of the Negro, the development of Negro agriculture and metal technology, and the creation of the early African states and empires, with consideration of Christian and Islamic influences. The second term emphasizes the effects of contact with Europe, the slave trade, the Islamic revolutions, the colonial period, and the rise of modern nationalism.

345 History of South Africa Lecture/tutorial 2 hours, P. D. Pillay

History 213 provides an appropriate background for this class, or History 220 for students wishing to make comparative studies with themes from Canadian history. The class concentrates on the period since the British acquisition of Cape colony, and examines the development of relationships and tensions between the English and Afrikaans speaking groups, and between the white population and other races. The main topics considered are the rise and fall of the Zulu nation, the opening up of the interior, the imperial factor and its effects on Cape and Transvaal politics of the late nineteenth century, South African Union Afrikaner nationalism, and the development of apartheid.

347 Caribbean History Seminar 2 hours, M. Reckord
Prerequisite: 213. Other students may be admitted by permission of the instructor.

The class will analyze the characteristics of colonial societies in the Caribbean and the factors contributing to their creation.

Classes Offered at the 400 Level

400-level classes are intended for history honours students in their final year; first year M.A. candidates may also attend.

400/1 British Imperial Defence, 1870-1920 Seminar 2 hours, P. Fraser

The class will review studies, articles and materials which have been published, discuss problems of interpretation and method, and be encouraged to exercise individual initiative in research.

499 Honours Essay

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 will be related to one of their 300 or 400-level classes and will be supervised by the appropriate staff member.

Graduate Studies

M.A. and Ph.D. programmes in history are offered. For details of classes, see the Calendar of the Faculty of Graduate Studies.

47.15 / 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.

History of the Sciences

Biology 402B/Physics 402B Special Topics in the History of Science, J. Farley/R. Ravindra.

The proposed topic for 1971-1972 is The Scientific Revolution of the 16th and 17th Centuries.

Psychology 358 History of Psychology, J. W. Clark.

Philosophy of Science

Philosophy 305 Epistemology, A. Rosenberg.

Philosophy 465 The Philosophy of Science, A. Rosenberg.

Philosophy 466A Problems in the Philosophy of Science, R. Ravindra.

Sociology of Science

Sociology 209A Sociology of Science and Ideas, D. H. Elliott.

Details of the above classes will be found under departmental listings.

47.16 / Mathematics

Professors

J. Ahrens (NSTC)
M. Edelstein
F. W. Lawvere (Killam Professor)
A. J. Tingley (Chairman)

Associate Professors

E. Blum
M. J. L. Kirby
K. V. Menon
S. Swaminathan
A. C. Thompson
R. J. Webster

Assistant Professors

I. D. Brown
H. Brunner
J. C. Clements
C. A. Field
R. P. Gupta
C. S. Hartzman
E. L. Heighton (Leave 1970-71)
G. Horne (NSTC)
A. H. Larson
E. B. Mercer
F. Servedio
W. R. S. Sutherland
K. Tan
M. Yasugi

Senior Research Fellows

H. Brinkmann
W. Felscher
B. Mitchell

Research Associate

J. Giraud

Postdoctoral Fellows

E. J. Dubuc
S. Fakir
G. C. Jain
E. Manes
E. Minieka
R. Paré
T. W. Rishel

Visiting Associate Professor

R. Webster

As man has viewed his environment, he has always tried to find patterns and relationships within it. For example, it was discovered many centuries ago that the lengths of the sides of a right angled triangle have a very precise relationship to each other; much later it was learned that the period of a pendulum is proportional (to a fairly high degree of accuracy) to the square root of the length of the pendulum. To aid his senses in the search for such patterns, man has developed all kinds of instruments and devices for accurately measuring all sorts of aspects of the universe from the distance between atoms to the distance between stars.

Some of the patterns, for example the two cited above, are concerned with numbers while others, for example the precise beauty of symmetric crystals, are concerned with things which are not numbers, and which are not readily measurable.

Mathematics is concerned with this kind of "pattern" or "structure" as an abstract entity which can be studied quite apart from the physical experience which give rise to it. For example, the knowledge by ancient Egyptian surveyors of the fact that the sum of the squares of the lengths of the two shorter sides of a right angled triangle is equal to the square of the length of the longest side of the triangle inspired the ancient Greek mathematicians to examine right angled triangles as "abstract" objects and to "prove" that the said relationship "always" holds.

Since so many of the relationships we have been talking about are numerical, a basic concern of mathematics is the structure of numbers themselves. We all know that two numbers can be added together to give a third number but what is "addition"? What basic properties does addition have? Consider the following two collections of numbers:
0, 1, 2, 3, 4, 5, 6, ...
1, 2, 4, 8, 16, 32, 64, ...

If we add 2 and 3 we get 5 while if we multiply 4 and 8 (which are the numbers in the second collection which are directly under 2 and 3 in the first), we get 32 (which is the number directly under 5). The "laws of indices" say that this is true whichever pair of numbers we look at. Why? Is there any real difference between addition in the first collection and multiplication in the second?

More basically still, mathematicians are concerned with the meaning of the word "number". Greek mathematicians were greatly disturbed when Pythagoras's theorem (which we have already mentioned) led them to the discovery that $\sqrt{2}$ is not a "rational number", i.e., a number which is the ratio of two whole numbers. They were disturbed because they (and everybody else who had thought about it) believed that all lengths should be rational. This is perhaps the first example of mathematics proving intuition to be wrong. Moreover, physics could never prove that $\sqrt{2}$ is irrational; even if a "perfect" right angled triangle could be drawn with the two shorter sides of length one, the measurement of the third side would always be approximate, i.e., to a certain number of decimal places.

Even more basic, bordering on philosophy but also a question for mathematics, is what is meant by saying that Pythagoras proved that the square on the hypotenuse is equal to the sum of the squares on the other two sides.

Another set of problems for mathematicians arise from statements of physicists like "the velocity of a moving body (such as a spacecraft) varies continuously with time" or that "the velocity is a function of time". Further, if it is known just how the velocity "varies" with time, what can be said about the body's acceleration or the total distance it travels in a certain time? These are the problems which gave rise to that part of mathematics called "Calculus".

So far we have talked about mathematical problems which arise directly out of physical investigations. Mathematics, however, in its study of abstract structures, can proceed

independently of the other sciences and, indeed, advance ahead of them. It was in 1830 that J. F. C. Hessel discovered the 32 "crystal classes" which describe all the possible ways in which crystals can be symmetric. It was in the same year (but quite independently) that the French Mathematician Galois (aged 19) defined the mathematical concept of a "group" of which the crystal classes are good examples. Again, at the beginning of this century the German mathematician David Hilbert investigated the properties of what we now call "Hilbert Space" which is another abstract mathematical structure. It was not for a number of years after that the physicists found that this was precisely what was needed to describe "quantum mechanics".

Thus, mathematics is a study of abstract patterns and relationships, many of which have their origins in physical problems although study of them has usually proceeded to such an extent that very little trace of the physical problem is left.

You will probably find university mathematics very different from high school mathematics. In high school, the emphasis is usually on computational skill. For example, a lot of time is usually spent in learning to use "log tables". This really means learning to use the equation: $\log(ab) = \log a + \log b$.

In university, the emphasis is on why this equation is true, what does "log" mean? It might be said that university mathematics courses fall into three types, with much overlap and fuzziness at the edges.

1. A deep analysis of a particular kind of mathematical structure. For example, a class with a title like "Real Analysis" is usually a detailed study of that unique mathematical structure which we call "the real numbers".

2. A study of the interrelationships and interplay between various kinds of mathematical structure. A class with a title like "abstract algebra" might be of this type.

3. A study of how "real world" problems give rise to mathematical structures and how a mathematical analysis of these structures sheds new light on (and sometimes solves) the given problems. This type of mathematics is usually called "applied" and a class with a title like "mathematical economics" would be of this type. Because mathematical structures have so often arisen from physical experience, and this term is used in its widest possible meaning, mathematics finds application in all fields of human endeavour from rocketry to economics, from psychology to life insurance. However, the mathematical structures themselves have such a logical beauty that few would claim that mathematics has only a utilitarian value; its study can give great aesthetic pleasure.

You will see that the words "for example" have been used a great deal in the preceding paragraphs. This is because it is extremely difficult to define mathematics. As with art, music and religion, one only begins to get a feeling for what mathematics is after one has practiced it for a while.

Degree Programmes

Major in Mathematics

Students who intend to concentrate on mathematics are expected to consult with the Chairman of the Mathematics Department, or his representative, preferably before registering for the second year of the degree programme, but in any case prior to registering for the third year.

Honours in Mathematics

Students who wish to take honours in mathematics may not be able to complete their courses in the usual four years if they do not have senior matriculation mathematics, unless they take a "make-up" class during the summer immediately preceding or following their first year at the

University. Such students should consult the Chairman of the Department when accepted. Other students interested in an honours degree should consult the Chairman of the department before the end of their first year.

The following programme will normally be followed by students who plan to take Honours in mathematics. Adjustments which do not conflict with the general regulations may be made.

Year I and Year II

Mathematics 100 or 150 or 151 will normally be taken in Year I, and 200 or 250 and 203 in Year II. During these years it is advisable to take most or all of the required classes.

Year III and Year IV

Seven classes in mathematics including Mathematics 300 or 350 and Mathematics 303 of which at least four will be numbered 300 or above and at least two 400 or above.

Three additional classes which conform with the general regulations.

Combined Honours

Students interested in taking honours in mathematics and another subject as a combined programme should consult the chairman of the department, through whom a suitable course of study can be arranged.

A combined honours programme may be appropriate for many students. Students contemplating a combined honours course in mathematics and another subject should, however, bear in mind that the work in either subject would probably be insufficient for admission to a regular graduate programme. A qualifying year would usually be necessary.

Classes Offered

001 Fundamentals of Mathematics, Lecture 3 hours, E. B. Mercer

This class may be offered in place of senior matriculation mathematics as a prerequisite for first year classes at the University. The student is expected to have taken junior matriculation algebra and geometry, but it should be possible for a good student to make progress in the class with an accurate knowledge of operations with algebraic fractions and of solving linear and quadratic equations including simultaneous linear equations in two unknowns. Students are recommended to consult the text prescribed for Grade XI in Nova Scotia to determine the background needed.

The principle objectives of the class, as taken from the preface to the current text, are:

- an appreciation of the natural origin and evolutionary growth of the basic mathematical ideas from antiquity to the present;
- a critical, logical attitude, a wholesome respect for correct reasoning, precise definitions, and a clear grasp of underlying assumptions;
- an understanding of the role of mathematics as one of the major branches of human endeavour and its relations with other branches of the accumulated wisdom of the human race;
- a discussion of some of the simpler important problems of pure mathematics and its applications, including some which often come to the attention of the educated layman and cause him needless confusion;
- an understanding of the nature and practical importance of postulational thinking.

Topics studied include: deductive logic, sets, evolution of the number system, the logic of algebra, analytic geometry, functions, elementary trigonometry, permutations, and combinations, binomial theorem and vectors and matrices.

100 Differential and Integral Calculus, Lecture 3 hours, Various members of department

Probably the best way of conveying some idea of this class is to describe some problems which can be attacked by use of the calculus.

In high school one learns that the distances travelled by a body moving in a straight line at a constant velocity v is given by the formula $s = vt$. A natural question is: What is the situation if the velocity is not a constant, but changes with time: Can the distance be calculated in this case?

As another example, consider finding the areas of figures. In high school one finds that some areas can be easily calculated by formulae. Some of these formulae are easy to see, e.g., that for the area of a rectangle. Others are not at all easy to see, e.g., the area of a circle. One may ask whether it is possible to find a method of calculating area which does not depend on prior knowledge of a specific formula.

Often, though of course not always, such problems can be solved by methods of the calculus. The first of the examples given above involved differentiation, the second integration. Problems which can be attacked by such methods often arise in the natural sciences, the social sciences, and other areas.

Topics studied include: limits and continuity, differentiation and integration of elementary functions and applications, introduction to solid analytic geometry.

Prerequisite: Familiarity with Euclidean geometry, polynomials, elementary trigonometry, and Euclidean plane analytic geometry. In addition to these specific topics, a degree of mathematical maturity is required. A student completing Grade XII in Nova Scotia or a similar course elsewhere should be ready for calculus.

110 Mathematics for Commerce and Economics, Lecture 3 hours

This class provides a survey of mathematical techniques which are useful in analyzing mathematical models in the social sciences. The material covered in the class is similar to that presented in Mathematics 100. However, certain topics (such as trigonometric derivatives and integrals) which are included in Mathematics 100 are not covered in Mathematics 110. In their place Mathematics 110 includes an introduction to matrix algebra, differential equations and difference equations.

This class is intended as 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 100 rather than Mathematics 110 as Mathematics 100 uses a more rigorous mathematical approach. Throughout the class, applications of mathematical techniques to social science problems, particularly economic problems, will be stressed.

Prerequisite: High school mathematics.

150 Introductory Analysis, Lecture 3 hours

The class is designed to provide a detailed introduction to those ideas and techniques of elementary mathematics which are of greatest use to the user of mathematics — whether he be in the social or physical sciences or in mathematics itself. At the same time the careful treatment of mathematical ideas will appeal to the non-science major who wishes to learn something of the art of mathematics and who is not afraid to work hard. The class will include sizeable sections of material from each of the following domains: combinatorial mathematics, real number system, differential calculus, integral calculus. The course will naturally lead into Math 250 or Math 200 at the second year and will give a solid introduction to the calculus adequate for first and second-year classes in physics and chemistry. All honours students in science and any other

well prepared student planning to take mathematics should seriously consider this class.

Prerequisite: As for Math 100.

151 Differential and Integral Calculus for Honours Students, Lecture 3 hours

This class, to be formed in the second term, is designed for students who, after a one-term exposure to Mathematics 100, have shown the ability and interest for a more rigorous introduction to Analysis.

Syllabus: The real line \mathbb{R} (as a complete ordered Archimedean field); basic topology for \mathbb{R} ; the concept of mappings, in particular those of \mathbb{R} into itself. Sequences, convergence and criteria for convergence. Limits and continuity of functions. Properties of continuous functions (like attainment of intermediate values, attainment of lub, etc.). Uniform continuity. Differentiation, Rolle's Theorem, Mean-value Theorem, Taylor's Formula, Taylor's Series. Theorems on uniformly convergent series of functions. Special functions. Integration, definition and properties of Riemann integral, evaluation. Fundamental Theorem; some techniques of integration; improper integrals.

Prerequisite: First division in Math 100 (Christmas mark) and consent of instructor.

200 Intermediate Calculus, Lecture 3 hours

It is assumed that students taking this class have already acquired some knowledge of calculus. Conceptual aspects will be treated, while stress is laid on manipulative techniques which lend themselves readily to applications in physics and engineering.

Topics include: real number system, continuous functions and their fundamental properties, partial derivatives and applications, convergence and divergence of infinite series, power series, double integrals, functional determinants, geometry of euclidean vector spaces with emphasis on three dimensions, elementary differential equations.

Prerequisite: Mathematics 100.

202 Basic Concepts of Mathematics, Lecture 3 hours

Symbolic logic is introduced sufficiently to show how this material can facilitate communication. Logical connectives including existential and universal quantifiers are defined and applied to syllogisms, switching networks, etc. The main purpose here is to develop a language in which mathematical statements can be expressed with precision. The concepts of ordered n -tuples and relations with the special case of function (operation) are studied using sets. The important mathematical object called an algebraic system is defined and studied. The axiomatic method is discussed in terms of algebraic systems. The real number system is constructed using decimal rationals instead of the usual Cantor or Dedekind approach. The relationship between the concepts underlying the real number system and the fundamental notion of analysis, the limit concept, is considered. The concept of a mathematical proof is introduced early in the class and studied in different situations.

203 Linear Algebra, Lecture 3 hours

The purpose of this class is to prepare the student for the use of linear algebra in the natural and social sciences, as well as in advanced mathematics classes, by introducing him to abstract methods of reasoning in the study of a particular mathematical system.

This class begins with a presentation of the algebraic notions and techniques which make possible a simultaneous development of the algebra of matrices and the geometry of linear transformations as related to finite dimensional vector spaces over the field of real numbers. The topics discussed include linear equations and determinants, equivalence relations on matrices, normal forms for matrices

including the Jordan canonical form, and certain metric concepts.

Prerequisite: A knowledge of elementary differential and integral calculus including some set theory; an understanding of the algebraic properties of the real number system; the ability to reason abstractly.

205 Projective Geometry, Lecture 3 hours (not offered 1971-72)

This class studies invariants under the group of linear transformations in the plane, projective properties of lines and conics, special subgroups leading to affine geometry and the metric geometries obtained by means of the absolute conic.

Prerequisite: Mathematics 100.

206A Probability and Mathematical Statistics, Lecture 3 hours

There are many phenomena which cannot be predicted with certainty, but which show such regularity that useful predictions can be made. For example, we cannot predict accurately whether or not it will rain on a day on which a picnic is scheduled, but, by studying the records of the weather of past years, we can state with some degree of assurance how likely it is that this will, or will not, happen. Such problems lead us to the study of probability and statistics.

In this class the following topics are included: probability and simple applications to distribution, game and decision theory, tabulation and description of data, problems of estimation, tests of hypotheses.

The major objective of this class is to introduce students to statistical techniques required by research workers in many fields.

Prerequisite: A knowledge of high school algebra.

206B Probability and Mathematical Statistics, Lecture 3 hours

This class is more sophisticated mathematically than is 206A. Rigorous proofs are given of many of the results introduced heuristically in 206A. Additional topics, including linear regression, linear correlation, and analysis of variance are introduced. It is expected that a student who completes this class will be able to examine statistical literature effectively in connection with problems in statistics which arise in his work, and that he will have a basis for further work in this field.

Prerequisite: An understanding of the elements of differential and integral calculus to at least the level of Mathematics 100 and Math 206A.

220 Applied Mathematics, Lecture 3 hours

This class is designed with the needs of science students in mind. It includes the topics: Functions of several variables, vector analysis, line and surface integrals, integral theorems, matrices and determinants, differential equations, sequences and series, complex analytic functions, integration by the method of residues.

Students who intend to do advanced work in mathematics are advised to take Math 200 rather than Math 220. However, students who complete Math 220 with more than the minimum standing may be admitted to classes where Math 200 is the normal prerequisite. Credit will not be given for more than one of Math 200, 220 and 228.

Prerequisite: Math 100.

227 Numerical Methods and Fortran Programming, Lecture 3 hours

In practice, scientists frequently encounter mathematical problems of well known types which cannot be solved by elementary analytical techniques.

For example, it is well known that every polynomial equation has at least one solution. Elementary algebraic procedures may be used to deduce that $x = 1$ is a solution of the equation $x^5 - x = 0$. However, a similar approach to a solution of the equation $1.9x^5 + 2.6x^2 - 9.3 = 0$ would be futile.

This class introduces numerical approximation techniques for solving several types of problem including non-linear equations, linear systems, integration, differentiation and differential equations.

Prerequisite: Mathematics 100.

228 Applied Mathematics for Engineers I, Lecture 3 hours

This class discusses various notions which are useful in studying physical phenomena. The prerequisite is a working knowledge of calculus. A major portion of the first term is spent in studying vector algebra and calculus with special emphasis on the usual geometric spaces of two and three dimensions. Afterwards, brief introductions are given to the complex number system and functions of complex variables. Sequences and series (a method of obtaining "infinite sums") are discussed and methods of approximating functions by series are indicated. Finally, a study is made of ordinary differential equations with particular emphasis on linear equations. The intent is to give future engineers some computational skills and a knowledge of useful mathematical tools. Care is taken to present definitions, notational systems and statements of theorems with assumptions explicitly stated. Intuitive arguments are presented rather than detailed mathematical formalism.

Students offering Mathematics 228 will not be given credit for either Mathematics 200 or Mathematics 220.

235 Foundations of Mathematical Astronomy, (not offered in 1971-72), Lecture 3 hours

This class is designed to give the student the mathematical background for a good understanding of the structure of the universe and a solid foundation for possible further study or admission to the naval or air forces. It provides up-to-date information about recent achievements in stellar astronomy. The history of the development of astronomical thought from ancient times to the present will be considered in connection with the presented material.

The class starts with geometrical considerations about the sphere, spherical coordinates and some concepts of spherical trigonometry. Then the topics, celestial sphere, diurnal motion, equatorial co-ordinates, mean time, parallax eclipses, and problems in connection with the stars and stellar motions, are treated.

The mathematical treatment is of an elementary nature; students will require knowledge of trigonometric functions, simple differentiation and polar co-ordinates.

240 Introduction to Computer Science, Lecture 3 hours

Comprehensive Fortran class with problems and applications. History of computation, number systems, coding. Description of computer systems: general structure, central processor, memory, peripherals. Introduction to machine codes with exercises in assembler programming. Data structures, searching and sorting, application programs. Introductions to high-level languages: Algol, COBOL, PL/1, APL, simulation languages. Interactive programming in Basic. Applications in numerical analysis and optimization.

250 Intermediate Analysis, Lecture 3 hours

This class provides a sequel to Mathematics 150 and 151 for those students who are interested in obtaining an understanding of the background on which the techniques of

calculus rest. Students who intend to continue their study of mathematics to a higher level are advised to take this class. Mathematics 250 is a parallel class to Mathematics 200 in the sense that the same topics are discussed but from a more "theoretical" point of view. The main part of the class is concerned with functions which map n -dimensional space into m -dimensional space (with special reference to the cases when n and m are equal to 1, 2, or 3). For this, an understanding of linear algebra is essential so that concurrent enrolment in Mathematics 203 is necessary. The topics discussed include: distance and related topological notions; continuity; integration; differentiation; (these three topics refer, as indicated above, to functions of "several variables"), convergence of sequences and series of real numbers and of functions.

Prerequisite: Math 150 or Math 151 or good standing in Math 100, with the consent of the instructor, and concurrent enrolment in Mathematics 203.

300 Advanced Calculus, Lecture 3 hours

Functions of several variables, continuity, differentiation, implicit differentiation techniques. Taylor's expansion; Jacobians (their geometric meaning), implicit function theorem; extreme values; multiple integration (especially transformations of double and triple integrals) line and surface integrals. Green's and Stokes' theorems; series of functions; uniform convergence; Fourier Series (sine and cosine series; convergence theorems). Applications; boundary value problems; partial differential equations.

Prerequisite: Math 200 or consent of instructor.

303 Modern Algebra, Lecture 3 hours

The existence of parallel theories in different subjects indicates that there is an underlying unified theory. Number theory, group theory and formal algebra have been connected together and abstracted to produce what is now known as abstract algebra. The aim of this class is to provide a gradual introduction to the basic concepts of abstract algebra. In the beginning, basic ideas of sets, relations, mappings and operations are given. From these ideas, groups, rings, integral domains and fields are defined and their properties are given.

Prerequisite: Mathematics 200

Text: I. N. Herstein, *Topics in Algebra*.

304 Foundations of Analysis, Lecture 2 hours

Beginning with the basic notion of composition of mappings between sets of abstract elements, an axiom system for mathematics is developed in which both the fundamental processes for constructing mappings (primitive-recursive definition of sequences, λ -conversion to mappings whose codomain is a set of names for mappings, and characteristic functions of a part of a given set) and also the fundamental processes of proof (rules of inference for implication, conjunctions, and universal and existential quantifications) are considered in a unified way as instances of the notion of adjointness from category theory. Theorems of Cantor, Schroder-Bernstein, Tarski, Godel, and Zorn. Some discussion of algebraic relational, and topological structures; i.e., how interpretations of particular mathematical theories may be constructed on the basis of the axiom system developed. In particular, it is shown that there exists a part of any structure corresponding to any definitions of a part in the higher order language of the structure. The non-negative real numbers are constructed and studied as an instance of the species of mathematical structure known as a closed category. Fundamental operations within the category of metric spaces can then be conveniently studied, leading to the foundations of integration theory.

Prerequisite: Consent of instructor.

305 Differential Geometry and Tensor Analysis, Lecture 2 hours

In differential geometry the properties of curves and surfaces are investigated by means of calculus. The subject

has various relations to other fields of pure and applied mathematics: on the one hand differential geometry forms an essential part of physics and geometry (measurements of the earth's surface) and on the other hand it is very much connected with differential equations, the calculus of variations, etc. Its results are of a symmetric form and have inspired generations of mathematicians for animated research. There are still sources available, which contain many precious ideas for further thought.

The class treats the topics: theory of curves, theory of surfaces, first and second fundamental form, foundations of tensor calculus, Gaussian and mean curvature, formulae of Weingarten and Gauss, curvature tensors, Christoffel symbols, geodesic curvature, geodesics, mappings, absolute differentiation and the displacement of Levi-Civita.

The class requires knowledge of matrices, determinants, the techniques of calculus, power series, some ordinary and partial differential equations.

Prerequisite: Mathematics 200 and Mathematics 203.

306 Probability, Lecture 3 hours

The class is intended to assist the student to acquire as thorough an understanding of basic concepts in probability as is compatible with his mathematical background. Statistical concepts will be developed where they arise as direct applications of the topics in probability under consideration. In this way students receive a brief introduction to tests of significance, confidence limits and major sampling distributions. Interesting topics such as "random walk" will also be studied to describe the empirical background and to illustrate the great variety of practical applications of probability.

The aim is not only to introduce probability and statistics but also to prepare the student for further study in these areas. The class should also serve to promote greater awareness and appreciation of the potential value of probability and statistics to science and industry.

The topics covered will include the following: Fundamentals and axioms, combinatorial probability, conditional probability and independence, binomial, Poisson and normal distributions, laws of large numbers and central limit theorem, generating functions, random walks and recurrent events, Markov, chains, sampling from a finite population, derivation of χ^2 , Student's t - and F -distributions, estimation from samples, tests of hypotheses.

Prerequisite: Calculus to at least the level of Mathematics 200.

307 Theory of Numbers, Lecture 3 hours

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; Euler's functions $\phi(n)$ - "Möbius function" $w(n)$; the function $d(n)$ and $\delta_k(n)$.

