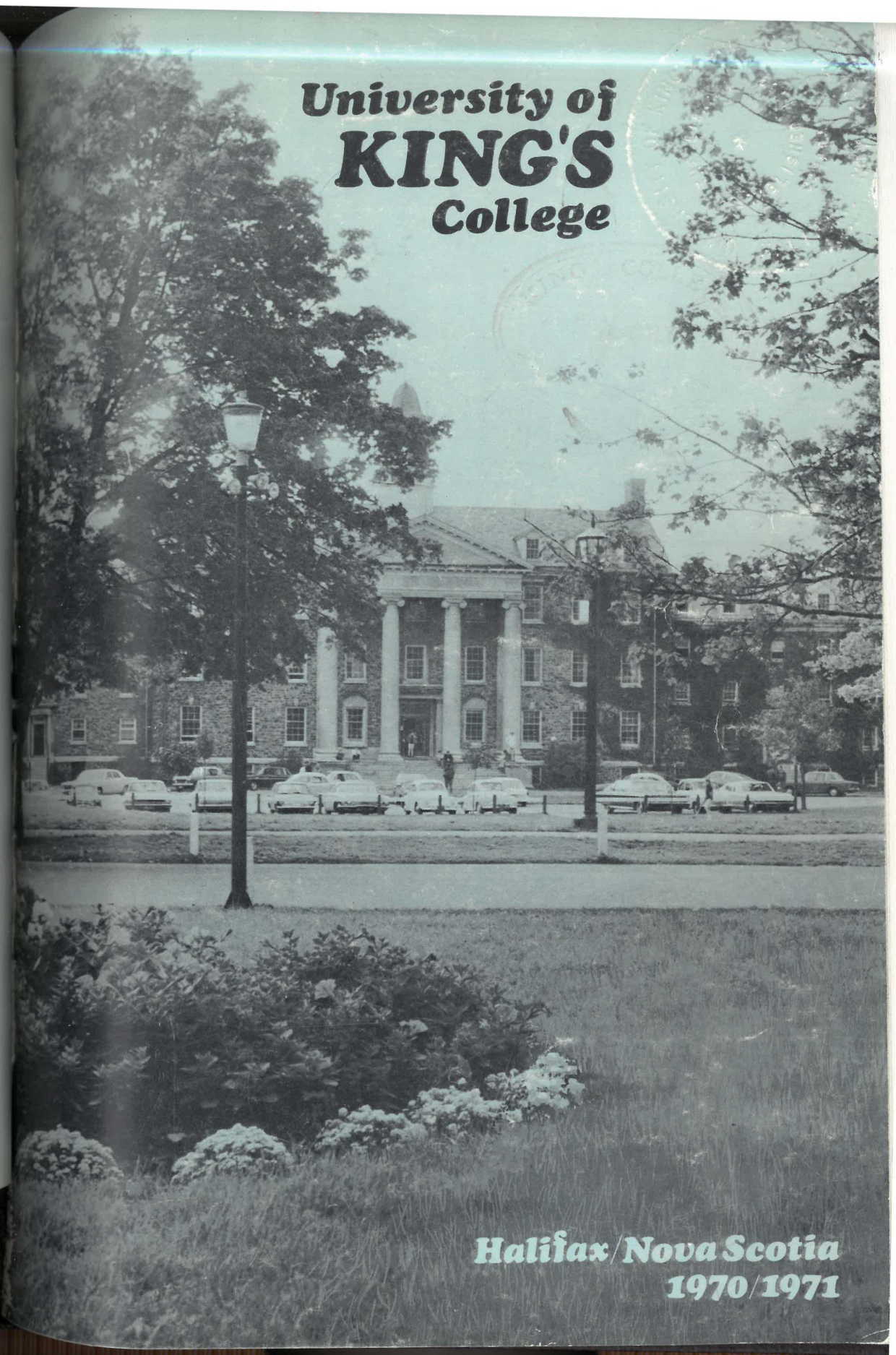
ENTRANCE SCHOLARSHIPS AWARDED

May, 1968

Dr. W. Bruce Almon Scholarship	David Charles Blagrave
Susanna Almon Scholarship	Robert MacDonald Hoegg
Alumni Living Endowment Scholarship	John Christie Stafford
	Catherine Ann Veinotte
King's Foundation Scholarship	Keith Allan Hamlin
	Ian Douglas Johnson
	Georgia Louise Proctor
	George Graham Sheppard
	Alice Irene Taylor
Halifax-Dartmouth Entrance Scholarship	Jane Elinor Bailey
	Elizabeth Gail Brooks
	Barbara Lynn Leslie
	Rebecca Ann Strople
Alumni Scholarship	Audrey Florence Oldershaw
	Janine Rosalind Wheatley
Winfield Memorial Scholarship	Linda Janet Grandy
Walter Lawson Muir Bursary	Lynn Marion Joudrey
Keating Trust Scholarship	Brenda Lou Cole



CALENDAR
1970-1971

University of King's College

FOUNDED A.D. 1789

HALIFAX, NOVA SCOTIA

182nd SESSION

'70

January

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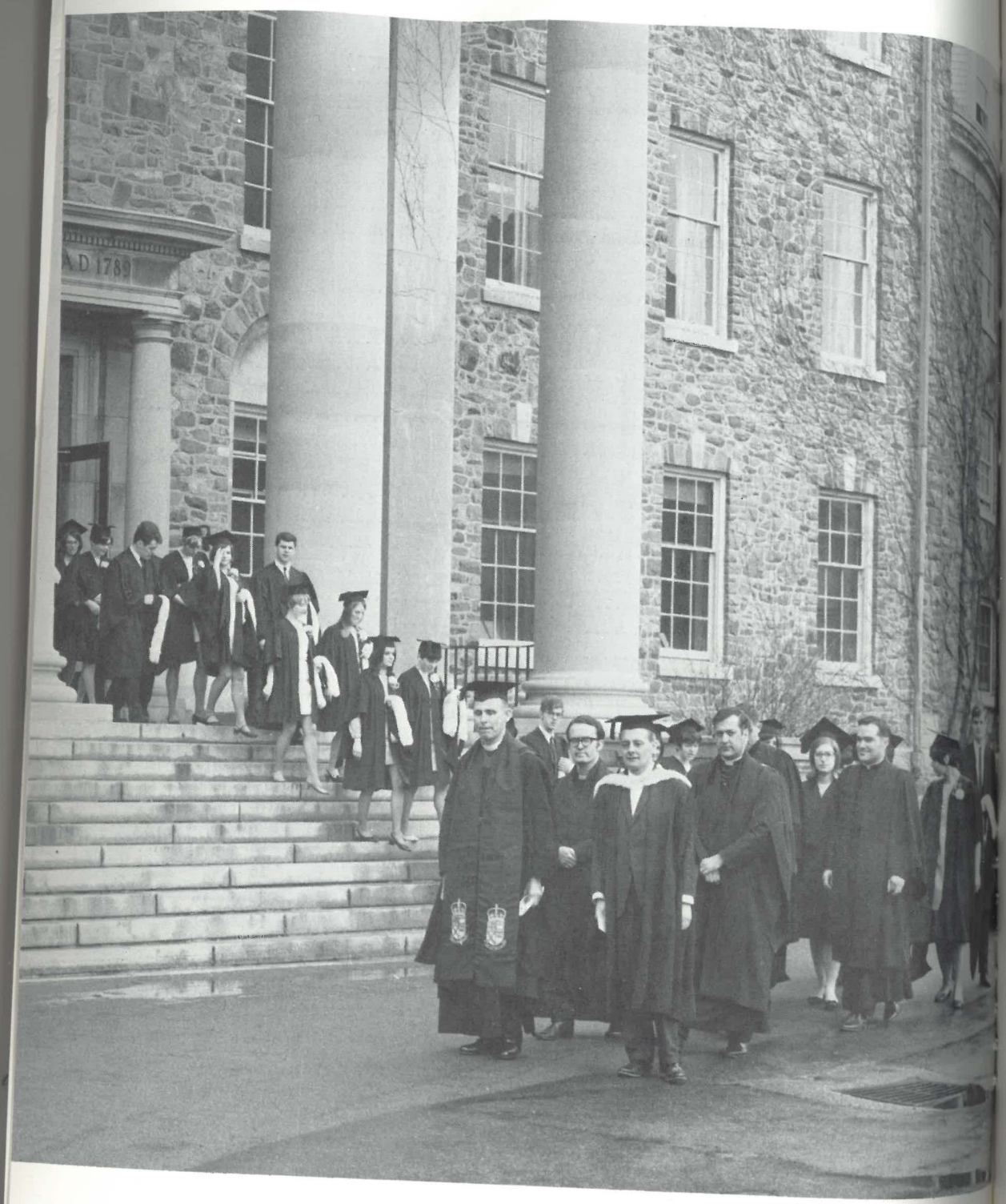

First Year Students

1. Complete application for enrolment form.

2. Application for enrolment 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 (p. 6) come to the University (King's Arts and Science students will go *first* to the Registrar's office at 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 registration for the 1970-71 term must be completed at the Registrar's Office before 15 May, 1970, and the required fee paid. Students who are required to withdraw during the summer must do so before 30 August, 1970 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 (p. 6), come to the University (King's Arts and Science students will go *first* to the Registrar's office at 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 enrolment.

The Haliburton Room

General University Almanac 1970-71

June, 1970

Sunday, 14
The Atlantic Summer School for Advanced Business Administration begins.

July, 1970

Saturday, 4
Last day for receiving applications for supplemental examinations in Arts and Science to be written at outside centres. Fee must accompany application. No late applications will be considered.

Wednesday, 8
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 9 and 31. No applications will be considered after July 31, and no refund of fee will be paid after this date.