Algebraic fields; algebraic numbers and integers; uniqueness of factorization; finiteness and elementary properties of ideals; ideal classes and class number.

Properties of binomial and Q - Binomial coefficients.

Prerequisite: Consent of instructor.

312A and 312B Differential Equations, Lecture 3 hours

In any scientific or technological field there are natural laws expressed by relations among functions and their derivatives. Such relations are called differential equations. Newton's law of universal attraction, Kirchhoff's laws in electricity, the law of natural growth and decay are examples of differential equations.

To answer questions of astronomy, physics, chemistry, engineering, biology, etc. the specialist must know how to obtain those functions which satisfy the given natural law and the particular requirements of the considered problem. In this way are found for example, the currents in an electrical network, the concentration of a solution, the resistance of a beam, the trajectory of a rocket, the number of bacteria in a given culture, etc.

These classes contain a study of the elementary theory of ordinary and partial differential equations. Emphasis is given to basic methods such as substitutions, operators, transforms, solution by series. Various applications are studied, e.g. most of the above mentioned problems, the motion of a satellite, etc.

Math 312A, given in the first term, contains the topics: differential equations of the first order, Laplace transforms, the second order linear differential equation.

Math 312B, given in the second term, consists of Ordinary differential equations and partial differential equations. The part of the class which deals with ordinary differential equations includes the topics solution by series, special functions, systems of differential equations, total differential equations. In the part of the class on 'partial differential equations the topics linear partial differential equations of the first and the second order and problems of mathematical physics solved by Fourier series are included. 312A is prerequisite for 312B.

Prerequisite: A knowledge of the topics of intermediate calculus as covered in Math 200 or 220 or 228.

320 Introduction to Numerical Analysis, Lecture 2 hours

Topics to be discussed will include:

- Lagrangian interpolation: interpolating polynomial, error term, finite difference interpolation formulas, Hermite interpolation.
- Numerical differentiation: extrapolation to the limit, numerical integration: closed and open Newton-Cotes formulas, error, orthogonal polynomials, Gaussian quadrature, Romberg integration.
- Numerical integration of ordinary differential equations: Euler's method, Taylor expansion methods, methods of Runge-Kutta type, extrapolation to the limit, methods based on numerical integration, error, stability and convergence.
- Functional approximation: least-squares techniques, curve fitting, minimum-maximum error techniques, Chebyshev approximations.
- Nonlinear equations: elementary methods, Newton-Raphson method, zeros of polynomials, Bernoulli's method, QD-algorithm.
- Systems of linear equations: Gaussian elimination, matrix decomposition, Choleski's method, iterative methods, Gauss-Seidel method, relaxation and overrelaxation.
- Eigenvalues and eigenvectors of matrices: basic theorems, eigenvalues of symmetric matrices, Jacobi's method, Given's method, eigenvectors of symmetric matrices, triangularization of a matrix, eigenvectors of tridiagonal matrices.

Prerequisites: Mathematics 200 (or equivalent class). The student has to be familiar with results and notions such as: mean-value theorems of differential and integral calculus, uniform continuity of functions, uniform convergence of a sequence of functions, etc. It is not assumed that the student has a knowledge in computer programming, though some problems will be assigned for those who are able to use the computer.

328 Applied Mathematics for Engineers II, Lecture 2 hours

Topics to be discussed will include:

- Laplace transformation: existence, transforms of derivatives and integrals, partial fractions, unit step function, shifting theorems, transformation of periodic functions, solution of ordinary linear differential equations with

constant coefficients, applications and examples from physics.

b) Numerical integration of ordinary differential equations: Euler's method, methods of Runge-Kutta type, Lagrangian interpolation, numerical integration formulas (Newton-Cotes formulas), multistep methods, predictor-corrector techniques, equations of second order.

c) Linear algebra: matrix theory, systems of linear equations, direct methods for the solution of linear systems, iterative methods, relaxation and overrelaxation.

d) Eigenvalues and eigenvectors of matrices: basic theorems, numerical methods for symmetric matrices, application (systems of ordinary linear differential equations of order 1).

e) Partial differential equations: linear and quasilinear equations of the first order, linear equations of the second order, model problems from mathematical physics (wave equation, heat equation, Laplace's equation), numerical methods for linear second-order equations.

f) Fourier series and integrals: orthogonal functions.

g) Special functions from mathematical physics: β -function error function, Fresnel integrals, asymptotic expansions, Bessel functions.

Students offering Mathematics 328 will not be given credit for Mathematics 220 or 300.

Prerequisites: Mathematics 228 or Mathematics 200 or equivalent class.

330 Linear and Integer Programming with Application, Lecture 3 hours

Operations Research is the science concerned with the use of mathematical techniques and computers to solve business and economic problems. One of the most widely used of these techniques is called linear programming. It is a technique for helping management make optimal decisions when these decisions involve a large number of variables which are inter-related in a variety of ways. In mathematical terms, a linear programming problem can be expressed as one of finding values for the decision variables which will maximize or minimize a linear function of these variables while, at the same time, satisfying certain technological constraints relating the variables. In the first part of this class, techniques for solving these problems both analytically and on a computer are presented. In addition, computational methods, for example the simplex and the dual method, are examined in detail and their efficiencies are compared.

The second part of the class is devoted to the development of particularly efficient techniques for solving special types of linear programming problems. As in the first part of the class, the use of these techniques on the computer is illustrated. The special types of problems considered include transportation models, network models and multi-period linear programming models. The final one third of the class is devoted to methods for solving the linear programming problem when, in addition to the technological constraints mentioned above, the variables are restricted to being integers. As this is currently an area of very active research by many people in the Operations Research field, the techniques presented for solving these problems vary from year to year depending on recent developments.

Throughout the class, application of the various mathematical techniques to problems of finding economic optima in industrial operations will be stressed. Specific topics include applications to production scheduling sequencing, capital budgeting decisions, allocation of resources, and optimization in economics at the levels of the firm and the economy.

The mathematical prerequisites for this class are elementary. They include only a knowledge of basic matrix algebra and an understanding of elementary linear algebra, including the concept of a vector space and of a basis for a vector space. The main prerequisite is an ability to solve mathematical problems, particularly when the solution requires a novel or ingenious approach.

340 Data Structure, Lecture 3 hours

The purpose of this class is to describe the formal relationships which can exist between items of data in an information processing system. The class will cover the following items: the basic concept of data; tree structures for data; the storage system with allocation and collection; sorting techniques; list processing technique in high level programming language; generalized data management systems. Examples of large scale information systems will be discussed.

Prerequisite: Mathematics 240.

350 Introductory Analysis, Lecture 3 hours

The topology of Cartesian spaces; convergence (including a discussion $\lim \inf$, $\lim \sup$ and summation procedures); continuity; sequences of continuous functions (including the Stone-Weierstrass and the Arzela-Ascoli Theorems); differentiation in \mathbb{R}^p , $p \geq 1$; mapping theorems and extremum problems; integration; Riemann - Stieltjes integral; main theorems of integral calculus; integration in cartesian spaces; convergence of series of functions.

401 Measure Theory and Integration, Lecture 2 hours

This class is a study of the theory of integration. The integral of elementary calculus turns out to lack certain desirable "continuity" properties which can be obtained by giving a different definition of the integral. An attempt is made to balance the constructive approach which treats the integral as a limit of approximating sums and the linear functional approach, which treat the integral as a generalized averaging process. A rudimentary knowledge of modern algebra, set theory and the theory of metric spaces is presupposed. The theory of integration is a careful blend of these theories and, hopefully, one gains some knowledge of the interplay of various mathematical structures from studying integration theory. The approach is abstract with sufficient examples given to provide motivation. After consideration of the theory of the integral in general, some study of the applications of the theory to other areas of mathematical interest will be made.

402 Theory of Functions of a Complex Variable, Lecture 2 hours

This is a first class in the theory of functions of a complex variable. In addition to having an elegant logical structure, the subject has many applications both in such fields of "pure" mathematics as real variable analysis and in such "applied" fields as physics and engineering, for example in electrical engineering, fluid flow and heat conduction.

The class studies the differential and integral calculus in the complex domain. It starts with the basic definitions and properties of complex numbers and studies the theory of functions of a complex variable as developed by d'Alembert, Euler, Gauss, Cauchy, Riemann, Weierstrass and others.

Some familiar functions are extended to the complex plane and used to illustrate the properties of more general functions.

In the more analytic approach of Cauchy and Weierstrass we examine the properties of analytic (i.e. differentiable) functions. In particular we obtain the integral theorem and formulae of Cauchy and Taylor's development of a function as an infinite series (power series).

Also, we consider the approach of Riemann, representing the complex numbers (together with an "ideal" number ∞) as a sphere, studying the geometric properties of complex functions and generalizing the complex plane to Riemann surfaces to study many-valued functions.

Applications considered include using the theory of residues to evaluate real integrals. The theory is also applied to the study of harmonic functions, or potential functions.

Topics include: topology of the complex plane, integration, analytic functions, Cauchy's theorem, elementary functions, maximum modulus theorem, conformal mapping, power series, analytic continuation, Riemann surfaces, Laurent series, theory of residues, meromorphic functions, normal families, Riemann mapping theorem, harmonic functions.

Prerequisite: A knowledge of real variable analysis, preferably to the level of Mathematics 300.

403 Advanced Modern Algebra, Lecture 2 hours

This class will take up topics in modern algebra beyond the level of Mathematics 303: structure of groups, rings, modules, sums, products, tensor products, direct and inverse limits of algebraic systems and then universal properties.

405 Statistical Inference, Lecture 2 hours

Sampling statistics are generally used to obtain information concerning the known group character of the population. Such generalization from sample to universe is the statistical inference. When we reach a conclusion by inference from sample data, we do so at the risk of being in error. This risk can be calculated numerically. It is the purpose of this class to describe methods which lead to valid inferences and to calculate the risk of error in those inferences. Several tests of hypothesis will also be derived regarding these inferences. Treatment will be of a mathematical nature. Students will be able to apply statistics competently in such fields as the social sciences, biological sciences and medical sciences. After this class, every branch of statistics will be open for further study.

The topics covered will include the following: point estimation, consistent, sufficient, efficient and unbiased estimators, method of maximum likelihood, method of least square, method of moments, method of minimum χ^2 , minimum variance unbiased estimation, interval estimation, minimax and Baye's estimation, Neyman-Pearson's lemma, composite hypotheses, goodness of fit tests, likelihood ratio tests, critical region, locally most powerful tests, non-parametric tests.

Prerequisites: Mathematics 200 and 306.

410 Decision Theory and Theory of Games, Lecture 2 hours

In the last few years, statistics has been formulated as the science of decision-making under uncertainty. Decision theory applies to statistical problems the principles that a statistical procedure should be evaluated by its consequences in various circumstances. Wald extended this principle to all statistical problems.

Wald's model for decision theory is a special case of game theory. A game is characterized by a set of rules having a certain formal structure, and governing the behaviour of certain groups. Chess and bridge are examples of this.

The central ideas and results of game theory and related decision-making models will be studied in this class: general decision problems, Bayes' and minimax solution of decision problems, construction of Bayes decision rules, sequential decision rules, empirical decision rules, estimation and testing as aspects of decision theory, rectangular games, games in extensive forms, games with infinitely many strategies, continuous games, separable and cooperative games, zero sum and non zero sum n person games.

Prerequisite: Mathematics 306.

414 Functional Analysis, Lecture 2 hours

As in the case of linear algebra, the prime object of study are vector spaces but whereas linear algebra is devoted almost entirely to the study of finite dimensional spaces, functional analysis is concerned with infinite dimensional spaces. The chief examples of such spaces are spaces of functions, a typical one being the space of all continuous

functions defined on the interval $[0, 1]$, and it is from this fact that the name "functional" analysis comes. Also, like linear algebra the mappings which are of importance are the linear ones. Unlike linear algebra, however, the notion of "distance" plays a crucial rôle, for example, in the function space mentioned above the distance between two functions f and g is given by $\sup |f(x) - g(x)|$; $x \in [0, 1]$, and hence the mappings which are studied in functional analysis are the continuous linear mappings.

Thus, functional analysis brings together algebra, analysis and topology and much of its interest lies in the richness of the mathematical structures involved and the interplay between, for example, the algebraic and the topological notions. Though there is a good deal of topology in the class, all that is required is developed at the beginning.

Class outline:

a) Topological introduction - mainly devoted to metric spaces.

b) Vector spaces with a distance derived from a "norm".

c) The particular case of (b) when the norm comes from an inner product, i.e. Hilbert space.

d) The properties of continuous linear functions from a normed vector space to the scalar field. The most important theorem here is the Hahn-Banach theorem.

e) The geometric nature of some of the consequences of the Hahn-Banach theorem.

f) The properties of continuous linear functions from one normed vector space to another, (the uniform boundedness principle and closed graph theorem).

It should be pointed out that in (d) and (f) not only are continuous linear functions studied "individually" but the space of "all" of them is also an object of study.

g) Continuous linear functions from a normed vector space into itself are studied in detail. This is sometimes given the name "spectral theory" and contains the theory of eigenvalues and diagonalization of matrices.

Prerequisite: The indispensable requirements for understanding this class are a thorough knowledge of linear algebra (Mathematics 203) and real analysis (Mathematics 300).

418 Introduction to Algebraic Topology, Lecture 2 hours

The topics of this class will include: classification of compact surfaces, the fundamental groups, Seifert-Van Kampen theorem, covering spaces, simplicial complexes, subdivision and approximation, fundamental group of a simplicial complex, simplicial homology theory, relative homotopy and relative homology groups, remarks on general homology theories.

Prerequisite: Mathematics 300.

419 General Topology, Lecture 2 hours

Topological spaces: relativization, bases, compactness, connectedness. Moore-Smith convergence: nets, subnets, and convergence classes. Product and quotient spaces; embedding and metization; compactifications uniform spaces and completion problems, function spaces.

Prerequisite: Mathematics 304.

421 Eigenvalue and Boundary Value Problems

Eigenvalue problems are discussed in the theory of matrices ordinary and partial differential equations and integral equations. This central theme of eigenvalue problems is used to present techniques which are involved in many practical problems.

Individual topics include: the matrix eigenvalue problem, the calculus of variations, orthogonal functions, boundary value problems of physics, Helmholtz equation and Green's functions.

Prerequisite: Mathematics 100, 200, 312 or consent of instructor.

As in Mathematics 330, this class discusses techniques for solving a class of operations research problems. The problems considered here are concerned with making optimal decisions with regard to how much inventory a firm should keep and when decisions to order more goods for inventory should be made.

The first part of the class deals with steady state systems: that is, systems in which short run fluctuations have been eliminated and in which it is assumed that the system has settled down into a state of long run equilibrium or balance. A variety of operating procedures for such systems are analyzed and their optimal solutions are discussed in detail. In addition, in depth applications of these models to particular firms are presented.

The second part of the class deals with dynamic inventory models. This material is substantially more advanced than the material covered in the first part of the class and is designed to bring the student to the forefront of research in this subject. The emphasis is on new research results, particularly with regard to the use of dynamic programming techniques in the solution of dynamic inventory models.

Prerequisites: An understanding of basic probability theory, including discrete and continuous probability distribution, their moments and characteristic functions. In addition, a thorough knowledge of advanced calculus to the level of Mathematics 200 is required.

Graduate Studies

Students who wish to work towards a Master's degree in Mathematics may do so in Arts and in Science, it being usually necessary to spend two full years after obtaining a B.A. or B.Sc. degree with a major in mathematics or one year after an honours degree. For details of such courses see the Calendar of the Faculty of Graduate Studies.

47.17 / Music

Associate Professors

R. D. Byham (Chairman, Music History)
V. A. Ellis (Music Education)
G. Karr (Bass)
D. F. Wilson (Leave 1970-71)

Assistant Professors

D. M. Farrell (Music Theory)
J. F. Galish (Music Education)
H. P. May (Voice)
R. F. Schutt (Piano)
A. G. Scott Savage (Voice)
J. E. Sorenson (Music History)
J. S. Tittle (Music Theory)

Specialist Instructors*

R. Armenian (Orchestration; Choral Techniques)
N. Babineau (Miss) (String Class)
M. Ball (Percussion)
J. C. Doane (Brass Class; Classroom Instruments)
M. Farmer (Organ)
H. Hrestak (Trumpet)
C. Hubley (Piano)
E. R. May (Mrs) (Piano)
A. Osborn (Miss) (Music Education)
R. Phillips (Mrs) (Horn)
E. Raum (Mrs) (Oboe)
R. Raum (Trombone)
J. Sumerlin (Violin)
C. Wilcox (Clarinet)
P. Wyman (Miss) (String Class)

*Additional instructors to be appointed.

Music, like science and other areas of learning, has become an immense field of specialized knowledge open only to those who have had a comprehensive musical education.

Similarly, music making in our contemporary society demands more than a mere technical command of voice or an instrument. For this reason, the music curriculum includes all of the essential elements of musical training — music theory, music history, performance.

Included in this curriculum is specialist instruction in all instruments and singing, a comprehensive training in music history and theory, emphasis in the performance of music in ensemble and in recital, and professional training in both instrumental and vocal music in the Bachelor of Music Education programme.

Concerts

Halifax is one of the centers of musical activity in Canada and many concerts and recitals are scheduled throughout the year. Dalhousie University sponsors a series of performances by internationally known artists and ensembles as well as recitals and concerts by Department of Music faculty, students and ensembles. The Atlantic Symphony presents its Halifax concerts in the new Dalhousie University Arts Centre.

Ensembles

The Department of Music sponsors a variety of large and small vocal and instrumental ensembles that are open to all qualified students in the University.
Dalhousie Band, John F. Galish, Director.
Dalhousie Chorale, Raffi Armenian, Director.
Dalhousie Orchestra, Gary Karr, Director.

Small ensembles include Chamber Singers, Opera Workshop, Brass, Recorders, Strings, Woodwinds.

Arts Centre

In 1971 the Department of Music will move into the new Centre for the performing and visual arts. Included in this building are teaching and practice facilities for music, a music auditorium, a drama theatre with adjacent teaching facilities, and an art gallery.

Admission

Students who wish to enrol in a degree programme in the Department of Music must satisfy the requirements for admission to the Faculty of Arts and Science and must satisfy additional requirements in the Department of Music. Admission to the Department of Music is largely dependent on the results of an audition, with Faculty members of the Department of Music, in which the student is expected to demonstrate proficiency as an instrumental or vocal performer. Information regarding the required levels of proficiency may be obtained from the Department of Music. *Early application for an audition is advised.*

When making application for admission to the University, music applicants should request the supplementary application form for the Department of Music.

Degree Programmes

Bachelor of Music Education

The Bachelor of Music Education is a four-year programme with emphasis on the highest possible development of musicianship and the professional training in the skills of teaching vocal and instrumental music. Students completing the Bachelor of Music Education degree receive a Nova Scotia Teacher's Certificate (Class 5).

The public schools of Halifax-Dartmouth have the largest concentration of music teachers east of Montreal. A close relationship has been established between these schools and Dalhousie which will give students an opportunity to be taught and supervised by music specialists in a variety of general music and instrumental music classes.

In order to ensure an adequate level of specialization within the field of music education, two areas of concentration are offered in the Bachelor of Music Education programme: General Music and Instrumental Music. Students whose background is on a keyboard instrument of voice will

normally elect the General Music concentration; students whose major instrument is in the area of brass, strings, woodwind, or percussion will normally elect the Instrumental Music concentration. These areas of concentration are not mutually exclusive. Depending on their qualifications and interests, students will be encouraged to participate in both areas of concentration.

Year I

1. Major Applied Study and Ensembles.
2. Music 100
3. Music 210
4. Arts electives.

Year II

1. Major Applied Study and Ensembles.
2. Classroom Observation and Secondary Studies.*
3. Music 310
4. Educational Psychology.
5. Arts elective.

Year III

1. Major Applied Study and Ensembles.
2. Secondary Studies*
3. Music 410
4. Music 300
5. Music 335
6. Music 330 (general music concentration) or Music 332 (instrumental music concentration).

Year IV

1. Major Applied Study and Ensembles.
2. Secondary Studies*
3. Music 420
4. Music 435
5. General Principles of Education (Education 401).
6. Music 430 (general music concentration) or Music 330 or 430 (instrumental music concentration).

*The level and content of secondary studies are determined by the student's previous training and area of concentration.

General B.A. with Major in Music

Year I

1. Major Applied Study and Ensembles.
2. Music 100
3. Music 210
4. Arts electives

Year II

1. Major Applied Study and Ensembles.
2. Music 310
3. Arts electives

Year III

1. Music electives (200 level or above).
2. Arts electives

General B.A. with Minor in Music

Students wishing to take music as their minor subject may elect a minimum of three classes from the following: Music 105, 201, 210, 300, 310.

B.A. with Honours in Music (major concentration)

Year I

Same as for General B.A. with major in music.

Years II, III, IV

Sight classes in music, 200 level or above, including Music 300, 310, 410, and at least two years of major applied study and ensembles; two classes in a minor field; five additional classes, normally in subjects other than the major and minor fields.

Students should consult with the Department of Music for programmes in combined or unconcentrated honours.

100 Introduction to Musical Styles, Lecture 3 hours.

A comprehensive view of the present musics of the world and of the history of music in Western culture. Styles, forms and composers are introduced through elementary analysis and guided listening to recorded and live performances of music. Social, aesthetic and philosophical frames of reference are considered. Open only to students whose major field is music.

105 Musical Styles and Their Appreciation, Lecture 3 hours.

For students taking a General degree course. A wide-ranging introduction to music, with emphasis on the listening experience. The development of Western music is traced and considerable attention is given to contemporary musical concerns, including jazz and musics of non-Western cultures.

201 The Contemporary Scene: Rock, Its Roots and Relatives, Lecture 3 hours.

A study of the music of today, including: a history of pop music, jazz and blues; the evolution of rock; musical syntheses and cross cultural influences; some technical, aesthetic and sociological considerations regarding contemporary music, popular and otherwise.

Prerequisite: Music 100 or 105 or permission of the instructor.

300 History of Music, Lecture 3 hours.

A detailed study of the history of music including the analysis of works of all historical periods.

Prerequisite: Music 100 and 310 or permission of the instructor.

400 Music History Seminar, Seminar 2 hours.

Advanced study of selected topics in music history and including individual research projects.

Prerequisites: Music 300, 310.

Music Theory

210 Theory of Music I, Lecture 2 hours, laboratory 3 hours.

The study of harmony, introductory counterpoint, and ear training integrated with keyboard harmony and sight-singing up to and including elementary modulation; weekly laboratory sessions in keyboard harmony, sight-singing and ear-training.

Prerequisite: Successful completion of the Music Placement Examination. Students should consult with the Department of Music prior to registration week for information regarding the content as well as the time and place of this examination.

310 Theory of Music II, Lecture 2 hours, laboratory 3 hours.

A continuation of Music 210: the study of harmony and analysis of complex chords and modulation; also includes the study of Renaissance polyphony; weekly laboratory sessions in keyboard harmony, sight-singing and ear-training.

Prerequisite: Music 210.

410 Theory of Music III, Lecture 2 hours, laboratory 3 hours.

A study of twentieth-century techniques including laboratory sessions in keyboard harmony, sight-singing and ear-training; also includes a study of Baroque and Romantic counterpoint.

Prerequisite: Music 310.

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415 Seminar in Theory and Composition, Seminar 2 hours.

The study and analysis of representative examples of music of various periods with regard to both form and harmonic and contrapuntal styles. Students will be required to write sample compositions in each of the styles studied.
Prerequisites: Music 300 and 310.

420 Orchestration and Conducting, Lecture 3 hours.

The study of the properties of the individual instruments of the orchestra and methods of combining instruments in small combinations and full orchestra, together with a study of orchestral and choral conducting.
Prerequisites: Music 100 and 310.

Music Education

231 Educational Psychology, Lecture 2 hours.

The study of child and adolescent psychology.

235 Classroom Observation

Supervised observation of selected classroom situations. (2 credit hours).

330 Elementary Methods, Lecture 3 hours.

A study of classroom techniques and materials for teaching using the "Threshold of Music" adaptation of the Kodaly approach, the Orff method and other systems currently in use at the elementary level; the role of the music consultant in elementary education; professional relationships; programme development.

Prerequisites: Music 100 and 310. Students should be able to deal with the musical problems encountered in vocal music in the public schools. They should also be able to sing in tune, and with good tone, and read vocal music, and should be familiar with the historical periods and styles of music.

332 Instrumental Methods, Lecture 3 hours.

A study of the techniques for teaching instrumental music, band and orchestra administration, rehearsal and conducting techniques, library management, programme building and class lessons. Students will be expected to compose and arrange music for beginning instrumental ensembles.
Prerequisite: Music 310.

335 Practice Teaching, 75 hours of supervised teaching in the public schools.

430 Secondary Vocal Methods, Lecture 3 hours.

An examination of the programme possibilities and teaching techniques for the general music class beyond the elementary level. Special emphasis will be placed on understanding and developing the musical interests and potentials of young adults.

Prerequisites: Same as Music 330.

435 Practice Teaching, 75 additional hours of supervised teaching in the public schools.

Applied Music

Major Applied Study (5 credit hours)

One hour of private instruction per week in the student's major applied instrument. Open only to students whose major field is music.

Prerequisites: Students will be admitted to the 100 level of applied music study upon successful completion of a performance audition. Students will be admitted to the 200, 300, and 400 levels upon successful completion of the next lower level and with the recommendation of the instructor. (Students who fail to meet the requirements for the 100 level may be given the opportunity to make up the

deficiency by enrolling in applied music study for no credit for a maximum of one year).

All students who enrol in a major applied study will be required to perform in student recitals annually.

Piano; 150, 250, 350, 450

Harpichord; 151, 251, 351, 451

Organ; 152, 252, 352, 452

Voice; 153, 253, 353, 453

Violin; 155, 255, 355, 455

Viola; 156, 256, 356, 456

Cello; 157, 257, 357, 457

Bass; 158, 258, 358, 458

Harp; 159, 259, 359, 459

Flute; 160, 260, 360, 460

Oboe; 161, 261, 361, 461

Clarinet; 162, 262, 362, 462

Saxophone; 163, 263, 363, 463

Bassoon; 164, 264, 364, 464

Trumpet; 165, 265, 365, 465

French Horn; 166, 266, 366, 466

Trombone; 167, 267, 367, 467

Percussion; 169, 269, 369, 469

Minor Applied Study (2 credit hours)

One-half hour of private instruction per week. Open only to students whose major field is music.

Prerequisite: Permission of the Department of Music. Depending on the student's programme of study, an additional fee may be assessed.

Piano; 180, 280, 380, 480

Harpichord; 181, 281, 381, 481

Organ; 182, 282, 382, 482

Voice; 183, 283, 383, 483

Violin; 185, 285, 385, 485

Viola; 186, 286, 386, 486

Cello; 187, 287, 387, 487

Bass; 188, 288, 388, 488

Harp; 189, 289, 389, 489

Flute; 190, 290, 390, 490

Oboe; 191, 291, 391, 491

Clarinet; 192, 292, 392, 492

Saxophone; 193, 293, 393, 493

Bassoon; 194, 294, 394, 494

Trumpet; 195, 295, 395, 495

French Horn; 196, 296, 396, 496

Trombone; 197, 297, 397, 497

Percussion; 199, 299, 399, 499

Ensemble (1 credit hour)

Ensemble participation each year is a requirement of all students whose major field is music. In addition to at least one large ensemble (Music 170, 171, 172), students will be expected to enrol in appropriate small ensembles as available. (A maximum of two credit hours per year.)

Chorale; 170

Band; 171

Orchestra; 172

Vocal Ensemble; 175

Wind Ensemble; 176

String Ensemble; 177

Piano Ensemble; 178

Secondary Studies

Group lessons or private instruction in secondary applied music studies for students in the Bachelor of Music Education programme. The classes to be studied, and their sequence, will be determined by the student's major applied study and the area of concentration.

240 Voice Class (2 credit hours)

241, 341, 441 Piano Skills (2 credit hours each)

243 Choral Techniques (2 credit hours)

Prerequisite: Music 153, 183, or 240.

344, 344, 444 String Class (2 credit hours each)

Class instruction on stringed instruments using the Bornoff method. I, violin; II, cello; III, viola and bass.

345 Brass Class

348 Classroom Instruments

346 Woodwind Class

347 Percussion Class

348 Recorder Class

349 Accompaniment

47.18 / Oceanography

Oceanography is a broad, inter-disciplinary science which 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 presently employed in Canada in a few universities and 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.

A good background in basic science is a necessary prerequisite, followed by specialization in oceanography at the graduate level. Dalhousie is one of three Canadian universities offering M.Sc. and Ph.D. programmes in this subject. However, properly prepared undergraduates are permitted to take one or more of the classes as electives. There are introductory classes which survey the entire field

and advanced classes in each of the major specialties – physical and chemical oceanography, marine biology, and marine geology and geophysics. Further details about this programme are given in the Calendar of the Faculty of Graduate Studies.

Although professional training is given only at the graduate level, an undergraduate class (Oceanography 100, Biology 175) has been offered under the experimental class programme. This can be repeated if the demand warrants it.

47.19 / Philosophy

Professors

D. Braybrooke
J. A. Doull (Dept. of Classics)
F. H. Page (Chairman, June 30, 1971)
R. P. Puccetti (Chairman July 1, 1971)

Associate Professors

R. D. Crouse (Dept. of Classics)
I. A. MacLennan
R. Ravindra
R. H. Vingoe

Assistant Professors

S. A. M. Burns
R. M. Campbell
W. F. Hare (Dept. of Education)
R. M. Martin

Visiting Fellow (1970-71)

A. Rosenberg

Unlike some subjects, philosophy is not taught in high school. The new student can therefore safely assume that no previous knowledge is required as a prerequisite for the introductory class, Philosophy 100. Philosophy has concerned itself in the past with a number of traditional questions. For example, are men in any sense free, or are they merely conditioned and determined by their environment, heredity, etc.; Again, have men souls which might conceivably survive death, or is individual life merely an emergent quality of matter doomed to vanish with the dissolution of the body? Then there are questions about the nature of knowledge. Are there some truths which can be proven to be true without relying on experience? Or is all our knowledge empirical? Does science require certain principles, like causality, which are more than inductive generalizations from experience? Then there is philosophical theology. Can any reasonable proof be given of God's existence? Finally, there are many problems of an ethical kind. For example, is there an absolute morality or are all ethical standards relative to the society in which they are practised, and the time when they are practised? Related to these questions are certain existentialist questions as to the meaning and purpose of life. How does one deal with the problematic nature of human existence?

The student may already realize that no final dogmatic answer can be given to the above questions. Nor need he be expected to endure a set of formal lectures. It is the aim of all classes of philosophy to proceed by class discussion. As a result of continually discussing the above questions, and many others like them, the student will acquire a certain philosophical technique, which will be of great benefit to him, whatever subject he may decide to specialize in.

The Arrangement of the Classes

The Department of Philosophy has arranged the classes in four levels. These levels are indicated by the number of the class. There is one 100-level class, which is normally the first class in philosophy taken by any student, and a number of 200- 300- and 400-level classes. Students who are interested in taking one or more classes in philosophy should notice that *there are no prerequisites for 100-level and 200-level classes*. This makes it possible for students to begin their work in philosophy according to their special

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interests. However, students taking 300-level classes must have previously taken as prerequisites one or more of Philosophy 100, 200, 201, 202. The 400-level classes are normally open only to advanced students in philosophy. In general students should try to arrange to take the higher level classes during their later years at the University.

Degree Programmes

General B.A. with Major in Philosophy

Students are strongly urged to take at least one of Philosophy 200, 201, 202, 305, and at least one of Philosophy 230, 310, 315, the combination of 316A and 318B, 320, 334. All students proposing to take a General degree with a major in philosophy should arrange their course in consultation with Professor I. A. MacLennan.

B.A. With Honours in Philosophy

Students intending to specialize in philosophy should take the honours course. It is the normal preparation for graduate study in philosophy. The honours course generally consists of ten classes in philosophy, two classes in a minor subject approved by the Department and four elective classes in at least two subjects other than philosophy. The ten philosophy classes in an honours course must include: Philosophy 200 (or 201 or 202), 230*, 305, 310, 320 and one 400-level class. Philosophy 100 may be included in the ten classes of the honours course, if it was taken at the beginning of the course. In addition, students taking honours in philosophy must satisfy the regulations for the first year of study for the General B.A. and also the overall requirements for the General B.A. Students intending to take honours in philosophy should arrange their course in consultation with Professor I. A. MacLennan.

*For philosophy 230 may be substituted the combination of Philosophy 315 and 334 or the combination of Philosophy 316A and 318B and 334. These classes may also be taken in addition to Philosophy 230.

Combined Honours

There are several combined honours programmes:
Philosophy and Economics
Philosophy and English
Philosophy and Psychology
Philosophy and Sociology
or other combinations that can be arranged.

Students interested in taking any of these combined honours programmes should consult with Professor I. A. MacLennan.

Classes Offered

100 An Introduction to Philosophy, Lecture and tutorial, staff.

Questions like the following have perplexed western philosophers since the time of the ancient Greeks: What is the nature of the human soul? Is it immortal? Is our apparent freedom to make decisions and to choose among alternative courses of action really an illusion? Are value judgments always subjective, depending upon one's personal view? How can there be evil in the world if God is all powerful and also perfectly good? How is it possible (if it is possible) that we can know some truths, e.g., that $7 + 5 = 12$, without relying at all on past experience? Can we ever justify our inferences about the future that are based solely on past experience? Students will have the opportunity to make a critical evaluation of some of the most significant answers that have been given in the past to these questions and to propose answers of their own. For this purpose, considerable time will be devoted to class discussion and students will be asked to write a number of short essays in support of their own views. Although Philosophy 100 is designed to prepare students for further classes in philosophy, its main purpose is to provide them with analytical skills that will be useful in the solution of conceptual problems in general, whether encountered in philosophy, other academic fields, or everyday life.

200 Symbolic Logic, Lecture 3 hours, I. A. MacLennan.

This class is designed as an introduction to the techniques of symbolic logic. It will not require any previous knowledge of the subject. Although symbolic logic in this class will be related to natural language, the emphasis will be on the systems themselves, each of which will be mastered as though it were a game played with pencil and paper. Because many students find this kind of study to be quite new in their academic career, there will be a great deal of practice until every member of the class can do relatively simple problems. The first term will be devoted to the development of natural deduction, extended to cover the theory of descriptions and identity. In the second term an attempt will be made to relate symbolic logic to the foundations of mathematics. There will be less stress on technique and more time spent on the philosophical implications of symbolic logic and the mathematics of which it is the foundation.

Texts: MacLennan, I. A., *Structure-generating Games*; Copi, I. M., *Symbolic Logic*, N.Y. MacMillan, 1961.

201 Logical Forms of Argument, Lectures with discussion, 2 hours, R. M. Campbell.

This class teaches the application of symbolic logic to arguments expressed in natural language, as in philosophy, science, ethics, law and politics. Its principal aim is to develop the student's capacity to analyze the logical structure of such arguments so that he can better assess their validity. Unlike Philosophy 202, this class deals extensively with formal manipulations within a logical system. Unlike Philosophy 200, symbolic logic will not be studied for its own sake or for its relevance to the foundations of mathematics. No previous acquaintance with symbolic logic is presupposed.

202 Basic Principles of Reasoning, Discussions 3 hours, (Not offered 1971-72).

The issues that the subject of logic raises are for the most part issues that in the end can be decided precisely only by the use of carefully managed symbolisms. But a great deal of applied logic can be mastered without the use of symbolisms. This class will approach logic mainly through its non-formal applications. It will study the general nature of problem-solving; language and meaning; the theory of terms; the theory of definition; and inference. The last-named subject, too, will be first treated with a minimum use of symbolism; and a good deal of attention will be given throughout the year to informal fallacies. During the last six weeks of the class, however, a brief survey will be made of the techniques of modern symbolic logic, with a view to appreciating the distinction between the predicate calculus and the propositional calculus and the range of both.

Texts: Leonard, *Principles of Reasoning*, and a brief textbook on symbolic logic.

217 Existentialism, Seminar 2 hours, I. A. MacLennan.

This class will begin with a study of works by Kierkegaard and Nietzsche. The development of existentialist philosophy will then be traced to the present day and contrasted with other philosophical traditions. Particular reference will be made to the works of Heidegger, Jaspers, Sartre, Husserl, Marcel and Buber.

Texts: Reinhardt, K. F., *The Existentialist Revolt*, N.Y.: Ungar, 1952; Nietzsche, F., *The Birth of Tragedy and the Genealogy of Morals*, tr. F. Golffing, N.Y.: Doubleday, 1956; Kierkegaard, S., *Fear and Trembling and the Sickness Unto Death*, tr. W. Lowrie, N.Y.: Doubleday, 1954; Jaspers, K., *Reason and Existenz*, tr. W. Earle, N.Y.: Noonday, 1955; Sartre, J. P., *Existentialism and Humanism*, tr. P. Mairet, London: Methuen, 1948; Sartre, J. P., *Transcendence of the Ego*, tr. F. Williams and R. Kirkpatrick, N.Y.: Noonday, 1957; Buber, M., *Eclipse of God*, N.Y.: Harper, 1957; Urmsion, J. O., *Philosophical Analysis*, Oxford: O.U.P., 1956.

220 Philosophy of Religion I, Lecture 2 hours, F. H. Page.

This class gives an introduction to the philosophy of religion. The identification and clarification of religious concepts, and the uses of religious language, are first discussed. The theistic arguments and counter-arguments are examined and the epistemological status of divine revelation, religious experience and religious faith is investigated. Other topics include the problem of evil, immortality, the relation of science to religion and the religious alternatives to theism.

Texts: W. P. Alston, *Religious Belief and Philosophical Understanding: Readings in the Philosophy of Religion*, N.Y.: Harcourt, Brace and World, Inc., 1963; N. Pike (ed.), *God and Evil: Readings on the Theological Problem of Evil*, (paperback), Contemporary Perspectives in Philosophy Series, Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1964; Hick, *Philosophy of Religion*, (paperback), Foundations of Philosophy Series, Englewood Cliffs, N.J.: Prentice-Hall Inc., 1966; W. C. Smith, *The Meaning and End of Religion: A New Approach to the Religious Traditions of Mankind*, (Mentor paperback), N.Y.: The Macmillan Company, 1964; N. Smart, *Philosophers and Religious Truth*, (S.C.M. paperback), London: S.C.M. Press, 1964.

225 Philosophy of Religion II, (offered in 1971-72 and alternate years), Lecture 2 hours, F. H. Page.

An introduction is given to the contemporary psychology of religion. The class begins with an examination of psychological accounts of religion, particularly the Freudian. The psychology of the moral conscience and the development of religious forms of behaviour through the life-history of the individual are discussed. Conversion, prayer, ritual, worship and mystical experience are considered in the light of current theories of learning, motivation and personality.

Texts: W. H. Clark, *The Psychology of Religion: An Introduction to Religious Experience and Behaviour*, N.Y.: The Macmillan Company, 1958; Sigmund Freud, *The Future of an Illusion*, (Anchor Paperback), Garden City, N.J.: Doubleday and Co., Inc., 1964; Gordon Allport, *The Individual and His Religion*, (Macmillan Paperbacks), N.Y.: The Macmillan Co., 1960; R. S. Lee, *Freud and Christianity*, (Pelican paperback), Harmondsworth: Penguin Books, 1967; Michael Argyle, *Religious Behaviour*, London: Routledge and Kegan Paul, 1961; R. H. Thouless, *An Introduction to the Psychology of Religion*, (C.U.P. paperback), London: Cambridge University Press, 1965; William James, *The Varieties of Religious Experience*, (Collier paperback), N.Y.: Collier Books.

230 General History of Philosophy, Lecture and seminar 3 hours, (not offered in 1971-72).

The purpose of this class is to help students discover those philosophic traditions which have entered into the moulding of western civilization and still persist in the contemporary world. Since the field of study is large, an attempt will be made to concentrate upon some of the greatest and most influential of western philosophers. Since a general history is apt to degenerate into vague generalizations, students will be expected to present short papers outlining and evaluating some parts of a given philosopher's writings.

Prerequisite: Philosophy 100.

Texts: S. P. Lamprecht, *Our Philosophical Traditions*, Appleton-Century-Crofts, Inc., N.Y., 1955; M. White, (ed.), *The Age of Analysis*, The New American Library, Toronto, 1955; D. J. O'Connor (ed.), *A Critical History of Western Philosophy*, Collier-Macmillan Canada Ltd., Toronto, 1964.

270 Philosophy in Literature, Lecture and discussion 2 hours, R. M. Martin.

Many important works of literature contain much philosophical material. Sometimes, in fact, the reader cannot fully appreciate these works unless he has an understanding of the philosophical traditions and issues involved. This class is designed for two sorts of students: those with literary

interests who wish to learn about and discuss the philosophical issues raised in several modern important literary works and those who are students of philosophy and who would like to investigate literary occurrences of philosophical ideas. Readings will include short works of Dostoyevski, Sartre, Camus, Conrad, Nietzsche, Peter Weiss, Beckett, Hemingway, Hesse, and Brecht.

305 Epistemology, Lectures with discussion, two hours.

An introduction to issues in the theory of knowledge, especially those which cast light on the conceptual aspects of the social and natural sciences. Among the issues normally treated are: the philosophical analysis of the concept of knowledge; perception and its relation to knowledge (and especially the claims of empiricism); the logical problem of induction; other minds and the relation between psychological and physical language. Questions to be raised include: Does knowledge have foundations, and if so, is the basis of knowledge to be found exclusively in perceptual experience? Are any non-deductive inferences justified, and more particularly what ground is there to believe the claims of science if the evidence for these claims is always formally incomplete? What evidential relation obtains between claims about persons' behaviour and claims about their beliefs, emotions, and other mental states. Readings will consist mainly of the work of contemporary authors.

Prerequisite: Philosophy 100 or 200 or 201 or 202.

310 Ethics, Lecture with discussion 2 hours, R. M. Campbell.

An attempt is made to relate some contemporary moral issues to traditional topics in moral philosophy. The contemporary issues include: hippie values, crime and punishment, pornography, homosexuality, honesty in business, ecology, racial discrimination, and civil disobedience. The traditional topics include: psychological and ethical egoism, varieties of pleasure and their relation to happiness, Kant's Categorical Imperative, Hume on the nature of moral belief and argument, utilitarianism, moral rules, and justice. Discussion of these topics proceeds systematically rather than historically.

Prerequisite: Philosophy 100 or 200 or 201 or 202.

316A The Philosophy of the 16th and 17th Centuries, Seminar 2 hours, R. H. Vingoe.

The general purpose of this class is to acquaint students with some of the dominant and novel themes of early modern European philosophy, e.g., the emphases upon criticism of traditional medieval philosophy, the primacy of the correct method of acquiring knowledge, knowledge of the natural world, and the relation between science and philosophy. Particular emphasis will be placed upon the philosophy of Leibniz. Students will be expected to write short papers outlining and evaluating some parts of a selected philosopher's writings.

Prerequisite: Philosophy 100 or 200 or 201 or 202.

Texts: R. H. Popkin (ed.), *The Philosophy of the 16th and 17th Centuries*, Collier-Macmillan Ltd., Toronto, 1966; W. Kaufmann (ed.), *Philosophic Classics, Bacon to Kant*, Prentice-Hall Inc., Englewood Cliffs, N.J., 1961.

318B Locke, Berkeley and Hume, Lecture and Seminar 2 hours, Steven Burns.

A critical study of classical British Empiricism concerned primarily with problems in epistemology, metaphysics and ethics, although some attention will be paid to the legacy of this tradition to politics and psychology.

Prerequisite: Philosophy 100 or 200 or 201 or 202.

319A The Philosophy of Descartes, Seminar 2 hours, R. H. Vingoe.

Descartes is important because his philosophy marks a radical break with ancient and medieval philosophy and

because this break made epistemology the main preoccupation of later western philosophers. This view of Descartes' importance will be explained in terms of his attempt to prove the existence of the self, the existence of God, and the existence of the external world. Students will be expected to write short papers outlining and evaluating some parts of Descartes' writings.

Prerequisites: Philosophy 100 or 200 or 201 or 202.
Texts: Ralph M. Eaton (ed.), *Descartes, Selections*, The Modern Student's Library, Charles Scribner's Sons, 1969; Anthony Kenny, *Descartes, A Study of His Philosophy*, Random House, 1969.

320 The Philosophy of Hume and Kant, (offered 1972-73 and alternate years), Seminar 2 hours, I. A. MacLennan.

This seminar will study the works of Hume and Kant, with particular reference to those portions of Hume which are relevant to a full understanding of Kant's *Critique of Pure Reason*. More importance will be given to Kant than to Hume in this seminar, and an attempt will be made to trace the influence of the former upon later philosophers.
Prerequisite: Philosophy 100 or 200 or 201 or 202.

330 Twentieth-century British Philosophy, (not given in 1971-72), Lecture and Seminar 2 hours.

This class surveys the development of the "Anglo-Saxon Tradition" in metaphysics and epistemology from the influence of Frege on Russell and Wittgenstein to recent conceptual analysis.
Prerequisite: Philosophy 100 or 200 or 201 or 202.

334 Greek Philosophy from Thales to Aristotle, Lecture and seminar 2 hours, S. Burns.

In which a study is made of the Presocratic fragments, major works of Plato, and Aristotle's *Organon*.
Prerequisite: Philosophy 100 or 200 or 201 or 202.
Texts: There are many available alternatives. The following are convenient: G. S. Kirk and J. E. Raven, *The Presocratic Philosophers*, (Cambridge University Press, paperback: Cambridge and New York, 1960); Edith Hamilton and Huntington Cairns (Eds.), *The Collected Dialogues of Plato*, (Pantheon Books: N.Y., 1963); Richard McKeon, (Ed.), *The Basic Works of Aristotle*, (Random House: N.Y., 1941).

336 Ancient Philosophy from Aristotle to St. Augustine, Lecture 2 hours, R. D. Crouse/J. A. Doull.

This class studies the development of Classical and Patristic thought from Aristotle to St. Augustine, with concern to explore the manner in which the philosophical achievement of ancient Greece came to form, in the thought of the Church Fathers, the intellectual foundation of European culture. Works most closely considered will be Plato's *Timaeus*, parts of Aristotle's *Metaphysics*, parts of Plotinus' *Enneads*, and St. Augustine's *City of God* and *De Trinitate*.
Prerequisite: Philosophy 100 or 200 or 201 or 202.

338 History of Medieval Philosophy, Lecture 2 hours, R. D. Crouse.

A study is made of the development of philosophy in the formative age of European civilization, with attention given to related political, institutional, literary and theological concerns. The authors studied most closely will be Boethius, Anselm of Canterbury, Thomas Aquinas, some thirteenth-century Augustinians and Averroists, Ockham, and one or more of the Late Medieval Mystics. The class will be conducted partly as a seminar, partly as a course of lectures.
Prerequisite: Philosophy 100 or 200 or 201 or 202.

346 Problems of Mind, Seminar 2 hours, R. P. Puccetti.

These traditional problems of mind will be explored: (1) How are a person's corresponding *mental* and *physical* states related? Is the concept of a person, and particularly

of his mental states, exhausted by descriptions of his behaviour? Or by descriptions of changes in certain parts of his nervous system? Or does the concept of a person require reference to a third entity, over and above his mental and physical states? (2) What kinds of entities might possibly count as persons other than human persons? Could machines do so? Could organic artifacts? Could non-material entities? How are we to make decisions about the application of mental and personal concepts to non-human entities? (3) In view of and depending upon our answers to the above questions, what chance is there of personal survival of bodily death either in disembodied or resurrected form?

Prerequisite: Philosophy 100 or 200 or 201 or 202.
Texts: Jerome Shaffer, *Philosophy of Mind*; Bruce Aune, *Knowledge Mind and Nature*; Alvin Plantinga, *God and Other Minds*; Sidney Shoemaker, *Self-knowledge and Self-identity*; Terence Penelhum, *Survival and Disembodied Existence*.

347B Freedom and Responsibility, Lecture and discussion 2 hours, W. F. Hare.

The purpose of this class is to examine philosophically issues which are significant in many disciplines, such as psychology, law and education. For example, what is meant by saying that a person has a responsibility to do something? And what is a person requesting when he asks to be given "more responsibility"? If there is a difference here, is it to be explained in terms of the freedom the agent has in acting? But perhaps this possibility is undermined by arguments which purport to show that a person has no freedom to choose his actions? And then in what sense can a person be held responsible for his actions? Readings will include recent articles by such authors as Pennock, Frankena and Hart, and certain papers in the volumes *Determinism and Freedom* ed. Sidney Hook (Collier Books, New York, 1961) and *Free Will and Determinism* ed. B. Berofsky (Harper and Row, New York, 1966).

351A Philosophy of the Social Sciences, Seminar 2 hours, D. Braybrooke.

The chief topics to be treated in this class (which is identical with Political Science 351A except for prerequisites) are the nature of explanation according to Popper and Hempel; the problem (or so-called problem) of induction; the hypothetico-deductive method; the nature of the axiomatized theory; the differences between behaviour (al)ism and theories of action; the fact/value distinction; and *Ideologiekritik*. Illustrations will be drawn chiefly from political science.
Prerequisites: Philosophy 100 or 200 or 201 or 202. A previous class in epistemology (Philosophy 305) would be helpful.

355B Marxist Theory (Not offered 1971-72) Discussion (once weekly), 2 hours.

See Political Science 355B.

381A Hegelian Idealism and Its Critics, Seminar 2 hours, R. H. Vingoe.

Two chief groups of topics will be explored; first, several central Hegelian themes, e.g., that everything is mental or spiritual in character, that the history of the spirit is a rational evolutionary process, that the nature of this process is "dialectical", and, second, how in Hegel's successors in the 19th century (e.g., Schopenhauer, Nietzsche, Marx, and Bradley) a reaction occurred suggesting the irrelevance or disintegration of Hegel's system and leading to other and equally novel themes, e.g., that existence is prior to mind, that man rather than global "dialectic" constructs his own world, that action, will, biological needs, and feeling are more basic than mind to man's nature. Students will be asked to present short papers outlining and evaluating a selection of writings.

Prerequisite: Philosophy 100 or 200 or 201 or 202.
Text: Patrick L. Gardner (ed.), *19th-Century Philosophy*, Collier-MacMillan Canada Ltd., Toronto, 1969.

390 The Philosophy of J. P. Sartre, Seminar 2 hours, I. A. MacLennan.

An intensive study of the works of J. P. Sartre, with particular emphasis on his *Being and Nothingness*. However, an attempt will be made to contrast his philosophy with that of other existentialists, and in particular with that of Heidegger.
Prerequisite: Philosophy 100 or 200 or 201 or 202.

431A Introduction to the Philosophy of Wittgenstein, Seminar 2 hours, S. Burns.

Central topics in the *Tractatus Logico-Philosophicus* and the *Philosophical Investigations* will be examined. The relationship between the earlier and the later work, and Wittgenstein's influence on contemporary philosophy will also be discussed.
Prerequisite: normally a class in logic, and some work beyond the 200 level in philosophy of language, philosophy of mind, epistemology or metaphysics (in, e.g., Plato, Aristotle, Leibniz or Kant).

445 Philosophy, Politics, and Economics, Seminar 2 hours, (not offered in 1971-72).

See also Political Science 449 and Economics 445.