Friday, 17
The Atlantic Summer School for Advanced Business Administration ends.

August, 1970

Monday, 10
Supplemental examinations begin in Arts and Science.

Friday, 14
Last day for receiving applications for admission to Faculty of Arts and Science.

Friday, 28
Last day for receiving applications for admission to the School of Divinity.

September, 1970

Tuesday, 8
Supplemental examinations begin in Divinity.

Wednesday, 9
Registration, and payment of fees, for NEW students (FULL TIME) in the School of Divinity.

Thursday, 10
Registration, and payment of fees, for RETURNING students (FULL TIME) in the School of Divinity.

Friday, 11
Registration ends for students in the School of Divinity (FULL TIME).

Monday, 14
Registration, and payment of fees, 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.

Monday, 14
Meetings of Divinity School Faculty and students.

September, 1970

Tuesday, 15
Registration, and payment of fees, continues 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.

Tuesday, 15
Classes begin in Divinity (9:00 a.m.).

Wednesday, 16
Registration, and payment of fees, for RETURNING 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.

Thursday, 17
Registration continues for RETURNING 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.

Saturday, 19
9:00 a.m.-12:00 noon. Registration for 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, 20
University Service with Academic Procession at All Saints' Cathedral. Assemble at Diocesan Centre (College Street) 10:30 a.m.

Monday, 21
8:30 a.m. Classes begin in Arts and Science.

Monday, 21
Last day for change of course or class in the School of Divinity without penalty.

Monday, 28
First day for change of course or class in Arts and Science.

October, 1970

Monday, 12
Thanksgiving Day. No classes.

Tuesday, 13
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, 1970

Wednesday, 11
Remembrance Day. No classes.

December, 1970

Tuesday, 8
Last day of classes in Divinity.

Thursday, 10
Last day of classes in Arts and Science.

Friday, 11
Examinations begin in Arts and Science, and Divinity.

Saturday, 19
12:30 p.m. Christmas vacation begins.

January, 1971

Monday, 4
Classes resume in Arts, Science and Divinity.

Friday, 29
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, 1971

Friday, 5
Munro Day. No classes.

Saturday, 6
Dalhousie Winter Carnival. No classes.

March, 1971

Monday, 1
Study break.

Monday, 8
Classes resume.

April, 1971

Thursday, 8
Last day of classes in Divinity. Last day of lectures for students in Arts and Science.

Friday, 9
Good Friday. No classes.

Wednesday, 14
Examinations begin for Arts and Science.

Monday, 19
Examinations begin for School of Divinity.

May, 1971

Sunday, 9
11:00 a.m. Baccalaureate Service (King's).

Wednesday, 12
Encaenia Day – King's Convocation – Arts and Science and Divinity.

Thursday, 13
Dalhousie University Convocation.

Friday, 14
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.

Officers of the University: 1970-71

Patron

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

Visitor

The Right Reverend the Lord Bishop of Nova Scotia.

Acting President and Vice-Chancellor

F. Hilton Page, M.A., (Tor.), D.D., (Pine Hill), 1135 Rockcliffe Street, Halifax, N.S.

Board of Governors

The Rt. Rev. W. W. Davis, B.A., B.D., D.D., (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.
F. Hilton Page, M.A., D.D., (Acting President), 1135 Rockcliffe Street, Halifax, N.S.
T. R. Francis, Esq., (Treasurer), Office of Senior Vice-President, Bank of Montreal, P. O. Box 100, Halifax, N.S.

Diocese of Fredericton

The Very Rev. H. L. Nutter, M.A., B.S.Litt., D.D., 808 Brunswick St., Fredericton, N.B. (1971).
The Ven. A. E. L. Caulfeild, B.A., L.S.T., Trinity Church, 115 Charlotte St., Saint John, N.B. (1971).
H. V. Frear, Esq., 116 Princess St., Saint John, N.B. (1971).
B. Campion, Esq., 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).

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. (1971).
The Rev. Canon H. B. Wainwright, B.A., L.Th., 3077 George Dauphinee Avenue, Halifax, N.S. (1970).
E. W. Balcom, D.C.L., Wolfville, N.S. (1970).
The Rev. W. R. Martell, B.A., L.Th., St. John's Rectory, Truro, N.S. (1970).
The Rev. Canon C. W. F. Stone, B.A., L.Th., B.D., 1423 Henry St., Halifax, N.S. (1971).
The Rev. H. A. Seegmiller, B.A., B.D., D.D., 3433 Dutch Village Road, Halifax, N.S. (1971).

Alumni Association

The Rev. W. R. Harris, B.A., L.Th., 6155 Chebucto Rd., Halifax, N.S. (1971).
John W. Alward, Esq., 1661 Cambridge St., Halifax, N.S. (1971).
The Rev. Canon L. F. Hatfield, M.A., D.D., 54 Wentworth St., Dartmouth, N.S. (1971).
Ralph V. A. Swetnam, Esq., 6897 Tupper Grove, Halifax, N.S. (1971).
Helen M. Creighton, D.C.L., 26 Newcastle St., Dartmouth, N.S. (1970).
Marion B. Dauphinee, M.A., D.C.L., Halifax Ladies College, 1400 Oxford Street, Halifax, N.S. (1970).
Roland C. Frazee, Esq., Vice-President, The Royal Bank of Canada, 20 King St. West, Toronto, Ont. (1970).
The Rev. W. E. Ingraham, Yarmouth, N.S. (1970).

Faculty Representatives

The Rev. Dr. J. B. Hibbitts M.A. (Dal.), B.S.Litt. (Vind.), S.T.M. (Gen. Theol. Sem., N.Y.), D. Phil. (Oxon.), 1625 Preston St., Halifax, N.S.
Professor H. S. Granter, B.A. (Dal.), A.M. (Harvard), 1171 Cartaret St., Halifax, N.S.
Professor H. MacGregor Dawson, M.A. (Tor.), B.Litt. (Oxon.), 1590 Walnut St., Halifax, N.S.
Professor A. G. Cannon, M.A., A.K.C., F.R.S.A.

Student Union Representative

Mr. David Harding, King's College Halifax, N.S.

Co-opted Members

G. R. K. Lynch, B.A., LL.B., Room 210, 5600 Sackville St., Halifax, N.S. (1970).
J. A. Chappell, Esq., 1966 Woodlawn Terrace, Halifax, N.S. (1972).
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).
C. J. Morrow, D.C.L., Lunenburg, N.S. (1973).
F. S. Taylor, B.A., LL.B., Box 218, Saint John, N.B. (1970).

Executive Committee

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The Archbishop of Fredericton
The President
The Treasurer
The Very Rev. H. L. Nutter

The Rev. Dr. J. B. Hibbitts
Professor H. S. Granter
The Ven. A. E. L. Caulfeild
E. W. Balcom
G. R. K. Lynch
R. G. Smith
D. B. Harding
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

Professor A. G. Cannon
The Very Rev. E. B. N. Cochran

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 of the Board of Governors

Miss E. D. Horlock, M.A., 1403 Robie St., Halifax, N.S.

Officers of Administration

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F. Hilton Page, M.A. (Tor.), D.D. (Pine Hill).
Administrative Assistant and Dean of Residence
The Rev. Canon J. H. Graven, M.A., (Dal.), L.Th. (Vind.)
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.),
Acting Registrar and Dean of Women
Mrs. G. S. Clark
Bursar
Miss Allison Conrod
Librarian
Mrs. G. N. Kent, B.Sc.
Executive Secretary Alumni Association
Mrs. J. Desrosiers

Officers of Convocation

Vice-Chancellor
F. Hilton Page, M.A., D.D.
Clerk
The Reverend Canon C. W. F. Stone, B.A., B.D. (Vind.)

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 HacKenley, D.D., 1937-1943.
Hon. Roy 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. Charles Porter, 1807-1836.
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.

Academic Staff

King's Faculty of Arts and Science (1970-71)

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

J. G. Morgan, M.A. (McM.), D.Phil. (Oxon.), Assistant Professor of Sociology and Anthropology, 5397 Inglis St., Apt. 3, 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. (on leave).

C. A. Field, B.Sc. (Dal.), M.S. (Northwestern), Ph.D. (Northwestern),
Professor of Mathematics, Mathematics Dept. Dalhousie University, Halifax, N.S.

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

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

A. G. Cannon, M.A. (Lond.), A.K.C., F.R.S.A.,
Assistant Professor of English, 4 Gardencrest Apts., 1544 Summer St., Halifax, N.S.

Conrad M. Ouellette, B.A. (Maine), M.A. (Clark),
Assistant Professor of Economics, King's College, Halifax, N.S.

Faculty of Divinity (1970-71)

F. Hilton Page, M.A. (Tor.), D.D. (Pine Hill),
Acting President, 1135 Rockcliffe Street, Halifax, 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. Canon C. W. F. Stone, B.A., B.D. (Vind.),
Associate Professor of Liturgics, 1423 Henry St., Halifax, N.S.

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

The Rev. D. T. A. Haviland, B.A., B.S. Litt. (Vind.),
Special Lecturer in Hellenistic Greek. 7041 Murdock Ave., Halifax, N.S.

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

Peter W. Harris, B.A. (Vind.),
Special Lecturer in Church Music, 6155 Chebucto Road, Halifax, N.S.

Associates in Supervised Pastoral Education (1970-71)

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. Canon F. M. French, B.A. (Vind.), M.A. (Dal.),
Rector of the Parish of St. Mark's, Halifax, N.S.

The Rev. H. D. Hergett, B.Com. (Dal.), L.Th. (Vind),
Priest Assistant, Christ Church Parish, Dartmouth, N.S.