The central concern of this class is the application to political choices of economic reasoning, taken as a source of both descriptive and normative theory. Dahl and Lindblom's well-known book, *Politics, Economics, and Welfare*, will be discussed as an illustration of complementarity between the concepts and concerns of economics and those of other social sciences; and also as a means of defining the present position of the issue between socialism and capitalism. The class will study the formal theory of voting as treated by such economists as Arrow, Black, Buchanan and Tullock, as well as by Riker, Murakami, and Marquarson. It will give some attention to Downs' economic theory of party competition and to the theory of games (as applied to voting and to party competition). A number of important philosophical lessons for the analysis of concepts as important to ethics as *self-interest*, *rationality* (personal and collective), *human welfare*, *utilitarianism*, and *justice* can be drawn from this discussion; and several philosophical authors will be studied, among them Baier, Rawls, Rescher, and possibly Braybrooke.

Prerequisites: Students taking this class should ideally have had previous classes in all three subjects; but it will suffice for them to have worked to an advanced undergraduate level in at least one of them. Students taking the class for a philosophy credit should have had a class in logic (200 or 201 or 202) and one in ethics (310); students taking the class for a credit in political science should have had at least one 300-level class in political science (351A and 355B are recommended); students taking the class for a credit in economics should have had at least one 300-level class in that subject.

445A Philosophy, Politics, and Economics, Seminar 2 hours, D. Braybrooke, (offered fall term 1971 only).

See also Political Science 449A and Economics 445A).

Of the topics listed above for the full year seminar, this class will discuss Dahl and Lindblom, emphasizing their treatment of the present issue between socialism and capitalism, and the philosophical authors. It will omit the theory of voting; the economic theory of party competition; and the theory of games.

Prerequisite: see the prerequisites stated for the full year seminar, Philosophy 445.

450 Philosophy of Language, Seminar 2 hours, R. M. Martin.

Questions such as the following will be discussed. What is a language? Is having a language essential to being rational? Is language necessarily a "public" phenomenon? The elements of language have *meaning*, but what is the meaning of "meaning"? Various theories of meaning will be considered.
Prerequisites: Philosophy 100 or a logic class (200 or 201 or 202) and at least one class in Ethics, Epistemology, of XX-Century Philosophy; or by permission of instructor.

460 Contemporary Philosophy of Religion, Seminar 2 hours, F. H. Page.

Topics discussed in recent years include: the verifiability question, the uses of religious language, analogical predication, revelation and epistemology, mysticism and philosophy, existentialism and faith, process-philosophy and theism, secular and sacred myths. Variations from year to year are customary in line with the interests of the participants.
Prerequisite: Primarily for graduate students but seniors majoring or honouring in philosophy may be admitted at the discretion of the instructor. A considerable background in philosophy is presupposed.
Texts: The reading consists mainly of journal articles, but a few very recent books are often included. The selection varies with the interests expressed by the participants and is agreed upon after the first meeting or two of the seminar.

465 Philosophy of Science, Lectures with discussion, 2 hours.

This class deals with the analysis of concepts which apply to scientific practices and results generally and does not deal with concepts scientists are especially concerned with or figure in any particular science (except by way of examples). The class seeks to present an account of such concepts as law, theory, explanation, model, and confirmation, which are important for an understanding of the work of both the natural and the social sciences. The class will be especially concerned with the contrast between received logical empiricist claims about these concepts and the newer theory-dependent view which opposes positivism. Philosophers to be considered include Carnap, Hemel, Nagel, Braithwaite, Goodman, Feyerabend, Hanson, Ryle, Dray. The view of the historian of science Kuhn will also be considered.)

Prerequisite: normally Philosophy 305 and a logic class (200 or 201 or 202); or by permission of the instructor.

466B Problems in the Philosophy of Science, Seminar 3 hours, R. Ravindra.

The purpose of this class is to discuss one or two important issues in our understanding of scientific knowledge and its impact on society. For example, in 1970-71 the topic discussed was the "concept of time". The topics to be discussed in any given year are announced during the preceding summer.

Prerequisite: A class in epistemology or philosophy of science. Others may be admitted by permission of the instructor.

467A Problems in Philosophy of Religion, Seminar 3 hours, R. Ravindra.

The purpose of this class is to discuss one or two important issues in philosophy of religion. The topic to be discussed in 1971-72 is "Mysticism and its philosophical criticism".
Prerequisites: Normally Philosophy 305 and either 220 or 225.

499 Directed Reading, Staff.

Graduate Studies

The Department of Philosophy provides opportunities for graduate study leading to the degree of Master of Arts in the history of philosophy, metaphysics, epistemology, the philosophy of mind, ethics, semantics and logic, philosophical analysis, existential philosophy, political philosophy, and the philosophy of religion. For details see the Calendar of the Faculty of Graduate Studies.

47.20 / Physics

Professors

W. J. Archibald
E. W. Guptill
C. K. Hoyt
M. J. Keen (Oceanography and Chairman of Department of Geology)
G. F. O. Langstroth (Dean of Faculty of Graduate Studies)

Associate Professors

M. G. Calkin (Lv. 1970-71)
D. J. W. Geldart
M. H. Jericho
D. B. I. Kiang
C. R. Mann (Oceanography)
R. H. March (Chairman)
G. T. Meaden
R. Ravindra

Assistant Professors

B. L. Blackford
J. G. Cordes
D. F. Goble
R. D. Hyndman (Oceanography)
W. Leiper
R. Overstreet (Oceanography)
P. H. Reynolds
A. M. Simpson
C. G. White

Senior Killam Fellow

S. Machida

Killam Postdoctoral Fellows

M. Hama
Y. Sumi

Postdoctoral Fellows

M. A. Coulthard
R. N. Singh

MacGregor Teaching Fellows

G. Pazonis
M. Roth
R. A. Stuart
G. K. Venkataramania

Physics in the broadest sense concerns itself with the way in which matter behaves and with the interaction between matter and energy in its different forms. It is an experimental science, which implies that the ultimate truth or falseness of a physical theory is to be determined by whether the theory is in agreement with experimental facts. The language in which these theories are expressed is mathematics so that a student embarking on an honours programme in physics must be prepared to take several classes in mathematics. Students wishing to become professional physicists engaged in original research or in university teaching will normally undertake further study leading to the advanced degrees of M.Sc. and Ph.D. upon completing the honours B.Sc. course.

In order to study the different interactions which occur between matter and energy, the subject is conventionally divided into such topics as mechanics, heat, light, electricity and magnetism. But these are not mutually exclusive categories. The fundamental physical processes occurring are common to several such topics, particularly when viewed in the light of our modern understanding of physical processes at the atomic level. The first year physics classes at Dalhousie are designed to give an introduction to the subject which includes these modern ideas and brings out the underlying unity of approach to seemingly diverse physical situations. Students not majoring in a physical science and who do not intend to take further classes in physics will normally take Physics 100. Those who are majoring in a physical science or who intend to take further

physics classes will usually take Physics 110. The subject matter of the two courses is essentially the same, but Physics 110 employs more sophisticated mathematical techniques, thereby laying the foundations for more advanced study.

In later years students proceed to develop the topics mentioned above within the framework of modern ideas of the nature of physical reality. An important part of the course each year after the first is the laboratory work which establishes a connection between the theoretical and mathematical ideas of the lectures and the world of physical reality. In the third and fourth years the student is encouraged to follow his own interests as much as possible, both by designing and carrying out experiments of his own choosing in the laboratory and by selecting suitable classes from amongst the electives available.

Degree Programmes

General B.Sc. with Major in Physics

A candidate for this degree must satisfy all of the general requirements. To major in physics he will take Physics 110 in the first year. In the subsequent two years, he may take as many as five classes chosen from Physics 221, 230, 245, 315, 320 and 335. It is recommended that the second major subject be mathematics because many physics classes have mathematics classes as a prerequisite. Details of these prerequisites are given under the individual class listings.

B.Sc. with Honours in Physics

All students who intend to take a B.Sc. with Honours in Physics are encouraged to discuss their programme with staff members of the department and to consult with the Chairman of the Department at the beginning of the second year.

Year I

1. Chemistry 100.
2. Mathematics 100.
3. Physics 110.
4. Arts or Science elective.
5. Arts elective.

Year II

6. Science elective.
- 7-8. Two mathematics classes.
- 9-10. Physics 211 and 231.

Year III

11. Arts or Science elective.
12. Class in Mathematics.
- 13-15. Physics 300 and two other physics classes.

Year IV

16. Arts, science or mathematics elective.
- 17-20. Four physics classes at the 400 level, one of which will normally be Physics 400.

Combined Honours

Students may take a combined honours course in physics and another subject. They should, however, bear in mind that the work in either subject would probably be insufficient for admission to a regular graduate programme. A qualifying year would usually be necessary.

Classes Offered

100 General Physics. Lecture 3 hours; problem session 3 hours. C. G. White.

This is a survey class requiring no previous preparation in physics, and offered primarily for students in arts, pre-medicine, pre-dentistry, and pharmacy. It will not normally be accepted as a prerequisite to advanced classes in physics unless exceptional circumstances arise.

The class surveys physics from its beginnings to the present day. The four major topics are: Newtonian mechanics

(motion, force, mass, momentum, energy); electromagnetism (charge, electric and magnetic forces and fields); relativity (space, time, mass, energy); quantum theory (elementary particles, atoms, causality and chance).

The major topics are dealt with mainly in historical sequence. To a large extent the ideas in later topics are built on the ideas presented in earlier topics. This means that the understanding of later topics depends on the understanding of earlier topics. Thus, the four major topics mentioned are not at all isolated from each other, but are rather closely inter-related.

Throughout the class, mathematics is used as a language for expressing the basic ideas of physics and also for deductive reasoning from these basic ideas. The mathematics used is not in advance of high school algebra and trigonometry, but some time is spent in the class developing greater facility with high school mathematics. It must be stressed that mathematical formulae are not used simple for "plugging in" numbers; rather, the emphasis is placed on a thorough understanding of the meaning and range of applicability of the formulae.

A large part of the class consists of developing understanding of physical principles through specific problems. For this reason, there is a 3 hour session each week during which students do problems with the assistance, when required, of the lecturer and graduate students. The problems are linked closely to the lecture material, and sometimes extend the subject matter of the lectures. The problem sessions are conducted informally and students are free to discuss the problems with each other as they work. There are no laboratory experiments in this class.

Text: K. R. Atkins, *Physics*, 2nd. ed., Wiley, 1970.

110 General Physics. Lecture 3 hours (2 sections); tutorial 3 hours, E. W. Guptill.

This class introduces the student to the elementary physical laws of our universe and the way in which these laws are used to forecast such natural events as the flight of a projectile, the relativistic variation of mass, the flow of electrical current in a circuit, etc. Newton's laws, for example, are stated and then one proceeds by asking "what do these laws say about the position of a projectile after a certain time has elapsed?" Intuitive reasoning or educated guessing is eliminated. Reasoning of this kind requires more sophisticated mathematics than one normally uses in high school and consequently a considerable fraction of the first few weeks of lectures is used introducing such topics as differential and integral calculus.

Throughout the year students will have an opportunity to assess their progress by the results of weekly quizzes which are given during afternoon tutorials. These tutorials replace the conventional laboratory work and give the student ample time to discuss his problems with the tutor. Most of the experimental work is confined to lecture room demonstrations.

Students beginning this class should be familiar with trigonometry, the solution of quadratic equations, binomial expansions and should now be prepared to start differential and integral calculus. Previous work in physics is not essential.

Text: F. Beuche, *Introduction to Physics for Scientists and Engineers*, McGraw-Hill, 1969.

211 Mechanics. Lecture 3 hours; laboratory 3 hours. C. G. White.

The class is divided into 2 parts: mechanics and wave motion. The first part deals with: basic vector mathematics and its application to physics, Newton's laws of motion and the description of 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. The last

topic in the first part of the course is harmonic oscillation, which provides an introduction to the second part, wave motion. In the study of wave motion, examples are taken from many branches of physics: mechanics, electromagnetism, quantum theory. Fourier analysis of wave packets and pulses will be included. The laboratory work for Physics 211 is run jointly with that for Physics 231.

Prerequisite: Physics 110 and Mathematics 100. This class will usually be taken concurrently with Physics 231. It is assumed that students are familiar with elementary mechanics and the concepts of work, energy and momentum as developed in Physics 110; and with the application of simple integral and differential calculus to the solution of physical problems.

Text: Berkeley Physics Course, Vol. 1 *Mechanics*, McGraw-Hill, 1965; Berkeley Physics Course, Vol. 3 *Waves and Oscillations*, McGraw-Hill, 1965.

221 Waves and Modern Physics. Lecture 3 hours; laboratory 3 hours. C. K. Hoyt.

This class is intended mainly for those who do not plan to take honours physics but who wish to learn more about 20th century physics than is possible at the first year level.

Waves are studied first, since their properties and the terminology used in connection with them have an important relationship to much of modern physics. Wave equations are deduced both for mechanical and for light waves, and it is shown how all the various wave properties can be derived and used.

The central role played by light in forcing a revision of 19th century ideas is brought out. The resulting relativity and quantum theories are applied first to simple idealized situations, and then to more realistic ones in discussions of the hydrogen atom, the structure of atoms and molecules, and the statistical properties of large assemblies of molecules. The necessity of using the newer theories will be apparent by the existence of phenomena which cannot be explained by the older ones.

Finally, the world of sub-atomic particles will be explored to show how the experimental facts are still compelling physicists to revise their conception of nature.

Prerequisite: Physics 110, Mathematics 100. Students are expected to be familiar with calculus, complex exponential functions, simple harmonic motion, and the simpler aspects of special relativity.

Text: H. D. Young, *Fundamentals of Optics and Modern Physics*, McGraw-Hill, 1938.

230 Mechanics, Electricity and Magnetism. Lecture 3 hours. G. T. Meaden.

This class is designed for second year science and engineering students who wish to take a second class in physics, in addition to Physics 221, or who for some reason are unable to take that class. Students may take third year physics classes if they have taken this class and Physics 221. The class will include discussion of the essence of classical mechanics, with an introduction to relativistic mechanics, and the essence of classical electricity and magnetism. Substantial emphasis will be placed upon the important ideas which arise from these fields of physics, and upon their present relevance.

Prerequisite: Physics 110, Mathematics 100.

Text: Berkeley Physics Course, Vol. 1 *Mechanics*, McGraw-Hill, 1965; Berkeley Physics Course, Vol. II *Electricity and Magnetism*, McGraw-Hill, 1965.

231 Electricity. Lecture 3 hours; laboratory 3 hours. A. M. Simpson.

The material discussed in this class forms part of the *Berkeley Physics Course*. The class begins by studying electrostatics, distributions of static charges, and the concepts of electric field and electric potential as physical quantities. Next, the motion of charge in conducting

materials is discussed up 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. The relationships between electric and magnetic fields are then studied and it is shown how these relationships imply the existence of electromagnetic radiation. 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.
Prerequisite: Physics 110 and Mathematics 100. This class will usually be taken concurrently with Physics 211. Students are expected to have an introductory knowledge of the nature of electric charge, electric field, magnetic field, and of electrical current as developed in Physics 110. Familiarity with the application of simple integral and differential calculus to the solution of physical problems is assumed.
Text: Berkeley Physics Course, Vol. 2 *Electricity and Magnetism*, McGraw-Hill, 1965.

300 Intermediate Physics Laboratory. Laboratory 6 hours. B. L. Blackford.

This laboratory class of six hours per week is intended to be taken concurrently with other third year physics classes. The class has two main aims. Firstly, it gives students a chance to do *non-set* experiments and thereby encounter and solve on their own the problems of experimentation. Secondly, as the number of experiments done is small (four to six), students should achieve a real understanding of a few physical phenomena. A measurement of one of the fundamental constants c , G or e is required and other than this a variety of topics appropriate to the third year level are available. Students are not discouraged from doing experiments or areas of experiments which have not been done by other Physics 300 students.
Prerequisite: The class is designed for honours and engineering-physics students and has Physics 231 as a prerequisite. In addition, two other physics classes must be taken concurrently. Exceptions have been made.

315 Modern Physics. Lecture 3 hours. W. Leiper.

This is an introductory class in quantum mechanics and atomic spectroscopy. Wherever possible quantum mechanical concepts and quantities will be discussed in terms of research projects going on in the Physics Department.
Text: R. Eisberg, *Fundamentals of Modern Physics*, Wiley & Sons.

320 Thermodynamics. Lecture 3 hours. D. F. Goble.

This class studies the basic principles of statistical mechanics and the relation that they have to thermodynamics together with the application of these principles to the study of ideal gases and certain physical systems.
Prerequisite: Some knowledge of partial derivatives; Mathematics 200, which may be taken concurrently with the class.
Text: Reif, *Principles of Statistical and Thermal Physics*, McGraw-Hill, 1965.

335 Electronics. Lecture 3 hours. A. Levin.

The class covers advanced circuit analysis of linear and non-linear systems, the physics and resulting properties of solid state devices, the concepts of information and noise and transmission lines and filters.
Topics treated: network reduction, the 4 terminal network and solutions by matrix methods, non-linear systems, modulation, demodulation and rectification, carrier transport in semi-conductors, properties of diodes and transistors; electromechanical analogues and analogue computation methods, feedback and control systems, stability

criteria, nature of information and noise, properties of distributed constant lines and filters.

Prerequisite: Physics 230 or Physics 231, Mathematics 220 or 228 to be taken concurrently.
Text: Milman and Halkias, *Electronic Devices and Circuits*, McGraw-Hill, 1967.

400 Advanced Physics Laboratory. Laboratory 6 hours. A. Levin/S. T. Nugent.

This is a physics and engineering-physics laboratory class in which students in groups of two work largely on their own initiative. The experimental work covers nuclear disintegration, gamma and beta spectroscopy and absorption measurements, proton spin quantitative measurements and Planck's constant determination; thermionic emission and ionization experiments using a vacuum pumping and instrumentation system; properties of solid state semi-conductors and devices; experiments on the spectral noise distribution of transistors and the use of analysis systems; experiments with a Helium-Neon laser, holography, etc. If they wish, students may do experiments in other areas, such as acoustics, optics, fluid dynamics. A report, on a topic to be agreed with the instructor, is required as part of this class.

Prerequisite: Fourth-year standing in physics or engineering-physics or permission from the instructor.

402B Special Topics in the History of Science. Seminar 3 hours. R. Ravindra (Physics and Philosophy), J. Farley (Biology).

The intention in this class is to discuss in detail some specific issues concerning the development of scientific knowledge and its impact on society. The proposed topic for 1971-72 is "The Scientific Revolution of the 16th and 17th Centuries".
Prerequisites: At least two classes in natural sciences and two in history or philosophy. Others may be admitted by permission of the instructors. Some acquaintance with history of science will be presumed.
Texts: Readings will be taken from a variety of sources, with emphasis on primary sources.

410 Advanced Classical Mechanics and Electrodynamics. Lecture 3 hours. J. G. Cordes.

The class will study in the first term Lagrangian and Hamiltonian mechanics, covering, for example, the material in Goldstein, Chapters 1, 2, 3, 7, 8, 9, 10: Lagrange's equation, Hamilton's principle, the two body central force problem, Hamilton's equation of motion, transformations, the Hamilton-Jacobi equation, and small oscillations.

The following topics will be discussed in the second term: classical electrodynamics, covering, for example, the wave equation and solutions, special relativity, electromagnetic radiation and absorption, energy loss by fast moving charged particles.
Prerequisite: Physics 211, 231, 315, or the permission of the instructor.

Texts: Goldstein, *Classical Mechanics*, Addison-Wesley, 1950; Jackson, *Classical Electrodynamics*, Wiley, 1962.

415 Quantum Mechanics. Lecture 2 hours. D. Kiang.

Topics discussed include: concepts and formulation of quantum mechanics, harmonic oscillator, potential well and barrier angular momentum and the central force problem, perturbation methods, scattering theory.
Prerequisite: Physics 315. Students should be familiar with elementary wave mechanics and with the mathematics necessary to discuss the Schrodinger wave equation.
Text: TBA.

416 Mathematical Methods of Physics. Lecture 3 hours. S. T. Nugent.

Topics discussed include ordinary differential equations, infinite series, complex variables, integral transforms.

ectors and matrices, special functions, partial differential equations, eigenfunctions, eigenvalues, Green's functions, perturbation theory, integral equations, calculus of variations, numerical methods, probability and statistics, tensors and an introduction to group theory.
Text: Mathews and Walker, *Mathematical Methods of Physics* (2nd. ed.).

421B Nuclear Physics. Lecture 3 hours. D. Kiang.

This is an introductory class in nuclear physics. Topics discussed include: nucleon-nucleon interactions, nuclear structure, gamma transitions, alpha decay, beta decay, nuclear reactions, Mossbauer effect, counting statistics, and nuclear detectors.
Prerequisite: Physics 315 and permission from the instructor.
Text: TBA.

423A Introduction to Solid State Physics. Lecture 3 hours. G. F. O. Langstroth.

This class introduces the basic concepts of solid state physics which are related to the periodic nature of the crystalline lattice. Topics will include crystal structure, X-ray diffraction, phonons and lattice vibrations, the free electron theory of metals, and energy bands.
Prerequisite: Physics 315.
Text: Kittel, *Introduction to Solid State Physics*, 3rd. ed., Chapters 1-9, Wiley, 1966.

433A Advanced Electronics. Lecture 3 hours. A. Levin.

Properties of intrinsic and doped semiconductors. Carrier generation and transport, Hall effect, photo effects and Schockley Haynes experiment. Semiconductor diodes; field and carrier densities, transport equations, special diodes. Transient behaviour in diodes. Bipolar transistors; properties, limitations, failure mechanisms. The F.E.T. unijunctions, multilayer diodes; tunnel diodes, thermistors, noise mechanisms in solid state devices.
Prerequisite: 4th-year standing and permission of instructor.
Text: Millman and Halkias, *Electronic Devices and Circuits*.

433B Materials Science. Lecture 3 hours. H. W. King.

The properties of engineering materials are discussed in relation to their micro structure. The approach is based upon the application of principles of Modern Physics.
Text: Wert and Thompson, *Physics of Solids*.

444A Optics. Lecture 3 hours. C. K. Hoyt.

Topics include a detailed study of the radiation from accelerated charges, the statistical properties of the fields from assemblies of radiators, interference, diffraction, with attention to the approximations of the Kirchoff theory, and the application of Fourier transforms to the structure of images, the resolving power of instruments and the characterization of coherence.

A few topics in geometrical optics may be included to assist in understanding the behaviour of optical instruments and to provide a background for the better appreciation of some of the topics in physical optics.
Prerequisite: Physics 230, or Physics 231, or Physics 221 and Mathematics 220. The student should be familiar with vector analysis, Maxwell's equations and the use of complex exponential functions.
Text: Stone, *Radiation and Optics*, McGraw-Hill, 1963.

444B Optics. Lecture 3 hours. C. K. Hoyt.

This class is a continuation of Physics 444A and deals with coherence, polarization, scattering by matter, the electromagnetic properties of matter, including crystals, reflection, refraction and double refraction.

Prerequisite: Physics 444A.

Text: Stone, *Radiation and Optics*, McGraw-Hill, 1963 and assigned readings on related topics.

445 Physics of the Earth. P. H. Reynolds.

This is an introductory class in solid-earth geophysics. Topics discussed are: the figure of the Earth and gravity, seismology and the internal structure of the Earth, the geomagnetic field, paleomagnetism - the prehistory of the geomagnetic field, heat flow and the Earth's thermal history, electrical conduction in the Earth, radioactive processes and the age of the Earth.

See also Geology 405A, B; 306A, B; Oceanography 501.
Prerequisite: Three physics classes and permission of the instructor.
Text: Stacey, *Physics of the Earth*, Wiley, 1969.

465 Relativity and Cosmology. Lecture 2 hours. R. Ravindra.

This class will deal with fundamental concepts, theoretical structure and experimental foundations of the special and the general theories of relativity. The postulates of relativity, the equivalence principle, and the nature of curved space will be critically examined; some solutions of Einstein's field equations will be derived, including gravitational waves. Foundations of cosmology will be discussed, and a few cosmological models will be studied in detail.
Prerequisites: Physics 211, 231, 315, or permission of the instructor. (Some acquaintance with differential geometry is desirable, but not necessary.)
Texts: Most of the material will be taken from Taylor and Wheeler: *Spacetime Physics*; Robertson and Noonan: *Relativity and Cosmology*; and the manuscript of a forthcoming book by Wheeler, Thorne and Misner: *Gravitation*.

Graduate Studies.

The Department of Physics provides courses of study leading to the advanced degrees of M.Sc. and Ph.D. 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.

47.21 / Political Science

Professors

J. H. Aitchison (Chairman)
J. M. Beck
D. Braybrooke
K. A. Heard

Associate Professors

A. P. Pross
D. W. Stairs

Assistant Professors

P. C. Aucoin
D. M. Cameron
W. R. Mathie
D. H. Poel
J. A. Wouk

Visiting Professor

L. A. Dexter

Special Lecturers

R. L. Dial
C. J. Gardner

Government is as old as human society. Even the family has some form of government, whether the husband and father is absolute master, whether husband and wife share in the making of decisions, or whether the children also share in the decision-making process. One of the most important differences between Plato and Aristotle is that Plato

believed, and Aristotle did not, that the government of the state is essentially the same as the government of the family.

Some political scientists define political science as the study of decision-making. With some important exceptions, they are not interested in studying how private individuals reach decisions: rather, they are concerned with how groups of human beings come to decisions about matters of common interest. Some political scientists would include all groups such as the family, the business corporation, the business office, the university, the trade union, the tennis club and their "governments", as well as the state and its government.

One of the obvious exceptions referred to above is the case of the absolute dictator of the state who, because he is an absolute dictator, makes his decision as an individual acting alone. In this case the political scientist is interested in the things he has to take into consideration in coming to his decision. Some political scientists would also include the absolute rulers of other groups, the patriarch of the old-fashioned family, for example. But all political scientists would agree that political science includes the study of the reasons why individuals come to decisions on matters relating to the government of the state. The political scientist is very interested, for example, in why the voter comes to his lonely, private decision when he marks his ballot in a polling booth. Some political scientists would include within the subject the private decisions people make concerning the "government" of other groups to which they belong, such as the family. But it is obvious that there are some private decisions which are of no interest to the political scientist.

When a group has to come to a decision on a question of common concern, the outcome often depends on the power which different members of the group have over one another. Much has been written recently, for instance, on the greatly increased power a prime minister now normally has over the other members of his cabinet. Consequently, some political scientists consider that "power" is the key concept that distinguishes political science from other subjects. Again, some political scientists would include within the subject the study of the resolution of power conflicts within groups other than the state.

When we look at what political scientists actually do, we find that they almost wholly confine themselves to the study of the state and its government. Some of them believe, therefore, that the old-fashioned definition that "political science is the study of the state" is still the best, it being understood that the study of decision-making and the exercise of power with respect to the affairs of the state is included. There are good reasons for this concentration on the affairs of the state. One is that in our time the state plays a constantly expanding role in economic and social life; the great dangers inherent in modern inter-state relations constitute another. But an even more important one is the fact that the state claims supremacy over all other groups within its boundaries and normally possesses enough coercive power to make its claim good. It is the great preponderance of coercive power at the disposal of the state that more than anything else marks off the study of the state as one of special importance.

A recent development in political science has been the recognition that there are many important problems that can be adequately explored only by new and rather difficult techniques. Those political scientists who develop and apply these techniques are known as "political behaviouralists" and those who apply the older methods as "traditionalists". The methods of both are needed for a comprehensive study of two of the principal areas into which the department divides the subject: political institutions and behaviour, and international politics.

If political science is the study of the state, the study of the relations between states (or international politics) falls squarely within the domain of political science. Decision-

making (in the formation of the foreign policy of each state and in the many international organizations that exist today) is part of this study. That power relationships are involved is obvious.

The state has been the subject of serious study at least since the time of the ancient Greeks. Many of the greatest thinkers of the past have devoted much attention to it. To follow and finally to understand their thought is to stimulate one's own thinking about the state and to guard against the peril of thinking one is original when one is not. Consequently, political philosophy, which includes the study of the history of political thought, is the third of the department's principal areas.

Students who wish merely to attain a deeper understanding of democratic government and politics in general and of Canadian government and politics in particular will be most interested in Political Science 100 and 202. The scope of the subject, however, is so large that students majoring in it in the general course are advised, and those taking honours in it are required, to concentrate on one of the three principal areas. While it is impossible in an undergraduate programme of three or four years to become a complete political scientist, it is the aim of the department to present undergraduate students as far as possible with a unified central view of the full range of political science in its present development. Consequently, students majoring in the general course are advised, and those taking a combined honours programme are required, to take at least one class outside their principal area. Students taking the major honours programme are required to take three classes outside their principal area.

Job opportunities for specialists in political science are steadily increasing. University political science departments continue to expand and many students who have majored or honoured in political science are now to be found teaching in high schools. Specialization in political science affords an excellent preparation for many positions in the public service and for the study of law.

Principal Areas

1. Political Institutions and Behaviour: Political Science 100, 200, 202, 205, 208, 209, 210, 217, 235B, 306A, 311, 312B, 313, 314A, 315, 316, 318, 319B, 326B, 331A, 331B, 332A, 334A, 337A, 338B, 350, 352B.

2. Political Philosophy: Political Science 201A, 336A, 336B, 341A, 343B, 345B, 351A, 353B, 355B, 449 and 449A.

3. International Politics: Political Science 209, 223, 225, 228, 320, 322, 324A, 327, 329B.

Degree Programmes

General B.A. with major in Political Science.

Students intending to major in Political Science are advised to consult a member of the staff. The Department recommends the following programme for Political Science majors:

Year I

(All students)

1. Political Science 100.

(Students without science matriculation)

2. A science or mathematics class.

3-4 Two of Philosophy 100, a class in economics, and a class in history.

5. An elective, e.g., a class in English or a foreign language.

(Students with science matriculation)

2-4 Three of Philosophy 100, a class in economics, a class in history, and Sociology 100.

5. An elective, e.g., a class in English or a foreign language.

Year II

7-7 Two political science classes at the 200 level.

8-9 Two of Philosophy 100, a class in economics, a class in history, Sociology 100, and a class at the 200 level in any one of these four disciplines.

10. An elective.

Year III

11-13 Three political science classes above the 100 level, one of which should be at the 300 level.

12. A class above the 100 level in philosophy, economics, history or sociology.

13. An elective.

B.A. with Honours in Political Science (Major Programme)

Students taking a major or combined honours programme are required to obtain the approval of the Chairman of the Department or his deputy for their programmes. Those taking a major honours programme must take at least two classes at the 300 level, and those taking a combined honours programme must take at least one class at the 300 level.

Years I, II, and III

The class requirements for an Honours B.A. in Political Science for the first three years are those recommended above for a General B.A. with Major in Political Science. It is recommended that students not needing a class in English take a class in a foreign language.

Year IV

16-19. Four classes in political science at the 200 or 300 level.

20. An elective.

Combined Honours

There are several combined honours programmes:

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 programmes should consult with the Chairman of the Department or his deputy.

Undergraduate Programme in Public Administration.

The Certificate in Public Administration requires the completion of six classes which may be taken on a part-time basis. Further information may be obtained from the Co-ordinator of the Programmes in Public Administration, Department of Political Science.

Classes Offered

100 Democratic Government and Politics, Lecture 3 hours, Section I, J. M. Beck/Section II, P. C. Aucoin/Section III (evening), J. H. Aitchison

This class may be pursued successfully by any senior matriculant. It is designed not only for the student who desires to continue in political science, but also for the student who will take no other classes in political science; as such, it is not particularly concerned with methodology.

During a short introductory section such questions as the following will be posed: Can there be a genuine science of politics? What approaches may be adopted in a study of political phenomena? Next, there will be an examination of the operative ideals of liberal democracy, fascism and communism, and a discussion of the conditions which are likely to be a prerequisite for the successful working of liberal democracy.

The basic part of the class will be a comparative study of the governmental institutions of three liberal democracies: Great Britain, Canada, and the United States. This study will lead to the posing of general questions such as: What difficulties stand in the way of making constitutions relevant to new needs? (In this regard there will be an extensive examination of the development of the Canadian

constitution through formal amendment and judicial review, and of the problem of re-writing the written constitution to accord with contemporary needs.) Can second chambers be justified in liberal democracy? Have British-type cabinets become veritable despotisms? What is the proper role of elective chambers in a time of increasing executive ascendancy? How effective are the devices designed to make elective houses more genuinely representative?

How successful are democratic political parties in maintaining effective contact between the "brass" and the "grass"? Does the exploitation of the irrational by the mass media vitiate the ends of liberal democracy? Is an entrenched bill of rights the best device for protecting fundamental civil liberties? Is the ombudsman the most suitable remedy for ills resulting from the abuse of quasijudicial authority?

In short, this class will acquaint the student with some of the basic problems in the practical working of today's liberal democracy.

It is intended for one month in the Spring term to divide Section II into small discussion groups to be led by several members of the staff and by graduate students. During the month the meetings of these groups will replace lectures.

200 Britain and the Commonwealth, Lecture and seminar 3 hours (not given in 1971-72).

201A An Introduction to Political Philosophy: Justice, Law and Morality, Seminar 2 hours, W. R. Mathie.

The aim of this class is to engage the students in the direct examination and discussion of a fundamental and substantive problem in political philosophy. Specifically, the class will consider the discussion of justice in Plato's *Republic*, Aristotle's *Ethics* and *Politics*, Hobbes's *Leviathan*, and Mill's *Utilitarianism*, as well as a few contemporary examinations of the relation between justice, law and morality.

Prerequisite: Political Science 100. (In future years this class will normally serve as a prerequisite for more advanced classes in political philosophy.)

202/502C The Canadian Political System, Lecture 3 hours, P. C. Aucoin/D. M. Cameron.

The class will be divided into three major topic areas of approximately equal length. Part one will examine the environment of the Canadian political system, including external factors (ethnicity and religion, socio-economic stratification, regionalism and nationalism, and urbanization). Part two will examine political communication and representation in Canada, including a discussion of politics as a communication system, the instruments of communication (political parties, pressure groups, mass media), public opinion, and the selection of participants in the political system. Part three will deal with Canadian government and policy making, including the constitution and structure of government and the structure of the policy-making process at the federal, provincial, local, and intergovernmental levels.

Prerequisite: Political Science 100 or an equivalent introductory class.

205 The Political System of the United States, Lecture and discussion 2 hours, D. H. Poel.

This class is intended primarily for second and third-year students who have successfully completed Political Science 100. Some prior familiarity with the institutional arrangements of American government will be beneficial though not essential.

The emphasis will be on familiarizing the student with the empirical generalizations concerning American political behaviour as supported by recent research. The text will set the traditional structures of American government (e.g., the

Presidency, Congress and political parties) within the conceptual framework of systems analysis. In lieu of the third lecture hour, students will be expected to carry on independent work in an area of their choice.

208/508 Government and Politics of the Far East, Lecture 2 hours (once per week), R. L. Dial.

This class will deal with the socio-political development of modern East Asia. The survey will include China (since 1840), Japan (since 1860), Korea (since 1895), and Vietnam (since 1945).

It is open to students at all levels, without prerequisite. Graduate students will be required, however, to pursue an expanded reading list and will be assessed primarily on the basis of critical writing performance.

209 Nationalism, Lecture 2-3 hours, J. A. Wouk.

Nationalism has become a worldwide phenomenon. Although there is considerable variety in the aims and methods of nationalist movements, there are sufficient similarities among them to permit the development of useful generalizations. The object of this class is to develop an understanding of nationalism as a force in the internal and external politics of states. The main topics to be covered are:

- (1) major studies of nationalism as a political phenomenon;
- (2) analysis of nationalism as an integrative (e.g., Italy) and disintegrative (e.g., Ireland) political force;
- (3) analysis of the impact of nationalism on foreign policy (e.g., Nazi Germany, the decline of colonialism);
- (4) nationalist movements in developing countries (e.g., Iran); and
- (5) recent or current nationalist movements of particular interest (e.g., Canadian nationalism, Quebec nationalism).

Each student will prepare a major paper (5,000-7,500 words) on some aspect of the problem of analyzing nationalism or using a concept of nationalism as a tool for analyzing other political phenomena. In addition, there will be a shorter "case study" paper - an analytical description of a nationalist movement.

Prerequisite: Political Science 100 or an equivalent introductory class.

210 Comparative Government, Lecture 2 hours (not given in 1971-72).

217 Politics in Africa South of the Sahara, Lecture and tutorial 3 hours, K. A. Heard.

This class is intended to increase the student's substantive knowledge and understanding of politics in Africa, but the more important object is to expand insights into the political process as it operates in a cultural environment different from our own. To these ends, attention will be given to the efforts to promote a larger African unity, the divisive factors that have inhibited such efforts, and also the integrative and disintegrative factors operating in the domestic milieu of African states. The political systems of a select number of African states will be examined from this latter point of view.

Prerequisite: Political Science 100 or another class acceptable to the instructor.

223 Techniques of Statecraft and Problems of Order in International Politics, Lecture 2 hours, D. W. Stairs.

This class is designed as a basic introduction to the study of foreign policy and international relations, and its primary purpose is to equip students with rudimentary concepts and tools for analyzing the actions and inter-actions of the various participants in international affairs. There are perhaps as many approaches to the study of international political phenomena as there are questions to which the phenomena give rise. In this particular case, two general

perspectives are employed, and these serve to divide the class material into two main parts.

The first part is concerned primarily with the formulation of foreign policy, and it seeks to deal with such questions as: What are the principal processes and ingredients of foreign policy decision-making? How do these processes and ingredients affect the content of the decisions that are made? What instruments do the decision-makers have at their disposal in pursuing their objectives in international affairs? Under what conditions are the various instruments likely to be effective or ineffective? And, what criteria are employed in selecting one "mix" of instruments as opposed to the other available combinations? These and similar issues are discussed under a variety of headings, including in particular: (a) Intelligence and Foreign Policy Decision-Making; (b) The Planning of Foreign Policy; (c) Negotiation as a Foreign Policy Instrument; (d) Propaganda as a Foreign Policy Instrument; (e) Economic Manipulation (including various forms of economic sanctions as well as such positive devices as foreign aid); (f) Informal Penetration, or Subversion; and (g) Military Force.

The second part approaches the study of international relations not from the perspective of individual actors and their capabilities, but from that of the international community as a whole. It involves consideration of a variety of "theories" of international politics, but the core problem around which the readings and class discussions are arranged is the problem of the maintenance of international order, and of conditions which permit the resolution of conflict by peaceful means. The various influences and mechanisms which contribute, or are alleged to contribute, to the performance of this function are discussed under a number of headings, including (a) International Law; (b) Disarmament and Arms Control; (c) Concert Systems; (d) Balance of Power and Alliance Systems; (e) Collective Security; (f) Peacekeeping; (g) Public Opinion; and (h) Regional Functional Organizations. It is obvious that these mechanisms, taken singly or in combinations, often fail, and an attempt is therefore made to explain the nature of their respective limitations.

There is no single text, and students are required to read selections from a variety of sources.

225 The Current International Milieu, Lecture and discussion, 3 hours, J. H. Aitchison.

Students entering this class are expected to have at least as much knowledge of current world affairs as can be gleaned from the reading of the daily press and popular periodicals and from other mass media. Among the topics examined are: the general structure of power in the world today; the problems of deterrence, limited war and flexible response; the loosening of both the Soviet and the Western blocs and the effect of the invasion of Czechoslovakia on the former; peaceful co-existence between communist and non-communist states with special emphasis on the movement toward detente in Europe and the effect thereon of the new West German Ostpolitik; the Sino-Soviet split; the influence of the Triple A (Asian, African and Arab states); international and regional organizations.

228 Comparative Foreign Policy, Lecture 2-3 hours, J. A. Wouk.

The foreign policy of a state is determined by considerations deriving from the international environment and from its own internal politics. The aim of the class is not just to survey foreign policy in several countries, but to seek generalizations about the relationship between foreign policy and domestic politics. Following some introductory discussion of general problems in studying determinants of foreign policy and in making comparative political studies, the foreign policies of France, Federal Germany, the USSR, Sweden, and a number of developing countries will be analyzed. Pertinent historical material will be utilized, but the emphasis of these analyses will be "current" domestic politics and foreign policy.

There will be a major paper (5,000-7,500 words): an analytical comparison of the foreign policies of two or more states.

Prerequisite: Political Science 100 or an equivalent. Some acquaintance with the foreign policies and internal politics of Canada and the United States will be useful preparation. These countries will not be studied explicitly, but will be referred to frequently. Political Science 223 and 225 are previous complements of this class, and might usefully be taken at the same time.

255B Public Opinion and Voting Behaviour, Lecture and discussion 3 hours, D. H. Poel.

This class will deal with the development and interplay of public opinions within the political system. To the extent that social scientists (as opposed to journalists) have examined public opinion and voting behaviour within the Canadian political system, Canadian material will be used. Since much of the literature in this area is quantitative in nature, considerable attention will be given to quantitative methods in Political Science. This "considerable attention" will, however, not be at such a sophisticated level to scare off students who can add 2 and 2 together. This class is not a substitute for a class in statistics.

306A/506A Comparative State and Provincial Political Systems, Seminar 2 hours, D. H. Poel.

Until recently very little work has systematically compared phenomena across all the Canadian provinces or compared Canadian provincial political systems with American state systems. There are both legitimate epistemological and very real practical reasons for this. The aim of this seminar will be to compare aspects of these political systems, i.e., inter-state, inter-provincial and state-provincial comparisons. The theoretical focus of this seminar may vary according to student interest and may include such topics as political participation, legislative process, interest groups, policy outputs, party systems, and political culture.

This class is intended to be an advanced reading seminar. Undergraduates may be admitted with the permission of the instructor. A paper surveying a student-selected area of this literature will be required.

311/511 Public Administration, Lecture 2 or 3 hours, A. P. Pross.

Although this is an introductory class in that branch of political science which studies the administrative area of government, it is given at an advanced level because it demands a fairly high level of knowledge of political systems and of the Canadian political system in particular.

The class will explore:

- (1) the interrelationships between the administrative structure; the political system and the community at large;
- (2) the internal environment of bureaucracy;
- (3) the management of the Canadian public service;
- (4) financial management of the Canadian public service; and
- (5) the process of policy formation.

312B/512B Provincial Public Administration, Seminar 2 hours (not given in 1971-72).

313/513 Intergovernmental Relations in Canada, Seminar 2 hours, D. M. Cameron.

This class will examine concepts and issues relevant to the territorial division of governmental power, the nature and substance of relations between governments in Canada (federal, provincial and local) and the relationship between intergovernmental relations and government policy.

It is open to graduates and third and fourth-year undergraduates. Participants must have at least one previous class in Canadian government.

314A/514A The Policy Process in Canada, Seminar 2 hours, A. P. Pross.

A study of the fashion in which politics are evolved and applied in the Canadian political system. Various models of the policy-making process will be discussed and their applicability to the Canadian setting will be considered. The functions of the participants in the process will be examined, but particular attention will be paid to the role of administrative structures.

Admission with the permission of the instructor.

315/515 The Politics, Government and Constitution of Canada, Seminar 2 hours, J. M. Beck.

This class is open to those students who have demonstrated competence in Canadian politics and government by attaining at least second-class standing in Political Science 202 or its equivalent and in exceptional circumstances to those students who have obtained high standing in Political Science 100. It takes the form of a seminar class in which the students' papers will explore the background, nature and significance of current problems in the politics, government and constitution of Canada. The relation of the political culture, and especially environmental, institutional and personal factors to these problems will be examined in detail by posing such questions as: To what extent did the federal election of June, 1968, constitute one more step towards the complete Americanization of Canadian politics? Has the operation of the first-past-the-post electoral system more than counterbalanced the nationalizing effect of Canadian political parties and thereby strengthened the sectional basis of Canadian politics? Can participatory democracy be a practicable concept in Canadian federal politics? How good a case may be made for restructuring the federal executive and the committee system of the House of Commons so as to make them function more like their American counterparts? How well do the Canadian mass media perform the functions which the theory of liberal democracy contemplates? Have the crucial problems in federal-provincial relations been financial rather than racial or ethnic?

The last question will prepare the way to further questions relating to a possible re-writing of the Canadian written constitution. To what extent are the recommendations of Book I of the Royal Commission on Bilingualism and Biculturalism calculated to eliminate the Quebec ghetto? Is an entrenched linguistic bill of rights based on Book I feasible or desirable? Should a charter of human rights be entrenched in the written constitution? What is and ought to be the competence of the provinces in external affairs? Que veut le Quebec and what is the reaction of the different segments of English-speaking Canada?

Primarily the class is designed to give the student an understanding of the basic forces which operate in Canadian politics, with a view to acquainting him in some depth with current problems relating to the Canadian national government.

316/516 Politics in Nova Scotia Since Confederation (not given in 1971-72).

318/518 The Politics of South Africa, Seminar 2 hours, K. A. Heard.

This class is intended to provide insights into the South African political system. Attention will be directed not only to the policies issuing from that system, but also to the supporting elements deriving from the social, cultural and economic environments. Equally, attention will be given to the forces operating in the direction of change in the political system. Knowledge of the formal governmental structure will be required, but the primary focus of the class will not be directed to that structure itself.

It is intended primarily for graduate students, but third and fourth-year undergraduates may be admitted on application to the instructor.

319B/519B The Budgetary Process, Seminar 2 hours, D. M. Cameron.

This class is designed for students specializing in Canadian government and public administration. While the content of the seminars will remain flexible to accommodate the interests of the participants, major attention will be focused upon two areas: the development of the budgetary process in Canada, and the models and techniques for analysis and/or reform of the budgetary processes in general.

It is open to graduates and, with the instructor's permission, to third and fourth-year undergraduates.

320/520 The Analysis of International Politics and Foreign Policy, Seminar 2 hours, D. W. Stairs.

This is a graduate seminar concerned with identifying and evaluating the assumptions involved in various approaches to the analysis of international politics and foreign policy. The class will review representative works drawn from a variety of analytical "schools" and will evaluate the arguments contained in the methodological literature which has accumulated in recent decades. The utilities and limitations of alternative approaches will be assessed.

One major essay of 5,000 to 8,000 words will be required, together with a series of smaller papers to be developed in preparation for seminar discussions.

Undergraduates will be admitted only in exceptional cases.

322/522 The History of Canadian External Relations, (Same as History 425/525), Seminar 2 hours, (Not given in 1971-72).

324A/524A Problems of Development: The Politics of New States, Lecture, discussion and seminar 2 hours, K. A. Heard.

This class deals with the internal problems and theories of development. It will cover such subjects as concepts of development and underdevelopment; cultural patterns in developing nations; the impact of colonial regimes on political and economic development; industrialization; urbanization and socialization; communication, ideology and nation-building; economic problems and policies; the role of the military; stability and instability of political systems.

It is intended primarily for graduate students, but senior undergraduates may be admitted on application to the instructor.

326A/526A The Politics of the Chinese Revolution, Seminar, 2 hours, R. L. Dial.

The aim of this class will be to treat the Chinese revolutionary period at a fairly high level of sophistication. Each session will combine:

- (1) a *brief* lecture dealing with a particularly important historical event in the chronology of the revolution (e.g., the introduction of the "Canton trade system", the "May 4th Movement", etc.); and
- (2) an open discussion by all members of the class of a related book. Only students prepared to keep up with the reading (one book per week, generally a biography or a novel) should enrol, since the discussions will be the core of the class.

It is open to graduates and third and fourth-year undergraduates. After 1971-72 Political Science 208/508 will be a prerequisite for undergraduates.

326B/526B Contemporary Chinese Politics, 1950, Seminar 2 hours, R. L. Dial.

This seminar will seek to untangle the various dimensions of "building socialism" in present-day China. Concepts such as ideology, government, party, economic development, mana-

gement and organization will be discussed at both the theoretical and applied planes. Considerable energy will be expended on *how* to analyze Chinese politics (Sinology) as well as on the substantive details of contemporary China.

It will be structured similarly to Political Science 326A/526A, although the readings for discussions will primarily be of the article, rather than the book, type and will include articles from the press of mainland China in translation. Political Science 326A/526A is not a strict prerequisite for 326B/526B, except for graduates planning thesis work on China.

The seminar is open to graduate students and third and fourth-year undergraduates. After 1971-72 Political Science 208/508 will be a prerequisite for undergraduates.

327/527 The Formulation and Content of U.S. Foreign Policy, Lecture and seminar, 3 hours (not given in 1971-72).

329B/529B Problems in U.S. Foreign Policy, Seminar, 2 hours, J. A. Wouk.

This seminar will focus on "all aspects" of one or more major problems in recent U.S. foreign policy (e.g., Indo China, 1949-1971), but its main purpose is to enhance the student's ability to evaluate features of U.S. foreign policy for his own purposes. It will begin with some lectures and discussions on techniques of foreign policy analysis, but for the bulk of the seminars student contributions will be the key element. These contributions will consist of:

- (1) discussion (including individual semi-formal presentations of material relating to the major problem or focus topic); and
- (2) preparation of an analytical case study, using resources available in Halifax, in U.S. foreign policy. Students will be called upon to discuss problems and progress with these studies during the term.

The subject of the seminar focus need not be Indochina. Students will be presented with a list of possible topics and invited to suggest others at the opening meeting. The purpose of having a focus topic is primarily to provide a basis for studying problems of foreign policy analysis. Achieving a "definitive understanding" of the topic is secondary. There will be no examination.

Prerequisites:

- (1) Political Science 100 or its equivalent;
- (2) a class in U.S. government or equivalent preparation;
- (3) a class in international politics or equivalent preparation; and
- (4) willingness to do 4-6 hours' reading per week on a week-to-week basis.

Prerequisites 1 to 3 are flexible. If in doubt, consult the instructor.

330B/530B Canadian Political Parties, Lecture 3 hours, J. M. Beck.

This class will examine the Canadian party system as an integral part of the entire political system and, among other things, will explore such questions as: To what extent have various factors, economic, geographical, regional, ethnic, religious, constitutional and social, determined the character of the parties and the party system? What (or whose) theories best explain the number of parties in the system? How valid are Alford's findings relating to the class basis of Canadian politics in blaming the lack of a creative politics on the brokerage function as it is performed by non-class parties? To what extent are the findings of Michels, Ostrogorski, Duverger, and R. T. McKenzie with respect to the internal organization of political parties relevant to Canadian parties, and do they constitute a serious limiting effect on Canadian democracy? Does Cairns over-emphasize the effect of the electoral system on the functioning of Canadian parties and the political system? Does Meisel argue convincingly the likely breakdown of the existing party system? Is the resort to other means of

interest articulation likely to make the existing party system redundant?

331A/531A Public Administration Techniques, Seminar 2 hours, C. J. Gardner.

This class is designed to introduce students to a group of administrative techniques which are being used increasingly in the public sector and which in themselves are becoming subjects of specialization. It is important that the public administrator should know:

- (a) the principal characteristics of these techniques;
- (b) the areas of possible application in the public service; and
- (c) the circumstances in which the application can be most effective.

The techniques are such as the following:
Operations Research (OR)
Program Evaluation and Review Technique (PERT)
Critical Path Planning (CPP)
Data Processing
Procedures and Methods Analysis
Work Measurement and Standards
Administrative Communications and Control Techniques.

The class will be conducted with continual emphasis on the use of these techniques within the public service. Instruction may be given by various specialists, but the general pattern followed for each technique will be:

- (a) introductory lecture(s) in which reading assignments will be given;
- (b) discussion sessions based upon reading assignments; and
- (c) the allocation of practice assignments.

331B/531B Public Administrative Practices, Seminar 2 hours, C. J. Gardner.

The aim of this seminar is to highlight and explore ways in which the practice of public administration has been and can be improved. While examples will be taken from the national and international fields, the basic issues involved will be applicable in provincial and local government administration and, to some extent, in the administration of non-government enterprise. It will supplement the various classes related to public administration by the discussion of difficulties in harmonizing theory and practice. These discussions should be particularly useful to students contemplating administrative careers in the public service.