The Rev. E. T. McKnight, B.A., B.D., (Acadia),
Chaplain at the Nova Scotia Hospital, Dartmouth, 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 Rev. C. R. Brown, B.A., L.Th. (Vind.),
Rector of the Parish of St. Andrew, Timberlea, 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. Canon J. H. Graven, M.A., L.Th.,
Graduate of Department of Religion and Psychiatry, Menninger Foundation, Topeka, Kansas, c/o University of King's College, Halifax, N.S.

The Rev. D. F. Hartry, B.F.A. (N.S.E.A.D.), L.Th. (Vind.),
Priest Assistant, All Saints' Cathedral, Halifax, N.S.

Historical Sketch

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 with the exception of the fifteenth-century King's College in Cambridge and in Aberdeen, the only foundation of that name in existence. Although there had been a King's College, New York, chartered by George II in 1745, 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, and Cochran Bay. 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 and as such can never be considered an anachronism. 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 direction of the Divinity School Council which is responsible to the Board of Governors. 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, University 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 Men (or his equivalent), the Dean of Women, three students: President, Students' Union, Chairman, 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. Habitual absence from classes and laboratories will be viewed most seriously by the Board of Studies.

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".

Dons in the Bays, the Dean of Men, the Dean of Women, the Registrar, Bursar, Faculty and 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. Books on the reserve lists may be borrowed for a period of three days or reading room only.

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

King's College Residence 1970-71

Dean of Residence
The Rev. Canon J. Harold Graven

Dean of Women
Mrs. G. S. Clark

Dons
David Jones
Stephen Wetmore
Robert Mohn
Stephen Hart
Drake Peterson
Grace Sheppard

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 girls, 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 years.

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 el- vator and ample storage space.

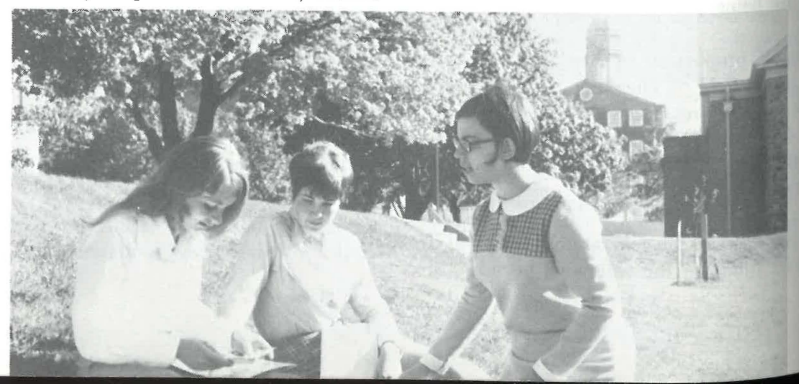
Both residences are designed so that it is not necessary to go outside for meals and extra- curricular activities.

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

Students accepted in residence by the Deans must 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 opened for new students from the evening of September 13, 1970, and for **returning** students September 16, 1970 until December 19, 1970, and from the evening of January 4, 1971, to the morning of May 14, 1971. *(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.

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.

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.

Other Libraries

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 Student Placement Office 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 through 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.

University Health Services

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 four full time general practitioners employed to provide twenty-four hour comprehensive medical care. In addition two 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 eight bed 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 Available
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 Ontario and Saskatchewan, or any other provinces requiring a premium for Medicare Insurance.

Medical Care — Hospitalization 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 annually.

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.

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 the completion by the physician of the University's Health record.

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 Services 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.
4. *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.

Other Services
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 Student Union Building third floor, telephone 424-2287, 424-2288, or 424-3590.

Names and addresses are as follows:
ANGLICAN: Rev. Don Trivett, 1665 Oxford Street 423-5707
BAPTIST: Rev. Willis Henderson, 3 Oakburn Ct. 454-8194
JEWISH: Rabbi Dr. Daniel Levine, 6674 Quinpool Road 423-5200
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 G. MacLean, St. Anges Church 454-3090

Articles Lost and Found

Students are required to report promptly at the General Office the loss or finding of an article

in or about the University buildings or grounds. The University will not accept any responsibility whatever for books, clothing, etc., lost or removed from the University premises.

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.

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
The annual charges for board, light, etc., to resident students from Arts and Science and Divinity registration day (including Sunday, September 13) until Dalhousie Convocation Day *(except that students not in their graduating year will be expected to vacate the residence 24 hours following their last examination)* are as follows:

	Double	Single
Men's Residence	$850.00	$925.00
Women's Residence	850.00	925.00
Suite Women's Residence		975.00

Students in residence must make a deposit of $450.00 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 for the following at commencement of the first term:

Student Body Fees	$30.00
Gown	15.00

and any tuition fees payable to the University of King's College.

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 $30.00 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 to be made to Dalhousie University Business Office. Fees must be paid in CANADIAN FUNDS at par in Halifax (add 1/8 of 1%, minimum 15 cents, on cheques outside of the Halifax area). 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 $360.00 including incidental expenses. The second instalment, $203.00, is due by January 29th. A charge of $2.00 per week will be added to all outstanding fees on February 1st and each 7 days thereafter until the account is paid. A carrying charge of $5.00 is added if fees are not completely paid on registration. No examination results will be released, nor will the student be permitted to register for another session until both academic, residence fees are paid in full.

The names of graduating students whose accounts are not completely paid by April 30 will not be included in graduation lists.

FOR PART TIME STUDENTS, registering for one or two classes only, 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 toascertain 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. *(Additional fee in graduating year only – Year Book* $5.00).

Faculty of Arts and Science
King's Students $563.00

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 Student Union and Faculty Societies. Student Union Fee $30.00
Faculty Society Fees (Arts and Science) .50

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 $115.00
Students registering for one-half course $ 70.00

Occasional 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 $50.00

Evening Classes
For students wishing to enrol in a single Arts class, take the examination and obtain a certificate $75.00
For students wishing to audit such a class without writing the examination or obtaining a certificate $50.00
In all other cases regular tuition fees apply.

Payment of fees for evening classes is required on registration.

A printed folder describing courses offered in the evening programme is available upon request from Dalhousie Registrar's Office.

(A student enrolled at King's is required to pay the King's Council of Students' fee of $30.00, 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 $30.00).

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 examinations 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 wilful 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 $5.00.

Refund of Fees
A student who has completed registration and wishes to withdraw must obtain written approval from the Dean of the Faculty concerned.

A student who withdraws within two weeks of the date set out in the Calendar for the commencement of classes will be entitled to receive a full refund of fees paid. Thereafter the whole of the "incidental fees" will be deducted and only the balance can be considered for refund purposes.

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 2 from full-time to part-time status, with the approval of the Dean of the Faculty concerned, 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 Dean 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 confidential report of your high school record. If you wish, you may have additional letters of reference sent to the college.

You must ensure that copies of the following documents are sent to the Registrar's Office:
(1) A certified transcript of Nova Scotia XI high school marks or their equivalent, or alternatively your Grade XI Provincial examination certificate. One or the other of these documents should be sent with your application.
(2) Evidence of your completion of Nova Scotia Grade XII, 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. 14th.
(3) A copy of your 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.

Admission Requirements
You may be admitted to the Faculty of Arts and Science by fulfilling the following requirements:
(1) You must have completed final Provincial, or local high school, examinations in the University Preparatory Programme for Nova Scotia Grade XI, or its equivalent, with a mark of at least 50% in each of five subjects including English.

And

(2) You must be in, or have completed, your Senior Matriculation year (Nova Scotia University Preparatory Programme in Grade XII or its equivalent).

You can be admitted if:
(i) After your mid-year examinations, you have an average of 70%, with no failures, in five subjects;

Or

(ii) After your Easter examinations you have an average of 70%, with no failures, in five subjects;

Or

(iii) After you have completed your final Grade XII high school examinations, or their equivalent, in June, You have an average of 60%, with no failures, in five subjects:

Or

(iv) After you have completed Province of Nova Scotia Grade XII examinations, or their equivalent, you have an average of 60%, with no failures, in five subjects;

Or

(v) Having completed Province of Nova Scotia Grade XII examinations, or their equivalent, you can show that you are eligible 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.

APPLICATION FOR ADMISSION TO THE PROGRAMME IN MUSIC:

If you intend to take a course of study leading to the B.A. degree which emphasizes Music, you should request the Admission Office to send you the special form for Music students, as well as the application form for admission to the Faculty of Arts and Science. You must also show that you can either sing competently or play an instrument competently before you will be accepted in either of these programmes.

NORMAL PREPARATION FOR ADMISSION TO THE FACULTY OF ARTS AND SCIENCE:

The *minimum* entrance requirements for admission to the Faculty have been stated above. However, you will have a wider choice of university programmes as your interests develop if, in Grade XI and XII, you choose Mathematics, English and at least one other language. If you lack preparation in any of these three

subjects, you *may* find yourself cut off from certain programmes, unless you take extra time to make up your deficiencies. In this connection, you should pay particular attention to the detailed suggestions to be found in those sections of the calendar of the Faculty of Arts and Science which describe the courses offered by individual departments.

If you are in any doubt about the suitability of your high school programme as a preparation for the work which you plan to do at University, you are advised to consult with your Guidance Counsellor or the Admissions Office.

The Faculty of Arts and Science offers two-year programmes in each of pre-Dentistry and pre-Medicine, which programmes are pre-requisite to application to the Faculty of Dentistry or the Faculty of Medicine. The requirements for entry to either of these courses are the same as those to Arts and Science.

The pre-Dentistry course consists of ten classes as follows: English 100, Physics 100, Biology 101 or 200, Chemistry 104 and 241, plus three classes from the humanities and social sciences, plus two other elective classes.