The substance of the seminar will consist of illustrative examples covering a wide range of administrative practices falling under the following general headings:

- (1) The Planning Process
- (2) Clarification of Work Objective
- (3) Organization
- (4) Staffing Practices
- (5) Financial Practices
- (6) Procedure and Method.

The seminar is designed mainly for graduate students who have taken, or are in the process of taking, the Graduate Diploma or Master's degree in Public Administration.

332A/532A Science and Government, Lecture 2 hours, P. C. Aucoin.

This class examines the role of science and scientists in modern society, and more especially in modern political systems. Science and its offspring, technology, are not only a major concern of developed and developing nations in themselves (as policies for scientific research and development illustrate) but they also contribute a significant (some say, dominant) input in other policy fields, e.g., industrial, economic, health, environmental, and military policy fields to list the most obvious. The class, therefore, will analyze such topics as: the norms and values of science and technology; the organization and structure of scientific/technological communities; the administration of science,

especially in the governmental sector, in the making of policies for science.

This class is for students who have taken the introductory political science class plus one class dealing with a modern political system (e.g., Canadian or American government). Science students would be welcome with the permission of the instructor.

334A/534A Local and Regional Government in Canada, Seminar 2 hours, D. M. Cameron.

This class will deal with the origins, development, and present legal and fiscal position of various forms of local and regional government in Canada. Special attention will be paid to three problem areas: the territorial extent of local government, policy formulation in a fractionalized political system, and the unique dimensions of urban government.

It is open to graduate and senior undergraduate students. Participants must have completed Political Science 202 or an equivalent class in the Canadian political system.

336A/536A Theories of Political Change and Revolution, Part I, Seminar 2 hours, W. R. Mathie.

The class will examine the understanding of political change and revolution of certain major political philosophers and the relation of the understanding of that phenomenon to the more general account of political and social life in each of those philosophers. Those to be examined in this way include Aristotle, Locke, Burke, Hegel, and Marx.

Those planning to take 336B/536B should note the prerequisites for that class.

336B/536B Theories of Political Change and Revolution, Part II, Seminar 2 hours, R. L. Dial.

This seminar is a continuation of Professor Mathie's 336A/536A. In this part we shall explore the writings of the post-Marxian "proletarian writers" Bernstein, Sorel, Lenin, Trotsky, and Mao. The second focus of attention will be on the political change and revolutionary theories derived from the structural-functional analytical movement. Among the writers to be assessed in that regard will be Chalmers Johnson, S. M. Lipset, Harry Eckstein, and Samuel Huntington. Finally, attention will shift to the emerging schools of revolutionary theory evident in the contemporary writings of such men as Marcuse, Cohn-Bendit, *et al.*

It is open to graduate students and third and fourth-year undergraduates and will follow a readings and seminar format. 336A/536A is a prerequisite. In addition, students should have some understanding of the "normal-cum-equilibrated" political process as might be obtained in Political Science 202, 205, or 210.

337A/537A Comparative Political Sociology, (Same as Sociology 317A), D. Grady.

338B The Politics of the Environment, Lecture 2 or 3 hours, A. P. Pross.

A discussion of the policy process as it relates to issues in the "environmental crisis". Special attention will be directed to the evolution of socio-cultural values (e.g., the recent growth in importance of wilderness areas) and their impact on the policy process as a dynamic interaction of media, political parties, pressure groups (including spontaneous protest groups), socialization processes and administrative organizations.

341A/541A The Political Philosophy of Plato, Lecture and discussion 2 hours, W. R. Mathie.

An attempt will be made in this class to understand the principles of classical political philosophy and political

science primarily through a careful analysis of one or more Platonic dialogues.

It will be open to all graduate students and to undergraduates by the explicit permission of the instructor. The course will include special tutorial and/or seminar sessions for graduate students in the class.

343B/543B The Origins of Contemporary Political Theory, Seminar, 2 hours, W. R. Mathie.

The aim of the seminar will be to clarify certain of the fundamental presuppositions of that form of theory predominant at present in political science and in the social sciences generally. It is assumed that one way of seeking such clarity is to inquire into the actual doctrines and intentions of those thinkers who appear to have played a decisive role in the adoption of those presuppositions. One such thinker with whom we shall be most concerned is Max Weber; the focus of the class will, therefore, be upon his writings. The work of "the historical school" and neo-Kantian philosophy in Germany, of other sociologists including Comte and Simmel, and of John Stuart Mill will be considered insofar as these seem likely to aid in understanding Weber's intention. Our specific aims in examining these writings will be to explicate and assess Weber's reflections upon the proper methodology of the social sciences and to consider his demand for an "ethically neutral" social science.

The seminar is open to graduate students and, with the explicit permission of the instructor, to third and fourth-year undergraduates.

345B/545B The Question of Regimes in the Study of Politics, Lecture and Seminar, 2 hours, W. R. Mathie.

Classical and especially Aristotelian political science focused upon the question of regimes. It aimed at examining and, if possible, mediating among the claims made by the partisans of the various regimes. Contemporary political theory tends either to ignore that question or to relegate it to a secondary level in political analysis. The present class will begin with the effort to show why and how this is so of contemporary political theory and to assess some of the advantages and costs of this change. The main body of the class will consist of an examination of "the political science of regimes" and, in particular, of Aristotle's *Politics*. An attempt will be made at the same time to contrast such a political science with contemporary political science. Finally, a brief attempt will be made to consider the prospects for any restoration of the question of regimes to its traditional place in political science. This attempt will be made in the context of a consideration of whether or not the classical understanding of tyranny is necessary or useful in seeking to understand modern totalitarianism.

The class is open to all graduate students and, with the permission of the instructor, to undergraduates. It will include special tutorial and/or seminar sessions for graduate students.

350/550 Statistics and Research Methods, Lecture 3 hours, (Same as Sociology 301).

351A/551A The Nature of Findings, Explanations, and Theories in Political Science. Seminar 2 hours, D. Braybrooke.

The chief topics to be treated in this class (which is identical with Philosophy 351A except for prerequisites) are the nature of explanation according to Popper and Hempel; the problem (or so-called problem) of induction; the hypothetico-deductive method; the nature of an axiomatized theory; the differences between behaviour (a)lism and theories of action; the fact/value distinction; and *Ideologiekritik*. Illustrations will be drawn chiefly from Political Science.

Prerequisites: Normally Political Science 100 and one other

class in Political Science. A previous class in logic (Philosophy 200 or 201 or 202) or in epistemology (Philosophy 305) would be helpful.

Students taking 351A/551A the first term should take either 352B/552B or 353B/553B the second term, or both.

352B/552B Research Methods in Political Science, Seminar 2 hours, D. H. Poel.

This seminar is an integral part of the "scope and methods" series and will allow students to bring their consideration of the philosophy of social science to bear upon methodological questions of conceptualization, measurement and inference in political science. The end product of this study will be the development of a "workable" research design in a substantive area of the student's choice.

Political Science 351A/551A will normally be considered a prerequisite for this seminar. A class in statistics would be useful but is not a prerequisite. Students not having a class in statistics should not be discouraged from taking this seminar.

353B/553B Contemporary Empirical Theory: A Survey, Seminar 2 hours (tentative), P. C. Aucoin/W. R. Mathie.

The objective of the seminar is to examine the major empirical theories in contemporary political science. The most significant contributions by social scientists in the 20th century to the development of empirical political theory will be surveyed. The examination will take the form of an analysis of group politics (Bentley, Truman, Dahl), structural-functionalism (Radcliff-Brown, Merton, Levy, Almond), organization theory (Barnard, Selznick, Simon, Etzioni), cybernetics (Ashby, Wiener, Deutsch), and systems analysis (Easton, Kaplan, Parsons). Throughout the class a major aim will be to explicate the philosophic foundations and/or the implicit assumptions or biases underlying the construction of these theories.

The seminar is open to undergraduates in the third and fourth years and to graduate students. Political Science 351A/551A will normally be prerequisite.

355B/555B Marxist Theory and Its Upshot in the Modern World, Seminar 2 hours, (Not given in 1971-72), D. Braybrooke.

360/560 Directed Readings, By different members of the staff as required.

449/549 Philosophy, Politics and Economics, (Same as Philosophy 445/545 and Economics 445/545.), Seminar 2 hours, D. Braybrooke.

The central concern of this class is the application to political choices of economic reasoning, taken as a source of both descriptive and normative theory. Dahl and Lindblom's well-known book, *Politics, Economics and Welfare*, will be discussed as an illustration of complementarity between the concepts and concerns of economics and those of other social sciences; and also as a means of defining the present position of the issue between socialism and capitalism. The class will study the formal theory of voting as treated by such economists as Arrow, Black, Buchanan and Tullock, as well as by Riker, Murakami, and Farquharson. It will give some attention to Downs' economic theory of party competition and to the theory of games (as applied to voting and to party competition). A number of important philosophical lessons for the analysis of concepts as important to ethics as *self-interest, rationality (personal and collective), human welfare, utilitarianism*, and *justice* can be drawn from this discussion; and several philosophical authors will be studied, among them Bairer, Rawls, Rescher, and possibly Braybrooke.

Prerequisites: Students taking this class should ideally have had previous classes in all three subjects; but it will suffice for them to have worked to an advanced undergraduate level in at least one of them. Students taking the class for a

philosophy credit should have had at least one class in logic (200 or 201 or 202) and one in ethics (310); students taking the class for a credit in political science should have had at least one 300-level class in political science (351A and 355B are recommended); students taking the class for a credit in economics should have had at least one 300-level class in that subject.

Not offered in 1971-72, but see the description of 49A/549A immediately following.)

49A/549A Philosophy, Politics and Economics, Seminar 2 hours, (Same as Philosophy 445A/545A and Economics 445A/545A.), D. Braybrooke.

The topics listed above for the full year seminar, this class will discuss Dahl and Lindblom, emphasizing their treatment of the present issue between socialism and capitalism; and the philosophical authors. It will omit the theory of voting; the economic theory of party competition; and the theory of games.

Graduate Studies

The Department offers M.A. and Ph.D. programmes in political science, details of which are given in the Calendar of the Faculty of Graduate Studies. Programmes leading to a Graduate Diploma in Public Administration and to the degree of Master of Public Administration are also available through the Department.

47.22 / Psychology

Professors

G. K. Caird
W. K. Honig
J. A. McNulty

Isaak Walton Killam Research Professors

H. R. James
N. J. Mackintosh

Associate Professors

J. Brimer (Chairman)
I. W. Clark
P. J. Dunham
B. Earhard
E. V. Goddard
S. Nakajima
R. S. Rodger
H. O. Schwassman

Assistant Professors

T. R. Anders
E. O. Boyanowsky
M. Earhard
J. M. Fearon
D. E. Mitchell
B. R. Moore
E. J. Mortenson
R. L. Rudolph
J. P. Winzce

Research Associates and Postdoctoral Fellows

L. L. Beale
D. N. W. Doig
V. Gray
D. Lander
W. Quinsey

Men see and hear, get hungry and fall asleep, and for an instant remember in great detail events which have just happened to them. Sometimes they hear but do not listen; often they remember only a fraction of what happened five minutes previously. They make love and play dangerous games, solve problems and go mad, drink far more than they need to quench their thirst; and they fight. Animals behave in the same way; if we knew the reasons why they did so we would have gone a long way towards understanding ourselves.

Psychology is an experimental science, and almost all the work which is done in the subject is done in the laboratory; its purpose is to discover the conditions which control the activities of animals and men, 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 rather than imitative men, better suited to those who want to find out for themselves than to those who want to be told what to believe. Although it has been the major achievement of psychology in the past two or three decades to discover the remarkable precision with which the behaviour of animals and men is controlled by their internal and external environments, — and as a student you will be expected to master the technology which has made these discoveries possible — this achievement has increased, not diminished, the challenge. We know for certain that there are at least two memory systems in the brains of vertebrates, but we do not know how these systems are linked together; we know (contrary to common sense) that things look larger the further away they seem to be, but no one understands why the moon on the horizon looks larger and closer than it does in the sky; there is reason to believe that at least some of the mental 'diseases' are not diseases at all, but forms of behaviour which are learned like other habits — yet we do not understand why some people learn these disordered behaviours while others escape scot-free.

The laboratory facilities of the department are amongst the best in Canada, and students who are willing to learn the necessary technical skills, and whose initiative is tempered only by a sense of compassion for other creatures, will be given the opportunity to use these facilities to the full.

Degree Programmes

General B.A. or B.Sc. with Major in Psychology

Students enrolled in the general (i.e., three year) degree programme must take a minimum of six classes beyond the introductory level in both their major and minor areas. In addition to meeting the university requirements for the General B.A. or B.Sc., students wishing to major in psychology must take at least four classes beyond Psychology 100. Required classes are listed below, together with one additional class which is open to students in their final year. All students who intend to major in psychology should consult with Dr. J. McNulty.

Year I
Psychology 100.

Year II
Psychology 200; Psychology 201.

Year III
One of Psychology 304, 305, 307, or 313; one of Psychology 308, 309, 310, or 312; Psychology 300 (Optional).

B.A. or B.Sc. with Honours in Psychology (Major Programme)

In the major honours programme students must take the nine psychology classes beyond Introductory Psychology that are listed below. All students who intend to take an honours degree in psychology should consult with Dr. J. A. McNulty.

Year I
Psychology 100.

Year II
Psychology 304; Psychology 357; one of Psychology 308, 309, 310, or 312.

Year III
Psychology 305; Psychology 307; one of Psychology 300, 308, 309, 310, 312, 313, 356, 358, or 464.

Year IV
Psychology 465; Psychology 470; one of Psychology 300, 308, 309, 310, 312, 313, 356, 358, or 464.

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 programme the student must take *eleven* classes beyond the 100 level in his two areas of specialization, with not less than *four* classes in either area. The student in the combined honours programme will normally write a thesis (or the equivalent) in the area that he elects as his major and in which he takes the majority of his classes. The following programme is based on the assumption that the student is taking the maximum number of classes in psychology. Any student intending to take a combined honours degree should consult with the two respective departments to arrange the details of his programme.

Year I

Psychology 100.

Year II

Psychology 304; Psychology 357; one of Psychology 308, 309, 310, or 312.

Year III

Psychology 305; one of Psychology 307, 308, 309, 310, 312, 313, 356, 358, or 464.

Year IV

Psychology 465; Psychology 470.

Junior Research Assistantships

A number of Junior Research Assistantships will be 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 attached to them, may be obtained from Dr. B. Earhard.

Classes Offered

100 Introduction to Psychology, Lecture 3 hours; tutorials, demonstrations, films and labs may be arranged as required, J. W. Clark/and other members of the department

Many people confuse psychology with either common sense or psychoanalysis, and most of them believe that human behaviour is unpredictable in principle, or so complex that we can have no hope of understanding it. The lectures and demonstrations which are given in this class should disabuse you of these ideas, and at the same time achieve something more constructive and useful; they will provide you with an understanding of the ways in which an individual's environment, his past experience and his heredity control the working of his brain and the choices and decisions which he makes.

Psychology 100 will be taught in a number of class sections. Although the sequence will vary for different sections, the material covered during the year will include such topics as the four described below.

1. The evolution and development of behaviour

The idea that the behaviour of animals is controlled by instincts, and the behaviour of man by innate intelligence, is dead. So is the contending idea that man's behaviour is solely determined by his environment. We now have a clear understanding of the fact that the behaviour of man and animals depends upon both heredity and environment in much the same way as the area of a room depends upon both its length and its width. Our intelligence, for example, is a product of a complex and continuous interaction between our genetic endowment and the environments in which we exist from conception to death.

Like that of all other species, the genetic endowment of man has been shaped by biological evolution. Unlike other species, man has progressively modified his environment. Thus we are creatures both of biological evolution and of our cultural heritage. A proper understanding of the nature

of our aggression, sexual behaviour, intelligence, and other characteristics must take into account our evolutionary history, our cultural history, and the often subtle interactions between heredity and environment in the course of our development.

2. Learning and motivation

What one learns obviously varies from one circumstance to another. Whether one learns depends upon a much more restricted set of conditions, and it is now possible to describe these in considerable detail, and to measure many of them with great accuracy. This part of the class will give you an understanding of how two fundamental forms of learning have been isolated and studied, as well as provide you with a knowledge of the laws which govern these two kinds of learning. We will also study the motivational conditions – the physiological drives, the emotional states, the acquired needs – that determine whether and when an individual will learn and make use of what he has learned. In addition, you will be asked to think about some of the problems in this area which are still unsolved: for instance, how do we learn to avoid (as opposed to escape from) pain, does punishment erase learning of simply suppress it, is learning a gradual process, or an all-or-none one?

3. Sensory processes and perception

We experience colour, form, movement, sound, odour, warmth, and so on in the world about us. The brain receives information from this world in the form of coded messages transmitted through sensory systems. Psychologists are concerned not only to measure perception but also to explain why we experience things as we do. In considering such questions as why some parts of the skin are more sensitive to cold than warm objects, or why things normally look single even though we view them with two eyes, psychologists have developed theories about the means used by the nervous system to signal information. These theories have often been successful in predicting which conditions affect perception.

Detailed attention will also be given to the way experience influences perception. Do animals reared without the opportunity of pattern vision tumble over 'cliffs' when first permitted to see; are normally sighted people able to avoid obstacles in the dark as easily as blind people; why do young children often confuse *b* and *d*? Questions like these have been studied experimentally, partly because of their practical implications but also to satisfy man's curiosity about the way we know the world about us.

4. Human Performance

This part of the class is concerned with the general characteristics of human performance in a variety of situations. The discussion will hinge mainly on the idea that the mind (or the brain) acts as a device which processes and stores information. A memory is not, in any sense, a literal picture of what actually happened; it is the end product of a number of complex steps in which the evidence of our senses is sorted and encoded, rejected or amplified, and integrated with other memories which are already in store. When a child learns to talk, he does not simply parrot all the sounds which are spoken to him by his elders. The structure of his nervous system, the limitations of his ability to attend and remember, and his past experience all force him to select and process only part of what he hears. How he does so, and how he manages to construct for himself an intuitive understanding of the grammatical rules of his native language, will serve as one of the examples in this class of the interplay of heredity, perception and learning.

Finally, some emphasis will be given to the practical implications of the research discussed in this section for education and teaching, industrial design, and the adaptation of men to new environments.

Laboratory

Students who are interested in doing laboratory work in connection with the class will be allowed to do so. Time and equipment will be made available in the departmental laboratories for students who wish to do research on any topic relevant to the class. Participation in the laboratory is entirely voluntary, and interested students may devote as much or as little of their time as they wish to their research project. Although participation in the laboratory is not obligatory, students who plan to major or honour in psychology will find the experience particularly valuable in acquainting them with the research techniques and methodology used in psychology. If the demand for laboratory work exceeds our facilities, it may be necessary to limit it to prospective honours students.

200 Problems in Experimental Psychology, Lecture 2 hours; laboratory 2 hours, P. Dunham/and other members of the department

1. Background Information

The main purpose of this class is to teach you how to work competently on research problems of your own invention. The best preparation for the class can be obtained either by taking Psychology 100 or by a careful reading of a modern introductory textbook of experimental psychology. The best one available at this time is: Kimble, G. A. and Garzey, N., *Principles of General Psychology*, 3rd ed., New York: Ronald Press, 1968.

2. Class Content

You will learn selected methods used by experimental psychologists in the study of behaviour, and at the same time you will be exposed to some of the controversial issues which have arisen as a result of our attempts to discover the fundamental laws of behaviour.

For the psychology major, the class will provide the necessary background for the more advanced classes in special areas which are offered by the department.

For the student who is not majoring in psychology, the class will illustrate the types of problems of interest to the contemporary psychologist, and the unique methods which he has developed to deal with these problems experimentally. These methods should be of interest to students in related natural sciences and social sciences such as biology, physiology, and sociology. The methods are in some cases easily applied to experimental questions basic to these latter sciences.

Three different sources of information will be provided in an attempt to accomplish the above stated general purpose of the class:

1. The basic textbook is *Psychology: The Experimental Approach* written by D. K. Candland and published in 1968 by McGraw-Hill. This text is a basic and general survey of the methods and issues of interest to the contemporary experimental psychologist. You will, for the most part, be expected to keep ahead of the content of the laboratory and lectures by reading appropriate sections of the text as assigned.

2. The lectures in the class are designed to give you an in-depth coverage of some of the methods and some of the issues which seem to be of primary importance in contemporary psychology. Although some of the lecture topics may be alluded to in the textbook, the lecture material will generally provide a more detailed analysis to illustrate the complexity of what seem at first sight to be relatively simple questions about behaviour.

3. The laboratory is the most important part of the class. It is conducted with the conviction that you will learn more from tackling your own problem and making mistakes than you will from being "spoon-fed" a series of ready-made experiments with perfectly predictable results. You will be

exposed to the following progression of events in the laboratory;

Before Christmas holidays:

- preliminary experiments to familiarize you with animal research procedures in psychology;
- an independent research project with animals which is formulated with the help of your instructor;
- final written and oral research reports concerning your independent research projects.

After Christmas holidays:

- preliminary experiments to familiarize you with human research procedures in psychology;
- an independent research project with humans which is formulated with the help of your instructor;
- final written and oral research reports concerning your independent research projects.

Prerequisite: Psychology 100.

201 Applied Psychology, Lecture 3 hours; J. A. McNulty/E. O. Boyanowsky/R. S. Rodger

Three major areas of applied psychology are discussed in this class.

1. Human Factors Engineering

Human Factors Engineering has been defined as the application of social, biological, and psychological science to the design of man-machine systems and organizations. Its objectives can be stated simply: (1) to design things so that people can use them effectively and efficiently, and (2) to create environments that are suitable for human habitation and work. No attempt will be made to survey the entire field. Rather, this section of the class will consider mainly the limitations and capabilities of the human and how a knowledge of these factors is essential in the design of new equipment and industry and in adapting men to new environments. As in all areas of human factors engineering, our understanding of such factors is based upon systematic research. Consequently, much of the class time will be devoted to discussing some of the basic facts and principles of human functioning which have come from basic research in perception, learning and performance, and human information-processing, with the emphasis upon how these facts and principles can be applied in practical situations.

No formal text has been assigned for this section of the class. Readings from various sources will be recommended and course notes will be distributed. A good reference book for background reading is E. J. McCormack, *Human Factors Engineering*, McGraw-Hill, 1964 (2nd ed.).

2. Psychology Applied to Social Issues

This section of the class will survey research findings in social psychology that are directly applicable to everyday life. The social performance involved in human interaction will be examined – i.e., how we create an image for others with our mannerisms, speech, dress, and the use of such nonverbal cues as posture, eye contact, and expressions. How the environment affects human relations in such diverse settings as abortion clinics, convents, and beer halls is discussed, as are social behaviours ranging from aggression and learning to altruism. Topics covered vary according to current issues and have included such things as social psychological analyses of pornography, drug use, supernatural phenomena, etc.

Readings will be assigned on the basis of the issues to be covered in the class.

3. Tests and Measurement

This part of the class will examine some of the history of psychological testing. A variety of types of tests will be considered – individual and group, projective and psychometric, free response and multiple choice, personality and intelligence tests, verbal and performance. The psychometric properties of tests, reliability, validity, item characteristics, and factorial purity will be studied, and, it is hoped, students will be given some practice in construction,

analyzing, and interpreting the results of tests. Some elementary notions in the theory of measurement will be presented, and the concepts involved in scaling, both psychometric and psychophysical, will also be discussed.
Text: J. Nunnally, *Introduction to Psychological Measurement*, McGraw-Hill, 1970.

This description refers to the currently offered class. Class content and instructors may change in 1971-72.
Prerequisite: Psychology 100.

300 Selected Research in Modern Psychology, Seminar and Laboratory 4 hours; R. L. Rudolph

This class is designed primarily for students who wish to gain further experience and understanding of contemporary psychological research. A student who enrolls in the class is assigned to a member of staff who will serve as his class advisor throughout the academic year. Contemporary research will be discussed and evaluated, and the student will be expected to conduct independent research of his own under the supervision of his class advisor.
Prerequisite: Psychology 200, and previous or concurrent enrollment in two other 300-level classes.

304 Learning and Motivation, Lecture 2 hours; laboratory 2 hours, W. K. Honig

What we do at any given moment depends upon past learning and present goals. Thus an adequate knowledge of the principles of learning and motivation is a fundamental prerequisite for any satisfactory explanation of human behaviour. Only to the extent that we know these basic principles can we expect to understand why some men are lazy while others are energetic, why sometimes we act decisively while at other times we are incapacitated by fears and doubts, or how attention facilitates remembering.

Psychology 304 deals with the fundamental principles of learning derived from research with animal and human subjects. Since most of these principles have been discovered and investigated in experiments using animal subjects, primary emphasis is placed on animal learning. The discussion of human learning emphasizes those aspects of behaviour that are unique to man — language and abstract thinking — in addition to considering more general phenomena, such as forgetting and training. Motivation is not studied as a separate topic but is discussed in terms of its effect on learning and performance.

Laboratory sessions involve both animal and human studies. During the year students are provided with the opportunity to design and carry out original experimental projects.

At the beginning of the class the student is expected to have some familiarity with the basic procedures (e.g., classical conditioning, avoidance learning, discrimination learning), the basic phenomena (e.g., generalization, extinction, frustration), and the basic terms (e.g., reinforcer, latency, discriminative stimulus) associated with the study of learning. This information may be obtained in the Psychology 200 class or by a careful reading of Chapters 13, 14 and 15 in D. K. Candland's *Psychology: The Experimental Approach* (McGraw-Hill, 1968).
Prerequisites: Psychology 100 (honours students); Psychology 200 or 201 (general students).

305 Perception, Lecture 2 hours; laboratory 3 hours, J. M. Fearon

Psychology 305 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 covered in the class 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, and the processing of this information achieved by the nervous system;

3. the psychological analysis of sensations and their relation to the known facts of sensory physiology;

4. the effects of higher processes, such as recognition, attention, and memory, on the way in which sensations determine how we perceive the world.