The pre-Medicine course consists of English 100, Biology 101 or 200, Physics 100 or 110, Chemistry 101 or 102 or 103 or 104 or 106, and Chemistry 241, plus five elective classes of which two must be in one subject.

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.

Newfoundland – First year Memorial University.

*Prince Edward Island** – First year University of Prince Edward Island.

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):

The results of the SACU or CEEB objective tests are not required for admission to Dalhousie-Kings'. Students may take either the Service for Admission to College and University (SACU), or the College Entrance Examination Board (CEEB) tests, and have your scores in either the one or the other forwarded to the Admissions Office.

No one who meets the admission requirements described in the foregoing will be refused admission because his or her SACU or CEEB scores are low. On the other hand, if your high school record does not meet all the requirements for admission, you may be admitted to the Faculty on the basis of your objective tests scores, taken together with your high school record.

Only two SACU tests are available at present, and you should take both of them. One is a test of mathematical and verbal aptitude, and the other a test of achievment in language (either English or French, whichever is the mother tongue of the student). Your school Principal or Guidance Counsellor will know when and where the SACU tests will be offered.

The CEEB tests consist of a mathematical and verbal aptitude test, and one or more achievement tests selected by the student in consultation with his high school Principal. The English achievement test is compulsory; the other tests may be chosen from a number of other subjects, including the following: English Literature; English Composition; Latin; French; German; Hebrew; Russian; Spanish; American History and Social Studies; European History and World Cultures; Mathematics Test, Level I; Mathematics Test, Level II; Biology; Chemistry and Physics.

CEEB tests must be written not later than March of each year. There are a number of testing centres for CEEB in the Maritimes, including one at Dalhousie. You can find out about these tests and the exact times and places where they are offered by writing to Educational Testing Service, Box 592, Princeton, New Jersey 08540.

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

I. 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.

II. 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. High School graduation with high standing. High scores on CEEB or advanced placement tests. (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.)

U.K., West Indies, West Africa

G.C.E. with standing in at least five subjects, of

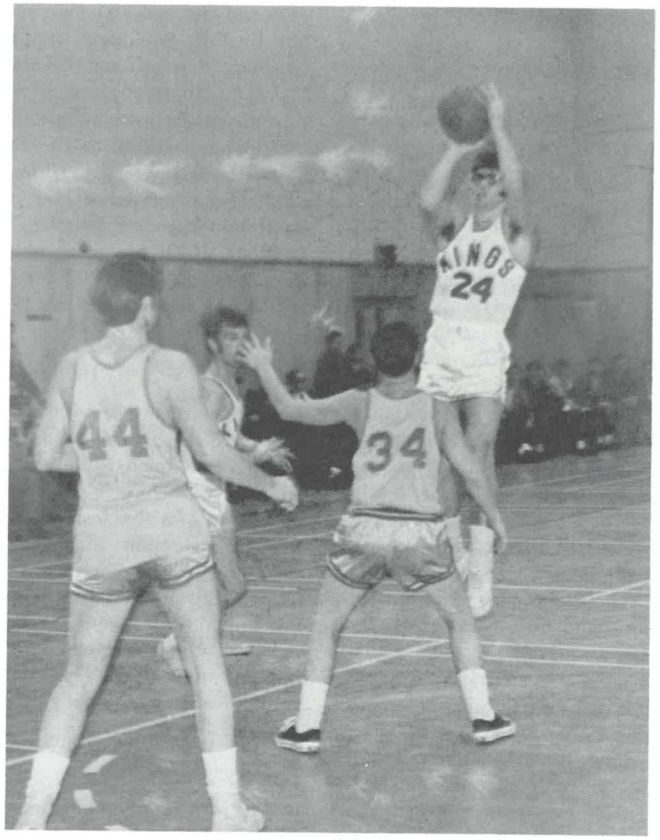
which at least two must be passed at Advanced Level; or four subjects of which three must be passed at Advanced Level. ***English is imperative at least at Ordinary Level.***

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 14.
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.
III. You should send to the Registrar's Office:
1. A completed application form. The form will be sent to you on request by the Registrar's Office;
2. A completed high school principal's report form (or our high school record-transcript which will be sent to you on request by the Admissions Office);
3. Official academic transcripts (or certified copies) relating to examinations or tests referred to in the Admission Requirements, above;
4. Records of CEEB (College Entrance Examination Board) scores, if available.

Records of other tests, as well as letters of personal and academic reference, can also be helpful in the consideration of applications from students educated abroad. *Note:* If an original certificate is in a language other than English, French, or German, a translation into one of these languages should accompany the certificate.



Programmes of Study

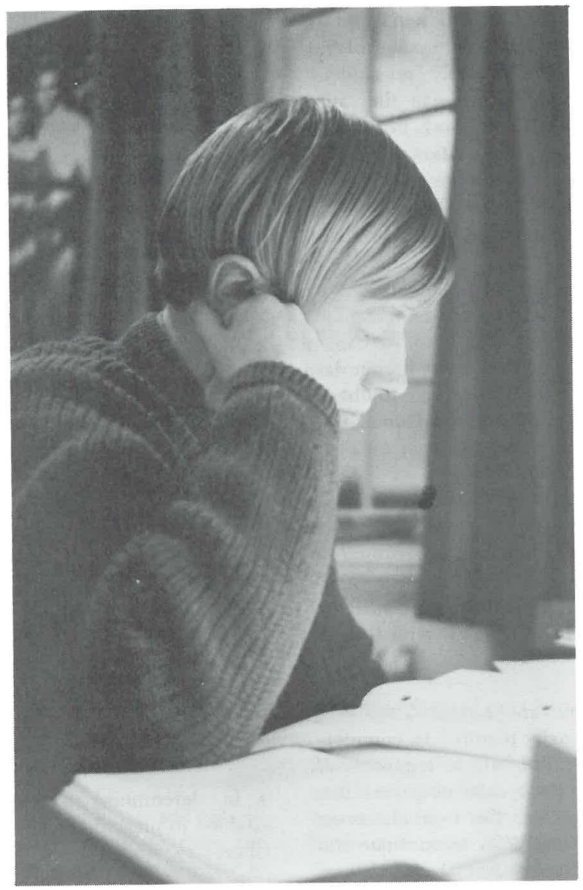
FACULTY OF ARTS AND SCIENCE

B.A. (general) three years:
Yr. I: five classes as follows: one class from the humanities, social science and sciences; two other classes, from any of languages, humanities or social sciences.
Yr. II: and
Yr. III: 10 classes as follows: 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.

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 follows; two classes in science, one language, one class selected from the humanities or social sciences and one other.
Yr. II: and
Yr. III: 10 classes as follows: six classes beyond the 100 level in two subjects selected from biology, chemistry, geology, mathematics, physics, psychology; four other classes in 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 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 for which size limits have been set.

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.

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, at least two examinations (or their equivalent) are held: the Christmas examination (or its equivalent) at the end of the first term, immediately before the Christmas vacation; and the Spring examination after the close of lectures in the Spring. Other examinations 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. The names of candidates successful in the examinations are arranged in the published lists in three divisions, according to marks awarded: First Division, 80-100%; Second Division, 65-79%; Third Division, 50-64%.

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.

Failed Year
13. 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 determine whether a student has passed or failed his year. A student who fails his year is not entitled to supplemental examinations.

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

15. 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
16. 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% in the final examination in that class;
c) he has not failed his year (see above).

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

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

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

20. 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.

21. 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.

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

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

24. 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.

25. 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 on or before July 8, the fee to be remitted with the notice. Students wishing to write at outside centres must apply by July 4.

Summer School and Extension Classes

26. 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.

27. No student may take more than one Summer School class for credit in any one 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. (In some cases, two one-semester credits may be allowed to count as one full credit.)

28. 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

29. 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.

30. 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

31. 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	Class Marks	Points
I	A	(80-100%)	3
II	B	(65-79%)	2
III	C	(56-64%)	I
	D	(50-55%)	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.

32. 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.

33. 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

34. Students in honours courses are expected to maintain an average of at least 60% 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

35. 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 fulfill the following requirements:
a) only classes on the 100 and 200 levels may be carried forward for credit;
b) of these, only classes that are applicable to the course for the second degree may be counted for credit;
c) each applicable class must bear at least one merit point in order to receive credit (i.e. be over 55%);
d) a new major field of concentration must be chosen.

Change of Registration

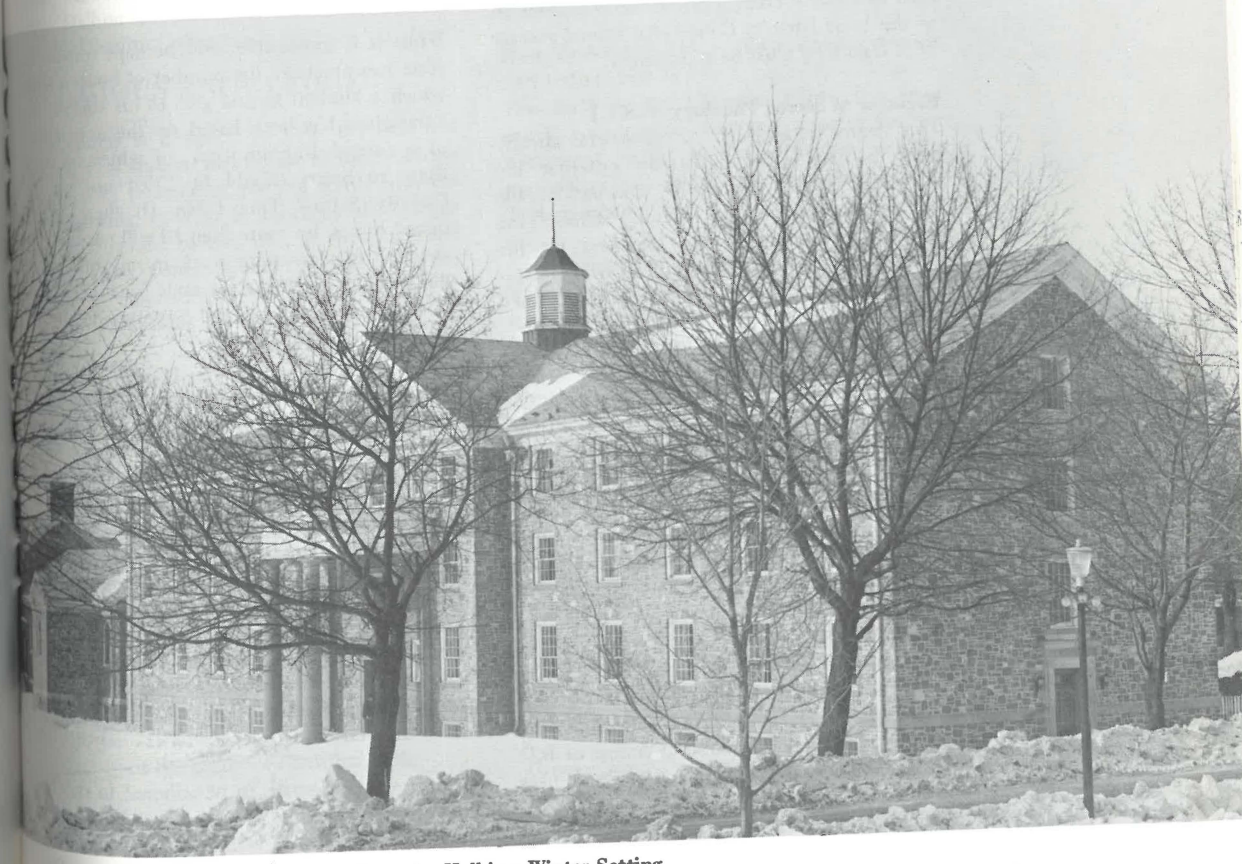
Changing a Course or Class

36. (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 28 September and 13 October. Students must complete the appropriate registration change form which must be approved by the instructors of the classes concerned, and by the Registrar.

37. After 13 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 11, 1971.

38. The last day for withdrawing from classes that terminate at Christmas is 13 October. The last day for withdrawing from any class that terminates in April will be 29 January. After these dates all classes for which a student remains registered will be recorded.

39. 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.



Alexandra Hall in a Winter Setting

Faculty of Divinity

Requirements for Entrance to the Divinity School
The regular Divinity course is normally a post-graduate programme. 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

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.

The course is arranged so that 25% of the basic material is assigned to Biblical Studies: 25% to Doctrine, Liturgics and Church History and 25% to Pastoralia and allied subjects. The remaining 25% of the course is chosen by the candidate himself, in consultation with the Divinity Faculty, from a number of available elective courses, thus enabling him to further his studies in areas which are of particular interest to him.

While it is impossible, and perhaps unwise, to state too precisely the number of hours a week which a student should give to his studies, the curriculum has been based on the assumption of a normal 40-hour week, of which no more than 16 hours should be "tied up" in the Divinity School Time-Table. Of these 16 assigned hours, no more than 12 will normally be assigned to class-room work in any one week, the remaining 4 being set aside for Professional Development sessions and Supervised Pastoral Education Assignments.

It is, of course, always assumed that students will be prepared to put the claims of academic excellence, and their service to the Church both in the University and in the wider local community, before their personal preferences. Students voluntarily engaged in more advanced courses will naturally expect to spend more time in private study, as in classroom work. However, it is felt that the minimum of 24 hours of unassigned time per week will enable each divinity student to attain maximum academic achievement, while finding adequate time to participate fully in the whole life of the university.

While not necessarily to be adhered to rigidly, the system of course numbering, as used in the Divinity curriculum, is intended to guide the intending student in his choice of courses. The three figures of the course number, taken in order, indicate the year of study (since Junior Matriculation); whether the course continues through a full academic year (denoted by "0") or for only the first or second term (denoted by "1" and "2"); and the identification number of the course within the department (usually according to intended sequence). Thus, for example, Church History 703 is a course normally taken in the Divinity Student's final year (7th after Junior Matric), continues throughout that year, and is number three of several courses offered in Church History.

It should be noted that some courses are "full" courses and some "half" courses in credit value, depending on their classroom time per week and whether they run for one or two terms. The 25% of his course open to a student's free choice from approved electives may be spread out over his three year program provided that he does not take more than one full course (or two half-courses) in his first year or second year.

Each year the Divinity School recognizes as elective courses open to its members a number of courses offered in neighbouring institutions with which it has academic relations. These include Dalhousie University, Pine Hill Divinity Hall, St. Mary's University, Holy Heart Seminary, Dalhousie School of Social Work, and Acadia Divinity College.

RELIGIOUS KNOWLEDGE

This course is designed to help the first and second year student meet some of the problems involved in reconciling the old Faith with the new learning. It is to be taken by all students looking forward to Divinity, in their first and second years. Other students, men and women, will be welcomed, and will not be required to write examinations. There is no fee.

Religious Knowledge 101 — 1 hour a week (1971-72).
Discussions on Church History and Doctrine.

Religious Knowledge 202 — One hour a week (1970-71).
Discussions on Worship and Religion.

BIBLICAL STUDIES

The courses offered endeavor to provide an intensive examination of the literary, historical and theological developments within and between the Old and New Testaments, with particular attention to the relevance and authority of the Bible for Christian faith.

(A) Old Testament

Old Testament 501 — Two sessions a week, both terms.
The history and literature of Israel from earliest times to the exile, including its religious, political and cultural development. Tests on the contents of the relevant English text of the Bible will be given in this and the following English Bible courses.

Old Testament 612 — Two sessions weekly, first term.
The exile and its effects, and the religious concepts and practice of Judaism in the post-exilic period.

Old Testament 723 — Two sessions weekly, second term.
Between the Testaments. A survey of the relevant intertestamental literature with an introduction to New Testament times.

Hebrew 501 — Two sessions weekly, both terms (1970-71). Elective. Pine Hill. Grammar and Translation: Ruth.

Hebrew 602 — Two sessions weekly, both terms (1970-71). Elective. Pine Hill. Selected prose extracts.

Hebrew 703 — Two sessions weekly, both terms (1970-71). Elective. Pine Hill. Selections from Prophets and Psalms.

(B) New Testament

New Testament 511 — Two sessions weekly, first term (1970-71).
The Birth of the Christian Faith. The emergency, composition, text and canon of the New Testament with special attention to the material not covered in the required Greek New Testament courses.

Greek New Testament 500A — Two sessions weekly, both terms (Not required of those who have taken Greek for their B.A.).
An Introduction to New Testament Greek.

Greek New Testament 501 — Two double sessions weekly one term. (See Pine Hill for 1971-72).
Synoptic Gospels and Introduction to Textual Criticism.

Greek New Testament 612 — Two sessions weekly, first term (1971-72). The Fourth Gospel.

Greek New Testament 713 — Two sessions weekly, first term (1970-71). Elective, Seminar, Romans.

Greek New Testament 724 — Two sessions weekly, second term (1970-71). Elective, Seminar, Revelation.

CHURCH HISTORY

The Courses listed assist the student to fill in for himself the general outlines of Church History. They concentrate on a number of themes which run throughout the centuries: the Church and its Mission, its Structure and Resources in Worship and Devotion; the Church and Society, the State and Reform; the Church and its Intellectual Development.

Required Courses

Church History 522 – Two sessions weekly, second term (1971-72).
English Church History from its beginning to the present day.

Church History 603 – Two sessions first term, one session second term (1970-71).
The Modern Church. A general survey from and including the Reformation. Canadian Church History.

Elective Courses

Church History 604 – One session first term, two sessions second term.
General Church History to 1500 and Development of the Roman Primacy.

Church History 705 – One session two terms, Seminar.
Continental Reformation and Counter-Reformation.

CHRISTIAN DOCTRINE

Courses in this Department are in process of being reorganized.

The two basic courses together provide an introduction to the five major departments of systematic Christian thought, viz., Theology, Christology, Pneumatology, Ecclesiology and Eschatology. Patristic, Medieval and Reformation periods is outlined, leading to an assessment of its place in Christian thought today. The doctrines of the Church, the Ministry and the Sacraments are dealt with in the first year to help candidates for Holy Orders towards a better understanding of their vocation from the beginning of their course in the Faculty of Divinity.

The three elective courses, of which all students are required to take at least one, provide an opportunity to study in depth those specific areas of Christian Doctrine which are central to contemporary theological thought.

LITURGICAL THEOLOGY

The aim of Liturgical Theology is to develop an appreciation and understanding of public worship, especially as shown by the Early Church, and Western Christendom. The interplay of Faith, Doctrine, and Devotion is studied by examining the various service forms, as these exhibit continuous development from the Early and Mediaeval Church, through the Reform into the present, – and especially, for us, in the Book of Common Prayer. It is of concern that the student get to know the how and why of public worship, and so be able to bring the people committed to his leadership into a deeper awareness, and more devout and knowledgeable participation.

Required Courses

Liturgical Theology 501 – Two sessions, two terms 1970-71.
(1st term: A rapid survey of Worship, from the early Christian period, to 1544.
2nd Term: Worship in English. The History and analysis of English rites from the mid-Sixteenth Century to the present.
(See also Pastoralia 603 (now 703). One hour a week. "The Prayer Book in the Parish" 1971-72).

Elective Courses

Liturgical Theology 612 – Two sessions weekly, first term. (1971-72).
The history and analysis of Christian Worship from the earliest days, through the mediaeval period, to the earliest Lutheran and Reformed rites.