The majority of the class will be devoted to vision and hearing in human beings.

The experimental work to be presented has been selected for its importance in the theoretical understanding of perceptual processes, and the student will be expected to organize his work around theoretical rather than factual questions.

The lab work will consist of a general introduction to the apparatus and methods used in perceptual research, followed by experimental studies designed and carried out by each student individually.

The student intending to take Psychology 305 would benefit from some prior knowledge of the anatomy and physiology of the sense organs and their neural pathways, which may be obtained by reading books such as F. A. Geldard: *The Human Senses* or T. C. Ruch et al: *Neurophysiology*, of the sensory phenomena associated with them, which may be found in S. H. Bartley: *Principles of Perception*, and of some of the higher processes involved in perception, as may be found in U. Neisser: *Cognitive Psychology*, W. N. Dember: *The Psychology of Perception* or R. H. Forgas: *Perception*.

Prerequisites: Psychology 100 (honours students); Psychology 200 or 201 (general students).

307 Physiological Psychology, Lecture 2 hours; laboratory 3 hours, S. Nakajima

The behaviour of animals and men is a product of the interaction between their nervous systems and their environment. Physiological psychology is the study of the detailed way in which the brain regulates behaviour; of the physiological, anatomical and biochemical mechanisms underlying psychological processes. The class begins with a review of the structure and function of the nervous system, and of the mechanisms of sensory and motor systems. It continues with an analysis of the physiological processes involved in learning and the storage of memories, and in the regulation of motivation and emotion.

Because physiological psychology is concerned with the biological analysis of psychological processes, two types of background knowledge are necessary. First, you should have some general knowledge of how living things are organized. This can be obtained either by taking Biology 100 or 101, or by the careful reading of an introductory textbook, such as Baker, J. J. W. and Allen, G. E.: *The Study of Biology* (Addison — Wesley, 1967). Second, you should understand the techniques developed by experimental psychologists to investigate behaviour and the concepts they have used to describe their findings. This background can be obtained by taking Psychology 200 or by reading D. K. Candland's, *Psychology: The Experimental Approach* (McGraw-Hill, 1968).

Psychology 307 is recommended for anyone planning to go on to graduate studies in psychology. The class is also recommended for students intending to study biology and medicine.

Prerequisite: Psychology 100 (honours students); Psychology 200 or 201 (general students).

308 Social Psychology, Lecture 2 hours; laboratory 2 hours,

This class is concerned with the factors which control our

perceptions of other people and our feelings toward them, with the ways in which social attitudes are formed and changed, and with the conditions which lead to regular and stable relations between people and groups of people. Exactly what cues do we use when we decide that someone dislikes us or that he is 'selfish'? What factors make political propaganda credible? Do children simply learn racial prejudice from their parents? What conditions within a group lead to competition and what factors produce cooperation?

Prerequisites: Psychology 100 (honours students); Psychology 200 or 201 (general students).

309 Developmental Psychology, Lecture 2 hours; laboratory 2½ hours, T. R. Anders

The developmental psychologist is concerned with the questions of how behaviour is acquired, sustained and altered over time. The answers to these questions have practical importance in child rearing, education and guidance, but the interest of the psychologist is directed first to determining the conditions in which behaviour begins and the conditions under which changes take place. This leads some psychologists to basic studies about activity and quiescence, attentiveness and indifference, and reactions to positive and negative consequences. It leads others to questions about the development of intelligence, what sensory experiences influence perception, and how the child acquires such immensely complicated behaviours as those involved in speech and concept formation.

During the past 15 years, improvements in the technology for studying behaviour have enabled us to determine that the very young child is a complicated, active and competent organism with perceptual abilities and response capacities greater than we had imagined. Along with this has come knowledge of some of the ways in which later intelligence, learning, and general adaptive behaviour are related to the early environmental experiences of the child.

The Psychology 309 class examines, through lectures and readings, the influences, — physiological, social and cultural — which affect the environmental experiences of the child. Studies of the young of less complicated species which provide useful hypotheses for the study of children are also examined.

Laboratory periods are devoted to systematic observations of young children, and teaching in enriched pre-school programmes for culturally disadvantaged white and Negro children.

Prerequisites: Psychology 100 (honours students); Psychology 200 or 201 (general students).

310 Theories of Personality, Lecture 2 hours; laboratory 2 hours, Not offered 1971-72.

A theory of personality can be viewed as an attempt to integrate observations about human behaviour into a meaningful framework that allows the theorist to make predictions. As yet, however, no individual theorist has been able to build a model that accounts for all of human nature. The reason for the great variety of personality theories now in existence must be sought not only in the inherent complexity of human beings, but also in the individual theorist's own biases, professional interests, and methods of observation. Thus one finds theories based primarily on medical interpretations and others that stress social and developmental factors. Within some theories, behaviour is viewed solely in terms of environmental consequences, and in others the phenomenal field or cognitive processes are stressed.

In Psychology 310 the student will compare and evaluate different personality theories. A thorough coverage will also be given to the various clinical, statistical, or laboratory procedures used by different theorists. In addition, each student will carry out practical projects designed to show how some personality traits can be isolated, observed, described, and modified.

The student desiring to enrol in Psychology 310 should be familiar with the basic issues and terminology of experimental psychology. This background can be obtained either by taking Psychology 100 or by a careful reading of a recent introductory psychology textbook (e.g., Kimble, G. A. and Garnezy, N. *Principles of General Psychology*, 3rd edition, New York: Ronald Press, 1968).
Prerequisite: Psychology 100 (honours students); Psychology 200 or 201 (general students).

312 Experimental Analysis of Behaviour Disorders, Lecture 2 hours; laboratory 2 hours, W. K. Caird

Psychology 312 is concerned with an examination of neurotic and psychotic disorders from an experimental psychological point of view. The general purpose of the class is to present to the students current psychological thinking regarding behaviour disorders; what the major problems are and the ways in which attempts are being made to solve them. It is primarily intended for honours students and those intending to do advanced work in psychology.

This class is largely descriptive and of a fairly broad nature. The concern is with topics such as: the hypothesized biological and psychological bases of neurosis and psychosis and the various models for the study of these; the rationale and utility of diagnosis and classification; experimental methods of research into behaviour disorders; behavioural descriptions of neurotic, psychotic and character disorders and the psychological concepts used in understanding and explaining these patterns of behaviour.

There are detailed discussions of the manipulative aspects of abnormal psychology — by drugs and various types of reinforcers. The major interest is the modification of behaviour by the use of learning theory principles, such as: operant conditioning techniques with schizophrenic patients; desensitization with phobic patients; aversion-type procedures with obsessive-compulsive disorders; modeling techniques with childhood behaviour problems; and conditioning procedures with alcoholism, drug addiction and similar disorders.

Various types of equipment used in experimental psychopathology are discussed. Included are measuring instruments, such as the polygraph for recording GSR (galvanic skin response), EMG (electromyograph-muscle potential), EEG (electroencephalogram), respiration, and blood pressure; manipulative apparatus for eyeblink conditioning and reaction time; tape recorders for binaural presentation of stimuli, etc. In addition, students spend two hours a week at a mental hospital where they participate in group discussions with patients.

Students intending to enrol in Psychology 312 should have a clear understanding of some of the fundamental concepts of psychology and human physiology. In particular, they should be familiar with the basic notions of conditioning and learning, motivation and perception. They should also understand the fundamentals of autonomic and central nervous system processes. In short, a thorough knowledge of a good introductory psychology text (e.g., G. A. Kimble and N. Garnezy: *Principles of General Psychology*, 3rd edition, 1968) is necessary if the student is to derive benefit from the class.

Prerequisites: Psychology 100 (honours students); Psychology 200 or 201 (general students).

313 Cognitive Processes, Lecture 3 hours; B. Earhard

A child enters this world without memory, thought or language — with only the requirement that certain basis needs be satisfied. Within two years, a child has a well-developed memory for people, events, and words, as well as the capacity to communicate verbally with others. Cognitive psychology is not concerned with providing a description of the developmental process, but rather with ascertaining the character of mechanisms that must underly such human abilities. Cognitive psychologists ask such

questions as: How does an individual recognize an object when it is in different contexts or orientations, when each shift in position or orientation produces a different pattern of stimulation on the eye? How much of daily experience is committed to permanent memory, and by what processes is it memorized? How is information stored in memory, and how is information lost from memory? In general, it can be said that cognitive psychology is concerned with developing explanations and mechanisms to account for thought and language in the human organism.

Prerequisite: Psychology 100 (honours students); Psychology 200 or 201 (general students).

356 Advanced Motivation, Lecture 2 hours; laboratory 2 hours, P. J. Dunham

The topic of motivation is one of the most difficult to describe in psychology. The material which appears in the standard textbooks on motivation could easily have been placed in a textbook on learning, on perception, on personality theory, or on physiological psychology. Because of the breadth of the subject matter, Psychology 356 is taught as a seminar dealing with selected topics in the area of advanced motivation. In addition to these special topics discussed in class, outside readings are assigned to familiarize the student with the various classic issues which have persisted in the history of thought about motivation.

Prerequisite: This class is primarily intended for honours students, but other students will be admitted with the consent of the instructor.

357 Statistical Methods in Psychology, Lecture 2 hours; laboratory 2 hours, M. Earhard

The object of this class is to familiarize the student with the logic and application of the descriptive and inductive statistical methods that are commonly used in the analysis of data in experimental psychology. The material covered begins with the topic of frequency distributions and their characteristics, and progresses through parametric and non-parametric tests of significance, correlation and regression techniques, analysis of variance and covariance. The general approach is to introduce each of a variety of statistical methods by reasoning through the ideas underlying the topic under consideration, then discussing the general method of attacking the questions asked of the data, and finally working through specific problems in class. The classes are conducted as a combination of lectures and labs, and students are encouraged to participate actively and question often.

Psychology 357 is required for honours psychology students and qualifying graduate students. Other students may be admitted with the consent of the instructor. Although mathematical sophistication beyond the principles of elementary algebra is not required for successful completion of this class, students who are weak in arithmetic and basic algebra are encouraged to consult the instructor during the summer preceding their enrolment for assistance in preparing for the class.

Prerequisite: This class is primarily intended for honours students, but other students will be admitted with the consent of the instructor.

358 History of Psychology, Lecture 3 hours, J. W. Clark

This class deals with how experimental psychology came to be what it is today. The emphasis is on the evolution of thought about a number of psychological issues which have been of central concern throughout the history of psychology. Speculation on these issues is traced from antiquity to the emergence of experimental psychology in the nineteenth century. Then their development is examined in the writings of the major psychologists — representatives of the prominent systematic viewpoints of psychology's first century: structuralism, behaviourism, Freudianism, Gestalt psychology. Finally, the diversification and theoretical upheavals of contemporary psychology are considered with a view toward the future of the science.

Some knowledge of the present state of experimental psychology is assumed, and it would be helpful if the student had taken an introductory class in philosophy or read a standard history of philosophy (such as, W. I. Matson: *A History of Philosophy*, American Book Co., 1968, or S. P. Lamprecht: *Our Philosophical Traditions*, Appleton-Century-Crofts, 1955).

Prerequisite: This class is primarily intended for honours students, but other students will be admitted with the consent of the instructor.

464 Ethology, Lecture 2 hours; F. J. Mortenson/H. O. Schwassman

The behaviour of animals may be considered from a theoretical or an empirical standpoint. In this class both approaches will be examined through a survey of contemporary schools of thought concerning animal behaviour and a review of trends in field and laboratory research. This overview of the science of animal behaviour will be supplemented by observations of animals in both natural and experimental settings. Such observations will illustrate techniques employed to study animal behaviour and allow the student to evaluate some of the theoretical formulations.

The format and the content of the course are somewhat variable and depend on the composition of the class. For example, topics or species of particular interest to the students may be examined in depth through discussions, paper presentations, or direct behaviour observations.

Prerequisite: This class is primarily intended for honours students, but other students will be admitted with the consent of the instructor.

465 Honours Thesis, The Department

Psychology 465 is designed to acquaint the student with current experimental problems and research procedures in experimental psychology. Each student is assigned to a staff member who advises the student about research in his major area of interest, and closely supervises an original research project which is carried out by the student. Each student is required to submit a formal report of the completed research before the first of May. The final grade is based upon the originality and skill displayed by the student in designing his project and upon the submitted report.

Prerequisite: Restricted to honours students in their graduating year.

470 Animal and Human Learning, Lecture 2 hours; B. R. Moore

This class deals with selected aspects of Pavlovian and operant conditioning, avoidance conditioning and punishment, discrimination learning, short-term memory, interference affects and forgetting. The techniques and control problems of the various areas are examined in sufficient detail to allow the student to evaluate critically the experimental literature. Certain of the areas are considered within the context of contemporary theories; in other cases the approach is atheoretical.

The format of the class varies. Lectures, brief student presentations, extended presentations and group discussion are intermixed according to the nature of the material to be covered. No formal text is used; all of the readings are from primary sources.

The seminar is required of all senior honours and qualifying-year graduate students, and is ordinarily not open to others. The enrolling student who has not taken a previous class in learning and conditioning should prepare by reading *The Psychology of Learning* by J. Deese and S. H. Hulse (McGraw-Hill, 1967), or a comparable work. A detailed knowledge of such a text is not assumed, but the student should be familiar with the technical vocabulary and the major techniques and phenomena described.

Prerequisite: This class is primarily intended for honours

students, but other students may be admitted with the consent of the instructor.

500 Research Assignment, The Department

The student is assigned to an on-going research project and works under the direction of a staff member. The student is required to submit a report, written in thesis form, of the work completed during the year.

Prerequisite: Restricted to qualifying-year students.

Graduate Studies

Courses leading to the M.A. and Ph.D. degrees in psychology are offered. Further details on graduate courses and general requirements for admission to graduate study may be found in the Calendar of the Faculty of Graduate Studies.

47.23 / Religious Studies

A number of classes relating to religious studies, other than Religious Studies 100 will be found among the offerings of several departments. Classes in the philosophy, psychology, and sociology of religion, for example, are offered by the Departments of Philosophy and Sociology, while classes bearing on the historical development of religious thought are offered in the Departments of History, Classics and English. Interested students may consult Professor Page, Department of Philosophy.

100 The English Bible, Lecture 2 hours

The class attempts to expand the student with the whole field of Biblical literature. The rise and development of the literature of the Old Testament is studied against its historical background. The New Testament writings are considered in relation to the life of the early Christian community with particular reference in their chief literary characteristics and their historical and religious significance. **Reference Texts:** William Neil, *The Rediscovery of the Bible*; R. W. Anderson, *Understanding the Old Testament*; T. Henshaw, *New Testament Literature*.

47.24 / Romance Languages

French

Professors

H. Aikens
P. Chavy
H. Rasmussen (Chairman)

Assistant Professors

L. Beschet (Miss)
E. Boyd
B. E. Gesner
S. Journoud
R. Kocourek
F. Kretschmer
D. Lawrence
M. Sandhu (Mrs)
C. Simon
L. Sugden

Lecturers

M. Bishop
J. Charbonnier
J. R. H. Enguehard
J. Gaillard de Semainville
K. Haberl (Mrs)
M. Leal
A. LeBerre
N. Poulet (Mrs)
G. Riegl
R. W. Ryan
C. M. Strong
J. P. Thomas

Spanish

Assistant Professors

P. Bly
M. S. Mounib (Mrs)
V. Romano

Lecturers

B. Lotito (Miss)
I. Pittas (Miss)
S. Rogge
H. Williams

The Romance Languages are the modern forms of Latin as spoken in various parts of the Roman Empire. They include Italian, Spanish, Portuguese, French, and Rumanian, as well as several other less important tongues. In modern times, some of these languages have been carried from Europe to other parts of the world, including Canada and Central and South America. Two of the most important of these, French and Spanish, are offered by the Department of Romance Languages.

French

People choose to study French for a variety of reasons — desire to gain understanding of one of the world's richest cultures, interest in the language for its own sake, preparation for certain careers (teaching, translating, etc.), or serving the cause of Canadian unity. The Department offers an excellent opportunity of pursuing such study to those whose interest is strong enough to make them willing to devote a good deal of their time and energy to it.

In general, students are expected to acquire a good knowledge of spoken as well as written French. As students' skill grows, French is used more and more in classes. The accent aimed at is "international"; that is, recognized as standard both in France and in French Canada. Much use is made of the language laboratory in the acquisition of oral skills. The object of our language instruction is to provide, through the judicious use of modern methods, a solid basic training that will enable students who spend a few months consolidating their knowledge in a French-speaking community to develop fluency rapidly and with precision. Students in our major honours programme are normally expected to spend at least one summer in a place where French is the language of communication.

Some students wish or are required only to gain a reading knowledge of French. Provision is also made for their needs.

If your tastes and abilities lie in the direction of French studies, you should consider the possibility of taking a bachelor's degree with honours in French, or with honours in French and another subject combined. Those who wish to do so, or to take French as a major or minor subject in a General bachelor's degree course, are encouraged to discuss the matter at any time (but the earlier the better) with a member of the Department. An Honours degree is usually required for or facilitates access to graduate studies.

French Degree Programmes

General Bachelor's Degree

With French as major, course should include:
French 102, 130, 202

Two, three or four of French 204, 230, 231, 304, and any 400-level French class.

Bachelor of Arts with Honours in French

Course should include:

Year I

- 1-2. French 102, 130
3. A class in the minor subject or French 202.
- 4-5. Two other classes.

Year II

6-8. French 250 and 251 and, normally, either French 202 (if not taken in Year I) or French 204.
9. A class in the minor subject.
10. One other class.

Year III and IV

Details of the honours programme in French in Years III and IV are to be arranged by consultation with the Department.

Students in the honours programme with French as major subject are normally required before graduation to:

- (a) write an honours essay under the supervision of a member of the Department; and
- (b) spend at least one summer in a French-speaking community to consolidate their knowledge of the language.

Bachelor of Arts with Combined Honours in French and Another Subject

Programmes may be arranged by consultation (as early as possible) with the departments concerned. Students planning a combined honours course should consider, however, that the number of classes taken in either subject might be insufficient for admission to many graduate programmes without at least an extra year's work.

Notes

(1) The "other" classes chosen as electives in the programmes outlined above must satisfy General degree requirements. (See).

(2) Combinations of classes other than those set forth above should not be chosen to fulfill degree requirements without the express approval of the Department.

(3) A student may, with the permission of the Department, be admitted to a French 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.

(4) A student admitted to a French course at an advanced level who obtains credit for a class at that level, may not later take a French class at a lower level for credit except with the express permission of the Department.

(5) No more than two classes in French may be taken for credit at the 100 level; and no more than three at the 200 level, except with the express permission of the Department.

(6) Enquiries concerning prescribed texts should be directed to the Secretary of the Department.

French Classes Offered

102 Spoken and Written French, (Part I), Lecture 3 hours; language laboratory 5 hours per week

For students with good aptitude for language study but with insufficient or no experience in oral French. Application to take this class must be made on the special form supplied by the Registrar. An aptitude test may be required before admission. French 102 is normally followed in the second year by French 202, which completes it. Students willing and able to cover the material more quickly through concentrated effort are invited to apply (on the special form mentioned above) to take French 102 and 202 in the same year. See note following description of French 202 below.

106 Proficiency in Reading, Lecture 3 hours

For students wishing to acquire or further skill in comprehending written French, without extensive training in the spoken language or in the active use of the written language. Although designed primarily for undergraduates, this class can also accommodate and meet the needs of

graduate students required to show evidence of a basic reading knowledge of French.

130 Introduction to French Literature, Lecture 3 hours

A general introduction through the study of a small number of texts of varied nature: analysis, appreciation, criticism, discussion.

Comparative Literature 100 (see *Comparative Literature, 47.7*).

202 Spoken and Written French (Part II), Lecture 3 hours; language laboratory 4-5 hours per week

This class continues and completes the work begun in French 102.
Prerequisite: French 102.

Note: Able first-year students are invited to apply (on a special form supplied by the Registrar) to take French 102 and French 202 in the same year. Students who take these two classes in the same year will attend classes 5 hours a week and work 9 hours a week in the language laboratory. Upon successful completion of this work, two credits are granted.

203 Spoken and Written French, (1971-72 only), Lecture 3 hours; language laboratory 5 hours per week.

This class is intended and reserved for students who successfully completed French 103 in 1971. It will continue and complete the work begun in French 103, achieving full coverage by the end of the class of the essential structures of spoken and written French.

Note: French 103 will not be offered in 1971-72. French 303, announced in the 1970-71 Calendar, is discontinued.
Prerequisite: French 103 (only).

204 Composition, Lecture 3 hours per week.

Training towards accuracy in reading and writing French. Exercises in translation from French to English and from English to French; grammar, vocabulary building, free composition.

230 Survey of French Literature (Part 1), Lecture 1 hour; study group 2 hours per week.

Study of a selection of the most outstanding works of French literature from its beginning to the time of the French Revolution. Not for honours students.

231 Survey of French Literature (Part 2), Lecture 1 hour; study group 2 hours per week.

Study of a selection of the most outstanding works of French literature since the time of the French Revolution. Not for honours students.

250 Theatre and Poetry in the 17th and 18th Centuries, Lecture 3 hours

For honours students.
Prerequisite: French 130.

251 Novel and Other Genres in the 17th and 18th Centuries, Lecture 3 hours

For honours students.
Prerequisite: French 130.

304 Composition, Lecture 3 hours

Continues the work of French 204 at a higher level.
Prerequisite: French 204.

352 Theatre and Poetry in the 19th and 20th Centuries, Lecture 3 hours

For honours students.
Prerequisite: French 250.

353 Novel in the 19th and 20th Centuries, Lecture 3 hours

For honours students.
Prerequisite: French 251.

404 Composition, Lecture 3 hours

Continues the work of 304 at a higher level.
Prerequisite: French 304.

420 History of the French Language, Lecture 3 hours

Study of the development of the French language from its origins in spoken Latin to the present day. Particular attention is paid to the period from the 16th to the 20th century.
Prerequisite: A knowledge of Latin is required.

421 General Phonetics, Lecture 3 hours

Study of the sounds of language, in particular those of English, French and other languages familiar to students; how these sounds are produced, how they may be classified; how they may be taught; practice in the use of phonetic script; introduction to principles of phonetics. Not a class in remedial pronunciation.
Prerequisite: Good knowledge of English and French.

422 General Linguistics, Lecture 3 hours

Study of the nature of language; elements of phonetics and phonology; writing; grammar (units, categories, functions); words and meaning (lexicon, semantics); summary of historical, comparative and contrastive linguistics; overview of major world languages; chief events in the history of linguistics; practical applications of linguistics. In view of the essential role of language in human life, this class is suitable for inclusion in various study programmes.

423 Evolution of Linguistics, Lecture 3 hours

The development of language study from early times to the present day. Special attention will be paid to the linguistic ideas of the twentieth century.

430 Introduction to Literature of the Middle Ages, Lecture 3 hours

431 Literature of the 16th Century, Lecture 3 hours

432 Literature of the 17th Century, Lecture 3 hours

433 Literature of the 18th Century, Lecture 3 hours

434 Literature of the 19th Century, Lecture 3 hours

435 Literature of the 20th Century, Lecture 3 hours

440 French-Canadian Literature, Lecture 3 hours

460 Special Honours Subject, Lecture 3 hours

Spanish

Not only is Spanish, like French, the language of one of Europe's great cultures, but it is also one of the most widely used languages in the world (being the official language not only of Spain but of most of the countries of South and Central America as well) and therefore of tremendous social, political and economic importance. Students interested enough in Spanish to be willing to devote a good deal of their time and energy to its serious study have an excellent opportunity to do so at Dalhousie.

In general, students are expected to acquire a good knowledge of spoken as well as written Spanish. As students' skill grows, Spanish is used more and more in classes. Both the "Castilian" and the "American" accents are used and considered of equal standing. Much use is made of the language laboratory in the acquisition of oral skills.

The object of our language instruction is to provide, through the judicious use of modern methods, a solid basic training that will enable students who spend a few months consolidating their knowledge in a Spanish-speaking community to develop fluency rapidly and with precision. Students in our major honours programme are normally expected to spend at least one summer in a place where Spanish is the language of communication.

If your tastes and abilities lie in the direction of Spanish studies, you should consider the possibility of taking a Bachelor's degree with honours in Spanish, or with honours in Spanish and another subject combined. Those who wish to do so, or to take Spanish as a major or minor subject in a General Bachelor's degree course, are encouraged to discuss the matter at any time (but the earlier the better) with a member of the Department. An Honours degree is usually required for or facilitates access to graduate studies.

Spanish Degree Programmes

General Bachelor's Degree

With Spanish as major, course should include: Spanish 102 and 202.

Two, three or four of Spanish 210, 230, 240, and 300-or-400-level class.

Bachelor of Arts with Honours in Spanish

Course should include:

Year I

1. Spanish 102.
2. A class in the minor subject.
- 3-5. Three other classes (one of which could be Spanish 202).

Year II

- 6-8. Spanish 210, 202 (if not taken in Year I) and either 230 or 204.
9. A class in the minor subject.
10. One other class.

Years III and IV

Details of the Honours programme in Years III and IV are to be arranged by consultation with the Department.

Students in the Honours programme with Spanish as major subject are normally required before graduation to:

- (a) write an Honours essay under the supervision of a member of the Department; and
- (b) spend at least one summer in a Spanish-speaking community to consolidate their knowledge of the language.

Bachelor of Arts with Combined Honours in Spanish and Another Subject

Programmes may be arranged by consultation (as early as possible) with the departments concerned. Students planning a combined Honours course should consider, however, that the number of classes taken in either subject might be insufficient for admission to many graduate programmes without at least an extra year's work.

Notes:

(1) The "other" classes chosen as electives in the programmes outlined above must satisfy General degree requirements (see section 46.11).

(2) Combinations of classes other than those set forth above should not be chosen to fulfill degree requirements without the express approval of the Department.