Liturgical Theology 703 – One session, two terms.
Theology of Worship, and a survey of various rites existing in the ecumenical scene of today.

Liturgical Theology 704 – One session, two terms.
Seminar: an in depth discussion on a topic to be chosen in consultation with Professor Stone.

PHILOSOPHY OF RELIGION

Philosophy of Religion 501 – (Philosophy 220 at Dalhousie) 1970-71.
Two hours a week. An introduction to the philosophy of religion. Prerequisite or Elective.

Philosophy of Religion 502 – (Philosophy 225 at Dalhousie) 1970-71. Two hours a week. An introduction to the contemporary psychology of religion. Prerequisite or Elective.

Philosophy of Religion 603 – To be arranged at Pine Hill.
Comparative Religion and Modern religious cults. Elective. Strongly recommended.

PASTORALIA

Pastoralia is concerned with all matters affecting the relationship between pastor and people, and questions involved in relating the eternal between pastor and people, and questions involved in relating the eternal gospel to contemporary human needs. Pastoralia courses complement essential theological learning with instruction and experience in communicating this learning. They also seek to assist the intending pastor to work co-operatively with his peers and with colleagues in other helping professions.

In addition to classroom work each year, much use is made of the methodology known as Supervised Pastoral Education, courses in which are offered in a variety of settings. Every student preparing for the ordained ministry of the Church is required to take all of the following basic program:

First Year

Pastoralia 511 – One session a week one term. Speech Training: the reading of services and lessons.
(At the discretion of the Divinity Faculty, a student may be required to take this course more than once.)

Pastoralia 522 – One session a week one term. Church Music.

Pastoralia 514 – Double session weekly first term. Introduction to Pastoral Relationships.

Pastoralia 525 – Double session weekly second term. Parish Administration together with a consideration of community resources available and of Christian Stewardship.

Pastoralia 506 – Double sessions weekly both terms. Homiletics and methods of Christian Communication.

Second Year

Pastoralia 617 – Two double sessions weekly first term. Ethics and Moral Theology.

Pastoralia 628 – Two double sessions weekly second term. Psychological insights relevant to Pastoral Care.

Pastoralia 609 – Two afternoons a week one term. Supervised Pastoral Education.

Third Year

Pastoralia 703 – Two sessions weekly both terms. Conduct of Church Service, use of the Prayer Book, and church meetings.

Pastoralia 706 – Double session weekly both terms Homiletics and methods of Christian Communication.

Pastoralia 709 – Two afternoons a week one term. Supervised Pastoral Education.

Supervised Pastoral Education is available in a variety of settings (hospitals, community projects, parish, etc.) Each student will normally have experience of at least two. If course vacancies exist, he may participate both terms in a year and gain credit thereby for an elective course.

With the approval of the Professor, a student may attend a summer course of not less than six weeks duration in Clinical Pastoral Education *either* instead of two of the above courses of Supervised Pastoral Education, *or* in addition thereto as an elective in Pastoralia. Attention is drawn to the courses listed below which are offered in conjunction with the Institute of Pastoral Training and which carry credit towards advanced work in Clinical Pastoral Education for graduate students proceeding to a Master's degree (see page 37) and for certification by the national accrediting bodies.

Other advanced courses (Pastoralia 908, 909 etc.) are arranged to meet the needs of graduate students as they arise.

SUMMER COURSES

Pastoralia 809a – Seven hours a day five days a week for six weeks. Introductory course in Clinical Pastoral Education in an institutional setting. Participants function as student chaplains under a professionally certified supervisor.

Pastoralia 809b – Seven hours a day five days a week for six weeks, usually following Pastoralia 809a, which is normally a prerequisite. This course carries the student to a more advanced level of Clinical Pastoral Education involving specialization in a field chosen in consultation with his supervisor.

Electives in Pastoralia

Each academic year, a number of courses (some extramural) are offered or approved as electives in Pastoralia. Amongst them may be such topics as Christian Education, Social Work and Welfare Services, Development of Personality, Community Organization, Special Ministries, etc. Interested students should consult the Professor of Pastoralia preferably before the end of the preceding academic year.

PARISH TRAINING

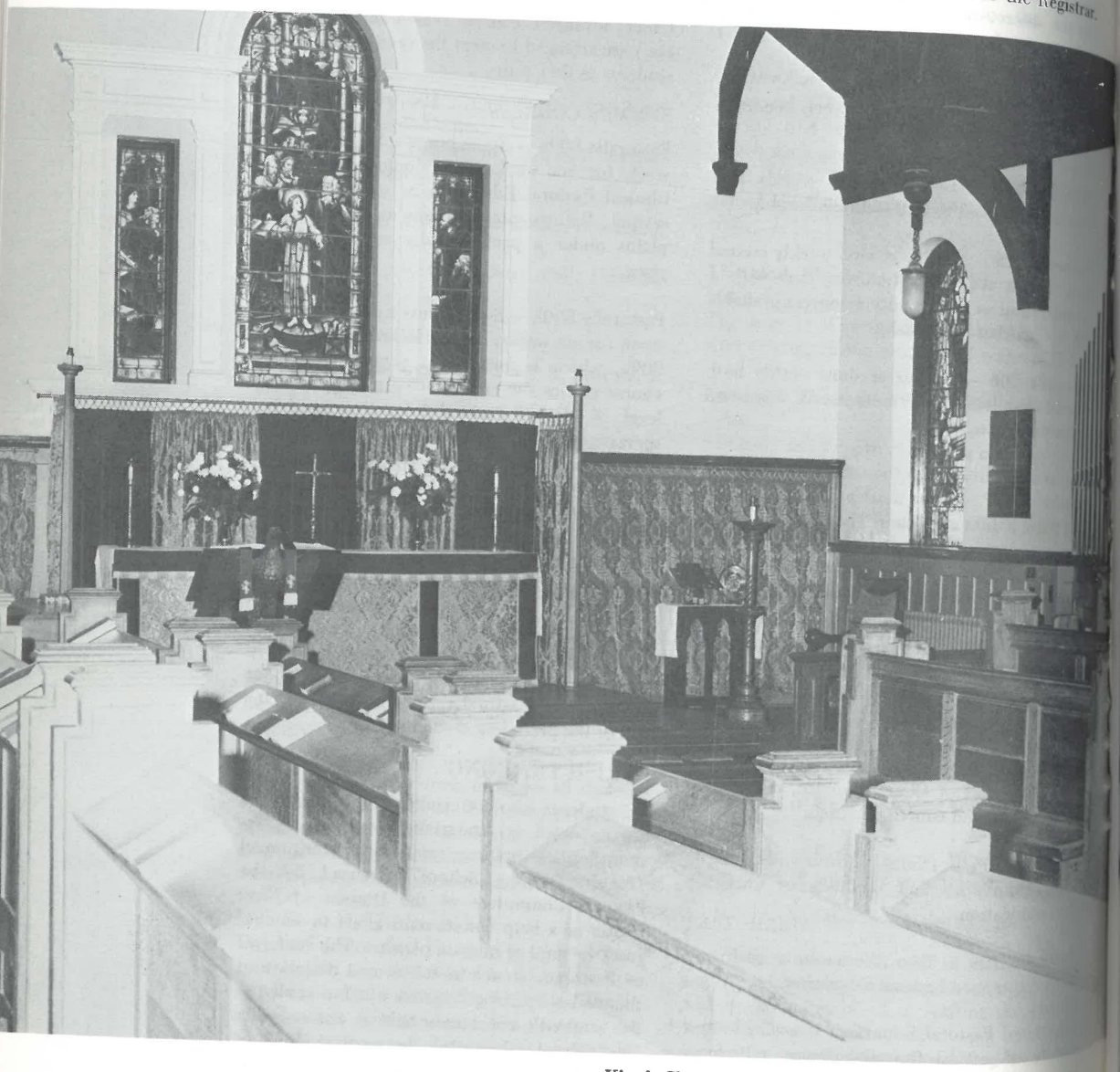
All students who are candidates for ordination are expected to undertake some Sunday responsibilities, and may participate in the annual "Parish Training School" arranged by the Pastoral Committee of the Diocese of Nova Scotia as a help for students going to summer work in rural or mission parishes. 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.

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, 1970; second term begins January, 1971.

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

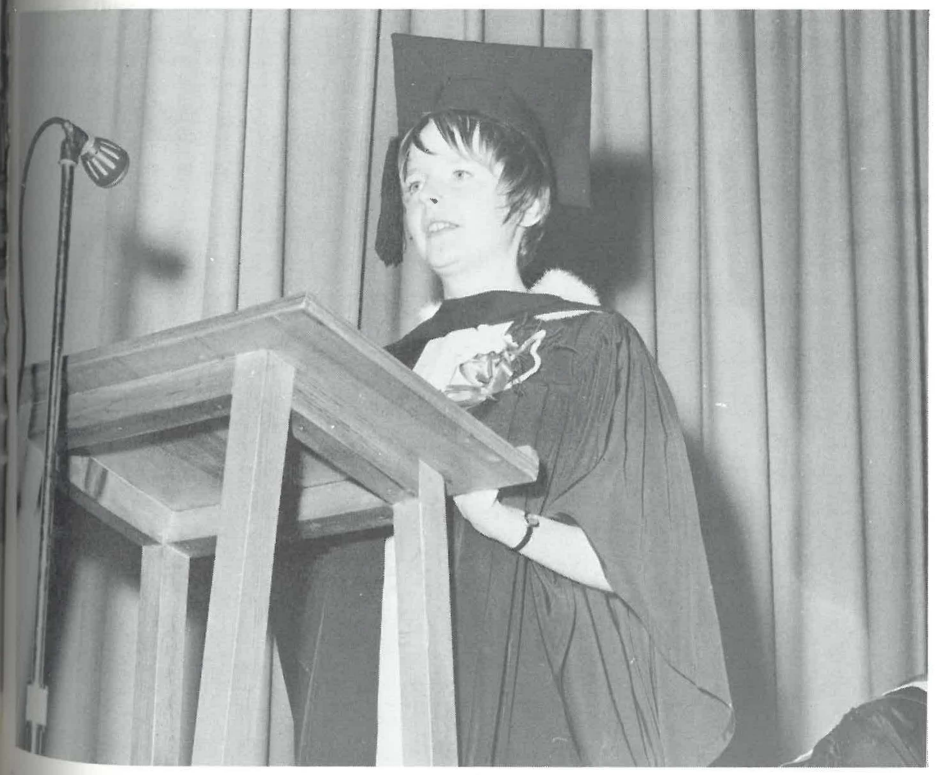
Effective Speech Communication for Professional and Business People

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 14th – July 17th, 1970

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 1970 the School will be held from June 14th to July 17th.

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 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.

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.

The Manning Room Alexandra Hall

Institute of Pastoral Training

University of King's College
Fine Hill Divinity Hall
Divinity School of Acadia University
Presbyterian College, Montreal
Medical Faculty of Dalhousie University

The organization of the Institute in collaboration with Fine 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, and the New Brunswick Provincial Hospital in Lancaster.

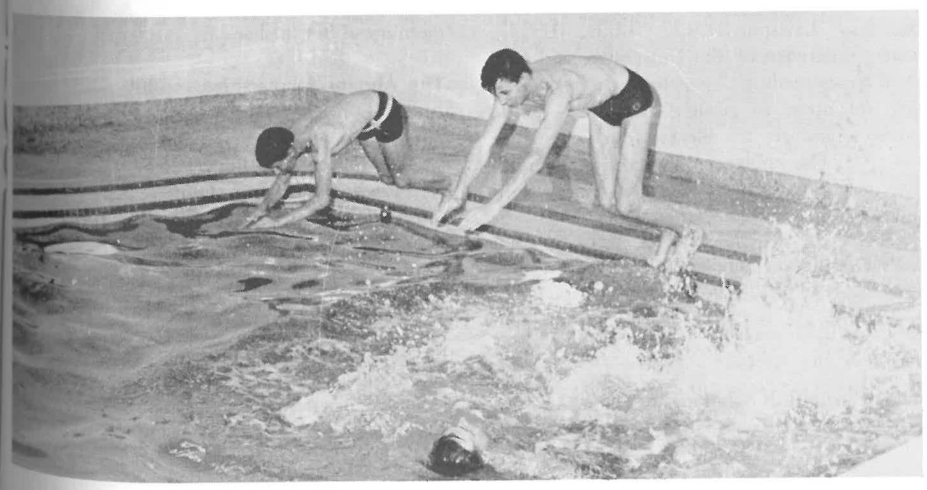
While the above mentioned courses aim primarily at increasing the pastoral competence of the parish minister or church worker, students of particular aptitude and interest can be guided in further theological training to become qualified teachers of these subjects in theological courses, directors of 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 Canadian Council for Supervised Pastoral Education", which seeks to co-operate training across Canada, establishing and maintaining high standards, accrediting training courses, and certifying supervisors. The Institute of Pastoral Training has links with the Council, one of its executive members currently serving as President of the Council and as a member of its Board of Directors and its Committee on Accreditation and Certification. Professor R. J. R. Stokoe of King's, 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.



Scholarships, Prizes and Bursaries

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 shouldbe 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 Living Endowment 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 Living Endowment 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.

The Prince Scholarship — $1000. Made available by a former graduate of the University in recognition of the pre-eminence in the spheres of education and community leadership of the late Dr. S. H. Prince, long associated with the University, this scholarship is open to any student of African extraction, a native of Nova Scotia.

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 judgement 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 four years from Grade XII. 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.

The Imperial Order Daughters of the Empire Bursary — $400 a year. As part of a War Memorial the I.O.D.E. offers annually in each Province of Canada one bursary for four years study in Canadian Universities, to the sons and daughters of deceased or permanently disabled men and women of the service (Army, Navy, Air Force.) 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 Registrar.

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 — $200. 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.

The 180th Anniversary Alumni Award — $1000. To commemorate the 180th Anniversary Reunion the Alumni have set up an award of $1000. The winner is to be announced at the 1971 Convocation.

The guide lines for the committee in selecting the winner of this award are character and leadership, athletic and academic ability and any other special considerations which might, in the opinion of the committee, have a bearing on the winning of this award.

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, Gagetown, 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.

Burns Martin Memorial Prize. Established in 1962 by a graduate of the University in memory of Dr. Burns Martin, for many years Professor of English and College Librarian, to be awarded at Encaenia.

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 Com-

monwealth 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, 1970, who stands highest in a special examination to be held on September 17, 1970 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. A paper on the content of the Old and New Testaments, and
b. 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 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 — $400.00. 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. ($300.00 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 — $450.00. 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.

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 students from 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 The Eastern 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 — $100. 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 ordinand, 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 re-

cognized 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 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 kindliness, 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.

Canada Student Loans

1. Canada student loans are federally guaranteed loans of up to $1,000 annually to a maximum of $5,000.

2. 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.

3. Students should apply as early in the Summer as possible by requesting application forms.

KCDCS presents Concert at St. Ovide

The University of King's College Student Union

The University of King's College Student 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 Student Union, the Student 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.

Bod 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 annual fee for membership is $4.00.

The Association maintains annual scholarships.

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

The Officers of the Association in 1969-71.
President,
Mr. Ralph V. A. Swetnam, 6897 Tupper Grove, Halifax, N.S.

Vice-President,
The Rev. Emery G. Harris, 320 Herring Cove Road, Halifax, N.S.

Treasurer,
Dr. Henry Muggah, Q.C., 6033 Belmont Rd., 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 has instituted a fund to support the Alexandra Chair of Divinity.

Officers 1969-70

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

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

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

Hon. President,
Mrs. H. D. Smith

Hon. Vice-President,
Mrs. G. F. Arnold.

Immediate Past President,
Mrs. V. McSweeney.

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

Vice-Presidents,
Mrs. A. MacKeigan, 35 Reserve St., Glace Bay, N.S.
Miss Miriam Morris, 2438 Gottingen St., Halifax, N.S.
Mrs. Clayton Beaver, 6281 Duncan St., Halifax, N.S.
Mrs. A. Holland, 42 Newland Crescent, Charlottetown, P.E.I.

Recording Secretary,
Mrs. J. C. Erving, 2231 Quinn St., Halifax, N.S.

Corresponding Secretary,
Mrs. R. B. Hobson, 125 Crichton Ave., Dartmouth, N.S.

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

Friends of King's,
Mrs. H. D. Smith, 25 Whitman Court, Truro, N.S.

*Convocation, May 14, 1969

*Conferred during the session
**In absentia

Degrees Conferred
Doctor of Civil Law *(honoris causa)*
Marshall, Clyde Slocomb
**Wiswell, Douglas Morgan

Bachelor of Sacred Theology
Mills, John Arthur, Rockingham, N.S.
Reid, The Reverend David Collins, Fairview, N.S.

Bachelor of Divinity
**Empey, The Reverend Walton Newcombe Francis, Stradbally, Co. Laois, Ireland.

Master of Social Work
Cherun, Marlene Esther (Goldfarb), Halifax, N.S.
MacDougall, Margaret Gail (Risdill), Halifax, N.S.
**Pike, Ann Louise, Halifax, N.S.
Prevatt, Diane Clare, Halifax, N.S.

Bachelor of Arts
Belmore, Elizabeth Carol, Caribou Gold Mines, N.S.
Brault, Helen Anita (Clark), Shelburne, N.S.
Calder, Robin Norman, Aberdeen, Scotland.
*Clare, Kenneth Hilary, Ottawa, Ontario.
Coombs, Elizabeth Burrington, Newton Square, Pa., U.S.A.
Daniels, Elizabeth Anne (Honours in English), Bedford, N.S.
Embree, Marjory Elizabeth, Amherst, N.S.
Flinn, Janice Marie, Halifax, N.S.
Ghiz, Louise Lyla, Charlottetown, P.E.I.
Halse, Jonathan George, Halifax, N.S.
Harlow, Anne Jessica, Sillery, P.Q.
*Hart, Stephen Edwin, Dartmouth, N.S.
Haslam, Catherine Diane (Holley), Eureka, N.S.
Hazen, Frances Rosemary Elaine, Rothesay, N.B.
Heighton, Patricia Suzanne, Halifax, N.S.
Hoegg, Judith Ellen, Stellarton, N.S.
Hyslop, Robert Buchanan, Moore's Mills, N.B.
Irvine, James Theodore, Fredericton, N.B.
Lorway, Helen Eve, Sydney, N.S.
MacLean, Robert Gordon, Westville, N.S.
McNutt, Marilyn Phyllis, Truro, N.S.
McPhee, Stuart Bradley, Halifax, N.S.
Martell, Anne Patricia, Truro,,N.S.
Miller, Heather Jean (Mason), Tangier, N.S.
*Moore, Bruce William, Halifax, N.S.
*O'Brien, Christopher John, Halifax, N.S.
Oxner, Michael Clifton, Chester Basin, N.S.
*Peck, Esmond Lawrence Hamilton, Westmount, P.Q.
Petite, Robert, Spryfield, N.S.
Petite, Sarah Henderson (Pierce), Peoria, Ill. U.S.A.
Publicover, Carol Grace, Hubbards, N.S.
Rau, Andrew Richard David, Ottawa, Ont.
Russell, Margaret Susan, Liverpool, N.S.
Selby, Michael Alan, Saint John, N.B.
*Severance, Hubert Glenwood, Halifax, N.S.
Singer, Lynda Joan, Sydney Mines, N.S.
*Swan, Peter Daniel, Pugwash, N.S.
Taylor, James Everett, Sheffield Mills, N.S.
Whidden, John Kenneth, Maitland, N.S.
Wilson, Barbara Elizabeth, Rio de Janeiro, Brazil.
Woodman, Faye Louise, Saint John West, N.B.