(3) A student may, with the permission of the Department,

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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.

(4) A student admitted to a Spanish course at an advanced level, who obtains credit for a Spanish class at that level, may not later take a Spanish class at a lower level for credit except with the express permission of the Department.

(5) Enquiries concerning prescribed texts should be directed to the Secretary of the Department.

Spanish Classes Offered

102 Spoken and Written Spanish (Part I), Lecture 3 hours; language laboratory 5 hours per week

For beginners or students with only a slight knowledge of Spanish.

Spanish 102 is normally followed in the second year by Spanish 202, which completes it. Students willing and able to cover the material more quickly through concentrated effort are invited to apply (to a Spanish instructor at registration or in the first class) to take Spanish 102 and 202 in the same year. See note following description of Spanish 202 below.

Comparative Literature 100 (see *Comparative Literature* 47.7).

202 Spoken and Written Spanish (Part II), Lecture 3 hours; language laboratory 3-4 hours per week

This class continues and completes the work begun in Spanish 102.
Prerequisite: Spanish 102.

Note: Able first-year students are invited to apply (to any Spanish instructor at registration or in the first Spanish 102 class) to take Spanish 102 and 202 in the same year. Students who take these two classes in the same year will attend classes 5 hours a week and work 9 hours a week in the language laboratory. Upon successful completion of this work, two credits are granted.

210 Hispanic Civilization, Lecture 3 hours

Survey of the main aspects of Spanish and Latin-American culture (e.g., living habits, politics, art, etc., in the various parts of the Spanish-speaking world). The class will be conducted mainly in Spanish, but readings will be both in Spanish and English.
Prerequisite: Spanish 102.

230 Survey of Spanish Literature, Lecture 3 hours

Introduction to the main works and trends in Spanish literature from the 10th century to the present day; aims at developing a critical point of view.
Prerequisite: Spanish 202 (which may be taken at the same time).

240 Survey of Latin-American Literature, Lecture 3 hours

History of the development of Latin-American literature from pre-Columbian times to the present. Study of illustrative works.
Prerequisite: Spanish 202 (which may be taken at the same time).

304-Composition, Lecture 3 hours

Training towards accuracy in reading and writing Spanish. Exercises in translation from Spanish to English and from English to Spanish; grammar, vocabulary building, free composition.
Prerequisite: Spanish 202.

334 Literature of the 19th Century in Spain, (Not offered in 1971-72)

Prerequisite: Spanish 202.

336 Literature of the 20th Century in Spain, Lecture 3 hours

Prerequisite: Spanish 202 (Spanish 304, which may be taken at the same time, is also strongly recommended.)

340 The Latin-American Short Story, Lecture 3 hours

Prerequisite: Spanish 202 (Spanish 304, which may be taken at the same time, is also strongly recommended.)

420 History of the Spanish Language, Lecture 3 hours

Study of the development of the Spanish language from its origins to the present day.

421 General Phonetics, (See under French classes offered.)

422 General Linguistics, (See under French classes offered.)

432 The Golden Age, (Not offered in 1971-72).

440 The Latin-American Novel in the 19th and 20th Century, Lecture 3 hours

445 Cervantes, Lecture 2 hours

Discussions on the literary theories of Cervantes and study of certain of his works with a view to discovering the key to his originality as a novelist.

47.25 / Russian

Associate Professor
Irene Coffin, Chairman

Assistant Professor
Natan Nevo

The Russian language has the same origins as English, French and German, and it is, in general, neither easier nor more difficult for the foreigner to learn than the other languages which are commonly taught in university. Students who take the introductory class at Dalhousie become sufficiently conversant with the language to be able to make themselves understood in countries where Russian is the first or second language and, with occasional assistance from a dictionary, they can read most of the editorials in Pravda and appreciate some of the satire in Krokodil. By taking the more advanced classes, one can become fluent in the language, and thus have direct access to Russian literary, political and scientific thought. The advantage of being able to find out for oneself what the representatives of some 200 million people say, rather than having to rely on the wire services and other secondary sources, does not need to be laboured in a university calendar.

Degree Programmes

Combined Honours

Russian may be taken in a modern languages combined programme with French, German or Spanish as the first language.

The language laboratory is open more than 50 hours a week (including some evenings) and students have a wide selection of times at which their oral assignments can be completed. Additional conversation classes are offered for students who wish to speak Russian fluently.

One of the features of the second and third year class is the participation in a Russian play. This is not compulsory, and

most students find it not only helpful, but entertaining as well.

Classes Offered

100 Elementary Russian, Lecture 3 hours. Irene Coffin/Natan Nevo

This class is designed for students who have no previous knowledge of the Russian language. Since Russian is an inflected language, the study of grammar is introduced along with oral work so that the student begins to speak right away. Reading Russian does not create any difficulty since the alphabet is phonetic.

The class is a credit class, and, since Russian is not taught in Nova Scotia high schools, it is often taken by students who have not acquired a sufficient knowledge of other modern languages taught at the University.

200 Second Year Russian, Lecture 3 hours, Natan Nevo

This is a continuation of Russian 100. The study of Russian grammar is completed and emphasis is placed on oral work. Additional conversation classes are given by the instructors for students who wish to acquire competence in speaking Russian.

201 Scientific Russian, Lecture 3 hours, Natan Nevo

This class is designed for science students. The study of Russian grammar is continued but emphasis is now placed on the reading of scientific texts. At the completion of the class a science student should be able to translate scientific texts with the aid of a dictionary.
Prerequisite: Russian 100.

300 Area Studies, Seminar, Irene Coffin

This class is a study of the geography and history of Russia from its beginning to the present time. The class is conducted as a seminar and the students are encouraged to express their thoughts in Russian.
Prerequisite: Russian 200 or 210.

301 Conversational and Literary Russian, Lecture 3 hours, Irene Coffin

This class is designed to develop the student's speaking ability about commonplace subjects and situations. The students are required to read articles in Russian papers and magazines which enlarges their vocabulary. Later in the course, they are exposed to some Russian literature.
Prerequisite: Russian 200 or 201, or by arrangement with the instructor.

302 and 303 Russian Literature (offered in alternate years), Lecture 2 hours, Natan Nevo

This is a general class in Russian prose, poetry and literary criticism, whose purpose is to help the student who has mastered the fundamental structure of the Russian language to deepen his knowledge of it and its literature and to strengthen his audiolingual skills.

The class will acquaint the student with biographical sketches and selected works of well known Russian authors of the 19th and 20th centuries. Discussions will be held in both Russian and English languages. Essays will be given during the year. Each student will be required to prepare a paper on a literary topic.
Prerequisite: Russian 200 or 201 or any equivalent achieved in any other university and recognized by Dalhousie University.

47.26 / Sociology and Anthropology

Professor
J. J. Mangalam
W. N. Stephens

Associate Professors
D. H. Clairmont (Chairman)
H. Gamberg (on leave 1971-1972)
J. Hamer
J. G. Morgan

Assistant Professors
J. Barkow
G. D. Bouma
D. Q. Brodie
P. G. Clark
D. H. Elliott
J. L. Elliott
D. J. Grady
N. W. Poushinsky
R. Schliewan
J. D. Stolzman

The sociologist is concerned in general with the growth and development of societies to modern, complex industrial ones. Within any particular society, sociology may analyze the distribution of wealth power and prestige, problems of conformity and non-conformity, and social problems such as crime, delinquency, divorce, and drug addiction, world population problems, or the development of personality.

As part of a liberal arts education, sociology teaches the student to think critically about problems which are part of his own society. His willingness to think about the reasons for racial prejudice, poverty, or war, will be increased by his exposure to this field. The career possibilities in sociology include research in government, industry, or university and teaching at the university level. An undergraduate major degree in sociology also prepares students for later professional training in social work.

Sociology/Anthropology 100, as a general introduction, is a prerequisite for all advanced classes. It includes lectures plus discussion in small tutorials. 200-level classes include all the classes normally taken by majors in sociology. 300-level classes are designed primarily as seminar classes and can be entered only with the permission of the instructor. 400-level classes are restricted to honours students and qualifying graduate students.

Degree Programmes

Sociology is offered as a field for major or minor concentration. For a B.A. with a major in sociology, a student must take Sociology/Anthropology 100 plus four or more courses in sociology at the 200-level.

At present the department offers only a minor concentration in anthropology. It is possible that a major in anthropology may be developed for 1971-72. Students majoring in sociology may minor in anthropology.

B.A. with Honours in Sociology:

Nine classes in sociology above the introductory level. Sociology 301, 405, and 450 are compulsory while the others are at the discretion of the student.

Combined Honours:

Students wishing to take sociology as the major or minor field in a combined honours programme should consult the department. Combined honours can be taken with economics, political science, philosophy, and psychology.

Sociology Classes Offered

100 Sociology/Anthropology Lecture 2 hours, tutorial 1 hour.

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This survey of the fields of sociology and social anthropology introduces the student to a wide variety of problems in these disciplines and provides a foundation for more specialized work in later years. In particular, the student will learn about the common and unique features of Canadian society, the nature of industrial and primitive societies, the place of religion in modern industrial society, and the causes of social problems such as crime, delinquency, divorce and drug addiction.

202 Comparative Analysis of Social Systems Lecture 3 hours.

This class looks at the ways by which similarities and differences between societies are investigated. Major emphasis is placed on a comparison of modern industrial societies with primitive, non-industrial ones. Sub-systems or parts of societies are also analyzed. These include factors such as family, economy, government, and social class systems.

203B Social Deviance and Social Control Lecture 2 hours, discussion 1 hour.

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. The purpose of the class is to examine 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.

204 Social Stratification Lecture 2 hours; tutorial 1 hour. J. Stolzman.

This class analyzes the principal aspects of social inequality in modern, industrial society. The formation of classes, status groups and the 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 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.

205 Sociology of Religion Lecture 2 hours; tutorial 1 hour. G. D. Bouma.

This course analyzes 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, social psychological considerations of religious behaviour. The primary focus is on religion in western society. A major paper is required.

206B Social Change and Modernization Lecture 2 hours; tutorial 1 hour.

This class is primarily concerned with social and economic problems of underdevelopment in the Third World, with emphasis on the political and economic relations between industrially advanced and backward countries, and the forms which these relations have taken since political independence. An attempt is made to identify the economic and social causes of underdevelopment in this relationship. Critical attention is also paid to the traditional nature of pre-industrial societies and values as obstacles to industrialization and social change.

207A Socialization Lecture 3 hours.

This class is concerned with the processes by which the

individual is trained to become a member of society. Biological, psychological, sociological, and anthropological studies of child-rearing practices will be examined with respect to their implication for an understanding of early socialization. Primary emphasis will be placed upon problems of adult socialization and the processes associated with learning and performing within group contexts such as the family, the classroom, the factory, the prison and the hospital. Although the main illustrations will be taken from contemporary western society, comparisons between cultures will be made.

208A Population and Society Lecture 3 hours.

This class presents a general analysis of the interrelationships of population and social structure. It examines changes in size, structure, and distribution of world population in terms of the three major components of demographic change: fertility, mortality, and migration, with great emphasis on their social, economic, and political causes and consequences. In particular, special attention is given to the population problem as analyzed by Malthus and Marx, and as it exists in different parts of the world today. Relevant facts on population in developed as well as developing nations are discussed.

209A Sociology of Science and Ideas Lecture 3 hours. D. H. Elliott.

The study of the social origins and organization of knowledge is an important aspect of contemporary sociology. This class is concerned with the examination of the body of knowledge known as modern science. The historical origins of science will be discussed. The social organization of contemporary scientific research will be examined using data drawn from major studies. The interaction between the scientific community and society-at-large will be analyzed. The relationship between modern technology and contemporary scientific research will be studied with particular reference to the impact of computers upon the development of modern social science.

211 Canadian Society Lecture 3 hours. D. Clairmont.

The social significance of such population processes as immigration and migration will be considered in an attempt to develop a general perspective on the Canadian society. Social systems within Canada will be analyzed with respect to the social determinants of class, status and power.

212B Minority Groups Lecture 3 hours. J. L. Elliott.

The social status of minority groups will be examined in the light of contemporary theories of prejudice and discrimination. The societal consequences of discrimination will be considered with respect to their effect on both minority and majority groups. Special emphasis will be placed upon an analysis of Canadian minorities.

213B Organization Theory and Bureaucracy Lecture 2 hours; tutorial 1 hour. R. Schlievan.

This class makes a critical study, from the comparative point of view, of theoretical models for the analysis of complex organizations. Organizations studied in this way include hospitals, schools, universities, business and manufacturing firms, military establishments, prisons and religious institutions.

Sociology 215 Mass Society Perspectives and Problems. Lecture 3 hours. D. H. Elliott.

This course deals with the origin of modern, industrial "mass society." In addition such problems as cybernation, technological militarism, human rights, and environmental degeneration are examined in detail. Various attempts at solution to these problems are analyzed. The rise of the "expert" and of counter-cultural movements are given particular attention. The grade for the course will be based upon one extensive paper and a final examination.

216A Sociology of Occupations. Lecture 2 hours; tutorial 1 hour. G. D. Bouma.

This course analyzes several social processes basic to occupational careers, professionalization and formal organization of occupations. These processes are treated in the context of their implications for the relations between occupations and both social structure and human behaviour. A term paper is required.

220 Sociology of the Family. Lecture 3 hours.

This class will review research findings and clinical and theoretical writings which bear on mate choice, marital adjustment, and role relationships within the family. The historical and in cross-cultural perspective.

230 Statistics Lecture 3 hours. N. W. Poushinsky.

This class is designed to give the student some experience at an elementary level with those branches of statistics which are most frequently used in the social sciences. In particular the student will learn when and how to use non-parametric tests. He will also be given a general introduction to factor analysis.

230A Experimental Analysis of Social Behaviour Lecture 3 hours. D. Q. Brodie.

This class provides an introduction to the study of the behaviour of small groups. Work in this branch of sociology is usually done under controlled laboratory conditions. Students in this class will become familiar with the literature which describes past work of this kind and will also be involved in experimental projects of their own.

230 Research Methods Lecture 3 hours. D. Q. Brodie and D. Clairmont.

This course is concerned with the construction and testing of "grounded theory." A detailed survey of the basic methods employed at various stages of social research is presented. The topics discussed in the class include the construction of theory, the formulation of a research problem, 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 provided through a class project.

231A Sociology of Leisure Lecture 3 hours. D. H. Elliott.

Sociology has been interested in work since the early origins of the discipline. Much less attention has been given to leisure. Currently, there is an increased emphasis upon the analysis of leisure among sociologists. This course deals with the historical and cultural origins of leisure time as a major social phenomenon, with factors affecting variation in amount and use of leisure time among individuals in Western societies, and with social consequences of trends toward more increased leisure. The course is planned as a seminar; readings are primarily based on journal articles.

231B Social Conflict Theories Seminar 3 hours.

Beginning with the conceptual sources of conflict theory in Indian, Chinese, Greek and Arabian philosophical literature, this class will concentrate upon the development of nineteenth-century conflict theories of Hegel, Marx, Darwin and the subsequent social Darwinists), Bagehot, Glum-Powitz, Ratzel, Sumner, Small and Oppenheimer. The current contributions of Vold and Coser will be assessed. Section size will be limited to fifteen.

231B Sociology of Health and Illness Lecture 3 hours. J. L. Elliott.

Beliefs and attitudes surrounding disease concepts and treatment will be examined in primitive and contemporary societies. In addition, the social organization of medicine

will be analyzed with respect to the following: the health professions, the hospital as a complex organization, and the larger society.

405 Sociological Theory Seminar 3 hours. J. G. Morgan and J. Stolzman.

This class is designed to introduce the student to some of the main concerns of major contributors to theoretical sociology. Writers considered will include Marx, Weber, Durkheim, Simmel, Pareto, Mannheim, Parsons, Levy, Merton, and Homans. The first half of the class will include a review of ideas from Karl Marx up to the death of Max Weber in 1920; the second half a consideration of modern sociological theory. In both parts of the class common themes will be investigated: for example, the problems of social order and integration, conception of sociology as a science, the nature of social conflict, the role of ideas and values in social existence, the theoretical problem of social change, the nature of power and authority.

450 Honours Seminar in Sociology Seminar 3 hours. N. W. Poushinsky, and R. Schlievan.

The object of this course will be to provide some understanding of the role of modern formal concepts in the formulation of substantive theories. This will involve discussion of existing mathematical models in such areas as social structure and social stratification. In addition, students will construct and test an original mathematical model of a preliminary nature.

451A Readings in Sociology

451B Readings in Sociology

452B Readings in Sociology Staff.

The student is assigned to a member of staff for regular meetings to discuss readings in a selected area. Papers and research projects will be expected.

Anthropology Classes Offered

There is little difference in theory between sociology and social anthropology. In the everyday work of the two disciplines, it has been customary for social anthropology to study the social life of the primitive peoples, whereas sociology investigates contemporary industrial societies. Therefore, many of the classes listed in sociology will introduce the student to problems in social anthropology. The Introduction to General Anthropology introduces the student to the more specialized aspects of anthropology such as archeology, linguistics, and physical anthropology.

100 Sociology/Anthropology
(Same as Sociology 100)

210 Introduction to General Anthropology Lecture 3 hours. J. Hamer.

This class gives a general survey of anthropology as a natural and a social science. The introductory class will provide the student with an understanding of the complex nature of human behaviour, including the analysis of man's physical structure, social organization, and art forms. This class also introduces the student to the non-social aspects of anthropology: archeology, linguistics, and physical anthropology.

302 Kinship Systems Lecture 3 hours.

While the rules of kinship and the structure of the family are taken for granted in our own society, they are in fact very complicated subjects when one looks at primitive societies. Most tribal societies have extended family systems which take up most of the life activities of the people in them. This class outlines the ways in which anthropologists have studied and classified these kinship groups. The

relationship of the modern family to industrial society is also investigated.

305 Culture and Personality J. Hamer. Lecture 3 hours.

A consideration of the way in which the individual acquires and modifies culture. Specifically, the course is concerned with cross-cultural studies in child rearing, theories of motivation and cognition, national character studies, social psychiatry, and methodology.

306 The Social Organization of Pre-Literate Societies Lecture 3 hours.

This class gives a systematic and detailed description and analysis of the social organization of non-industrial societies where men earn their living by gathering, hunting, herding, or agricultural activities, and whose economy differs from that found in industrial systems.

Graduate Studies

An MA programme in sociology is offered. For details see the Calendar of the Faculty of Graduate Studies.

47.27 / Theatre

Associate Professors

A. R. Andrews (Chairman)
L. H. Lawrence
R. G. Merritt

Assistant Professors

D. Farnsworth
D. R. Overton
W. A. Reznicek
O. W. Schaub

Theatre is a living art. As such it is constantly changing and the theatre programme aims at remaining flexible and responsive to those changes. Students who intend to study theatre should be prepared to look at the future as well as the past. For though the department is not directly engaged in training personnel for the existing commercial theatre, it does expect its students to take an active interest in the relationship of theatre to life.

The history of theatre forms a part of the curriculum in order that the student may gain a firm understanding and clear vision of the various established conventions and possibilities. Plays are studied as performed events since it is only in performance that a play is fully realized. In all classes, practical exploration of problems is regarded as fundamental to their solution.

The new arts centre at Dalhousie provides appropriate teaching areas and laboratory facilities for students in the theatre programme. The spaces in the theatre wing of the building have been designed with the specific intention of meeting these needs, and include a master classroom, two studio classrooms, design and seminar rooms, and ancillary workrooms. The offices of the department, are also located in the arts centre, which is on the north side of University Avenue, between Henry Street and Seymour Street.

No class offered by the department of theatre will be permitted to exceed twenty in number because of the nature of the work involved. Any student who wishes to take a class in theatre must therefore first consult with the department.

In conjunction with the programme, experiments, public exercises and formal productions are presented throughout the year.

Degree Programme

B.A. with Honours in Theatre

The classes in theatre beyond the introductory level are designed as a coherent programme of study leading to an

Honours B.A. in Theatre. The full course should comprise the following classes:

Year I:

1. Theatre 100.
2. A class from Group A.
3. A class from Group C.
4. A class in a fourth subject from any group.
5. A class in a fifth subject from any group.

Year II:

6. Theatre 250: The Classic Theatres and their Origins.
7. Theatre 270: Design in the Theatre.
8. A class in art history.
9. A class in the student's minor subject.
10. An elective class.

Year III:

11. Theatre 350: The Theatre from the Renaissance to the Nineteenth Century.
12. Theatre 360 (formerly 480): The Playwright in the Theatre.
13. Theatre 380: The Actor in the Theatre.
14. A second class in the student's minor subject.
15. An elective class.

Year IV:

16. Theatre 450: The Modern Theatre.
17. Theatre 470: Special Topics.
18. Theatre 460 (formerly 370): Theories of Play Production.
19. Theatre 490: Dramatic Criticism and the Aesthetics of the Theatre.
20. An elective class.

Combined Honours

Combined honours programmes of study in which theatre is related to some other discipline studied at Dalhousie also exist. Interested students should apply to the department for further information.

Classes Offered

100 Introduction to Theatre Class meets 6 hours

There are many ways of approaching the art of the theatre and different sections of this class can be expected to take different paths, following the particular interests and curiosities of the members of the group. Common to all sections, however, will be the assumption that the theatre is everywhere and always a living art. In the theatre, human beings communicate with one another by sights and sounds; plays exist to be seen and heard. The practical work which goes on in all theatre classes emphasizes this fact. The student can expect that some of the traditional concepts of the theatre will be critically examined, for example; the notion of the theatre as a collaborative venture to which various specialists, playwright, actor, director and designer, contribute their skills. The study of various possible relationships between a play and an audience falls within the scope of the class, as does the re-examination in theatrical terms of plays which have become literary heirlooms. The chief aim of the class is to enable students to discover the theatre, to exercise their curiosity in a creative environment and to decide whether they wish to take more advanced classes in the subject.

There is no prescribed textbook and no formal prerequisite for the class. Individual instructors will recommend outside readings where appropriate.

250 The Classic Theatres and their Origins Class meets 4 hours

This class begins by examining the possible origins of the theatre in prehistoric times. It then considers what we know of the scripts, theatre buildings, acting and general staging conventions of Greek, Roman and Eastern theatres. In addition to this exploration of original performance conditions, which will include practical work, students will

be asked to consider the philosophical and social implications of these theatres and their relevance to contemporary societies. Particular areas of emphasis will be determined by the students and instructor.
Prerequisite: Theatre 100.

270 Design in the Theatre Class meets 6 hours

This class is specifically concerned with visual aspects of the theatre. Its terms of reference include any visual stimulus in the environment that may affect the theatrical event. Everything in the theatre that is seen, from its basic architecture to the organization of bodies in space at a particular moment, has been subject to a process of design. Areas of particular study, to be determined by the students and instructor, may be drawn from scenic, lighting, costume, and architectural design. Students will be expected to devote time to the practical exploration of questions and problems as well as the theoretical discussion of them. Thus they will be given an opportunity to develop their visual awareness of theatres and what happens in them.

Prerequisite: Theatre 100.

350 The Theatre from the Renaissance to the Nineteenth Century Class meets 4 hours

This class examines the theatre forms which evolved during the processes of secularization and mechanization which dominated the Western world from the early Renaissance to the nineteenth century, with its primary focus on the theatre in Europe. The development of the theatre in North America and Asia may also be included. Areas of particular study may focus upon the actor, playwright, audience or upon the physical structure of the theatre. The practical exploration of the theatre of this period will be directed towards realizing the possibilities of different theatrical conventions.

360 The Playwright in the Theatre (formerly 480) Class meets 6 hours

This class is concerned with the creation of theatrical events, usually, but not necessarily, on the basis of a formal written script. It does not deal with the printed or spoken word exclusively but rather with the total language of the theatre, as incorporated into a script. It may further involve study of the playwright's sources for a theatrical event, a structural analysis of existing scripts and practical explorations of the ways in which a script can be prepared.

380 The Actor in the Theatre Class meets 6 hours

This class examines the nature of acting. Students will be given an opportunity to explore the function of the actor in the theatre, his relationship to other theatre artists, and his several possible relationships to the audience. The scope of the class includes such topics as the externalization of character, the concept of impersonation, analysis of a particular role, improvisational techniques, particular theories of acting, and the study of specific forms or styles of acting, both historical and contemporary. Areas of

special emphasis will be determined by the students and instructor.

450 The Modern Theatre Class meets 4 hours

The modern theatre has been characterized by successive bursts of creative energy and experiment. This class gives students an opportunity to study these developments in detail and to examine several important theatrical theories. Their implementation in particular plays and in theatrical practice will also be examined.

460 Theories of Play Production (formerly 370) Class meets 6 hours

The procedures that lead to theatrical events are analysed in detail in this class. Depending on the interests of the students in the group, specific theories are explored so that their practicality may be tested in experimental conditions. Principles implicit in theories of the past are examined and their relevance to the theatre of today is evaluated. Students are encouraged to forward and test new theories for the theatre of tomorrow. Those taking this class are expected to have a firm understanding of the theatre as it exists in performance.

470 Special Topics

This class allows the student to explore in detail particular areas of the theatre which are of special interest, with the guidance of members of the faculty. Frequency and length of meetings will be decided to meet the needs of the particular topic or project under study.

490 Dramatic Theory and the Aesthetics of the Theatre Class meets 3 hours

All the arts face a profound problem in the attempt to establish criteria which will enable creative activity to be evaluated. This class sets out to tackle that problem as far as the theatre is concerned. 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. Practical work will form a part of the work of the group when it becomes necessary to test theories in practice.

Drama in Education

The department of theatre is also responsible for Education 411 and partly for Education 414, classes offered in the B.Ed. programme to help future teachers understand how drama can encourage the imaginative development of children in elementary and secondary schools. These classes are not available to undergraduate students.

Graduate Studies

Graduate studies in theatre are not at present available at Dalhousie. Members of the department will be glad to help students with advice about opportunities for graduate study at other universities.