Bachelor of Science
Austen, Jacqueline Marguerite Ruth (McMahon), Halifax, N.S.
*Cameron, Kim Scotney, Head of St. Margaret Bay, N.S.
*Diggins, Barry Sheldon, Halifax, N.S.
*Hiltz, Elizabeth Ann, Kensington, P.E.I.
Hobson, Elizabeth Anne, Dartmouth, N.S.
Mitchell, Janet Eileen, Jeddore, N.S.
Page, John Hilton, (First Class Honours in Physics), Halifax, N.S.
Sellick, Sandra Joan, Rockingham, N.S.
Snair, Joanne Margaret (Honours in Biology), Lower Sackville, N.S.
Webb, Alton Trevor, O'Leary, P.E.I.

Diplomas Granted
Licentiate in Theology
Burton, The Reverend Theodore Kingwell, Halifax, N.S.
**Lane, The Reverend Ronald Chester, Waverley, N.S.

Class Life Officers — 1969

Honorary Life President,
The Reverend Professor R. J. R. Stokoe.

Life President,
Robert Petite.

Life Vice-President,
Robin N. Calder.

Life Secretary,
Louise L. Ghiz.

Life Treasurer,
Lynda J. Singer.

Encaenia Awards

Arts and Science

The Governor General's Medal, John Hilton Page.
April Fund Scholarship, Ian Edward Deakin.
President's Scholarship (Third year), Bruce Parkinson Archibald.
President's Scholarship (Second year), Cheryl Ruth Coates.
President's Scholarship (First year), Catherine Ann Veinotte.
The Stevenson Scholarship, Susan Rosemary Haughn.
Alexandra Society Scholarship, Patricia Ann Teasdale.
The Beatrice E. Fry Memorial Prize, Lynn Marion Joudrey.
Dr. M. A. B. Smith Prize, Ian Edward Deakin.
Bishop Binney Prize, Ian Edward Deakin.
The Almon-Welsford Testimonial Prize, Keith Allan Hamlin.
The McCawley Classical Prize, Keith Allan Hamlin.
The Zaidee Horsfall Prize in Mathematics, David Charles Nisbet Blagrave.
The Lawson Prize, Dennis William Theman.
The Harry Crawford Memorial Prize, Allan Richard Thomson.
The Binney Bursary, William Alton Hayter.
The Jackson Bursary, Allan Richard Thomson.
Charles Cogswell Bursary, William Alton Hayter.

Divinity

The Canon W. S. H. Morris Travelling Scholarship, The Rev. David Collins Reid.
The Ott Reading Prize, The Rev. David Collins Reid.
The Ott Preaching Prize, The Rev. David Collins Reid.
The Canadian Bible Society Book for the Reading of Holy Scripture, Brenda Jean Pierce.
The McCawley Senior Hebrew Prize, Brenda Jean Pierce.
The McCawley Junior Hebrew Prize, Bruce Herbert Warren Howe.
The George Sherman Richards Proficiency Prize, Bruce Herbert Warren Howe.
The Shatford Pastoral Theology Prize, The Rev. Ronald Chester Lane, The Rev. David Collins Reid.
The Moody Exhibition, Robert David Price.
The Kenelm Eaton Memorial Scholarship, Bruce Herbert Warren Howe.
The William Cogswell Entrance Scholarship (B), Robert David Price.
The Wallace Greek New Testament Prize, Bruce Herbert Warren Howe.

Entrance Scholarships Awarded May, 1969

Susanna Almon Scholarship
Denise Rosaline MacQueen,
Harold Tega Wood.

Chancellors' Scholarship
Judith Suzanne Blakeney,
Frederick Anthony Musial,
James Matthew Queen,
Kenneth William Tutty.

Alumni Living Endowment Scholarship
Robert Gordon Anthony,
Peter Warren Douglas MacKinnon,
Heather Louise Murray.

King's Foundation Scholarship
Barbara Marion Nowlan,
Patricia Louise Rowat.

Halifax-Dartmouth Entrance Scholarship
Helen Faith Brooks,
Donna Marie Matthews,
Valerie Jeanne Morine,
Tricia Joan Murwin,
Gladys May Nickerson,
Sharon Victoria Stephenson,
Carolyn Ann Stroud.

Alumni Scholarship
Peggy Anne Aulenback,
John Harold Roby.

Winfield Memorial Scholarship
Gail Kathleen Rudderham.

Walter Lawson Muir Bursary
Linda Susan Thorburn.

Prince Scholarship
Mureena Mae Francis.

Keating Trust Scholarship
Ann Louise Harlow.

Margaret and Wallace Towers Bursary
Beverley Arnold Greenlaw, Jr.

King's College Naval Bursary
Lynda Avril Harfield.

Nova Scotia Teachers College Bursary
Diane Susan Cowl.

Deihl Bridgewater Bursaries
Helen Elizabeth Keddy,
Charles Lawrence O'Neil.

Mabel Mason Bursaries
Eleanor Jane Bond,
Esther Jean Wainwright.

University Bursaries
Eleanor Jane Bond,
John Allison Carr,
Anne Elizabeth Chaldecott,
John Angus Dodge,
Debra Adele Hanson,
Ann Louise Harlow,
John Alfred Miles,
Heather Louise Murray,
Frederick Anthony Musial,
Barbara Marion Nowlan,
Patricia Louise Rowat,
Gail Kathleen Rudderham,
Linda Susan Thorburn.

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.

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	English
Greek	European Literature
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; Education 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.

45.2 / 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 the following characteristics:
1. All the material is presented in one term. The letter indicates the term:
A: a class offered only in the first term, with the final examination at Christmas;
B: a class offered only in the second term, with the final examination in the Spring;
C: a class offered twice during the session, once in the first term (final examination at Christmas) and repeated in the second term (final examination in the Spring).

2. Half-credit classes will have one-half the value of full classes in determining the standing of students. Points 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 *rapporteur* 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 in each of Groups B, C, and D, together with sufficient classes chosen from Groups A, B, and C to make a total of five, except that, if a natural science was passed as part of the senior matriculation course, the Group D requirement may be waived.

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 insofar as the overall requirements permit. (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).

3. Overall Requirements
The fifteen classes making up the overall course for the General B.A. must include:
(a) at least one class from each of three subjects in group B;
(b) at least one class from each of two subjects in Group C; and
(c) if a natural science class was not passed in Senior Matriculation, one class from physics, chemistry, geology or biology must be included among the fifteen taken at the University. If a natural science was passed as part of the Senior Matriculation course, the Group D requirement stated for the first year may be waived.

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 student planning to take a B.Sc. degree will in his first year take five classes as follows: namely, two classes in Group D, one class in Group A and one class in either Group B or Group C, together with one class chosen from any group.

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, geology, mathematics, physics, psychology, engineering;
(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 insofar as the overall requirements permit. (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)

3. Overall Requirements
Any B.Sc. programme must include at least one class in mathematics and a language other than English.

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 65% in the classes in the two disciplines in which he has concentrated; attainment of an average of at least 80% 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 65% or higher on an honours essay or a comprehensive examination regarding his honours work. In addition, he must attain an average of 65% in the required advanced classes which comprise his honours programme. Achievement of an average of at least 80% 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.

46.4.1 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.

46.4.2 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.

46.6.1 DIPLOMA IN EDUCATION
The Diploma in Education is awarded to students who have taken:

1. the education and arts and science classes prescribed for the first three years of the integrated Bachelor of Education (Elementary) course: *and*

2. at least four classes beyond the introductory level in subjects regularly taught in Nova Scotia schools. At least one of these classes must be in English.

Details of the curriculum for these courses are given under *Education* in *section 47.8 / Programmes of Study*.

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 47.9 / 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 47.9 / 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 47.15 / Programmes of Study*.

46.10 / *Architecture*

The requirement for admission to the School of Architecture at the Nova Scotia Technical College will be the satisfactory completion of at least two years at any university or equivalent institution recognized by the school. Classes may be taken in any subject, but candidates should preferably have completed at least one class in mathematics at a university; alternatively, they may be required to take an entrance examination on this subject.
Candidates for admission to the first year in the School of Architecture at the Nova Scotia Technical College must submit an official transcript, and a letter of recommendation supporting the candidate's application.

46.11 / *Social Work*

Students looking forward to professional training at the Maritime School of Social Work should include in their undergradute curriculum a choice of classes from such fields as sociology, psychology, political science, anthropology, biology, economics, history and philosophy, with special emphasis on sociology, psychology and political science. It is in the student's interest that from one-third to one-half of his undergraduate curriculum be made up of these classes.

46.12 / *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.

47.1 / Art History

Classes Offered

Art History 101 Introduction to the History of Art, Lecture 2 hours

An introduction to art through lectures, slides, demonstrations and discussions to provide the student with the necessary tools to deal more intelligently with works of art; and an illustrated survey of the development of art with particular emphasis on the main periods in the history of Western art.

Students having a credit for Art History 101 are eligible to take any of the following classes offered by 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 Seventeenth and Eighteenth-Century Art (first term).

The Barogue and related movements in Europe.
Prerequisite: Art History 101.

Art History A202B 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. Gray
Lecturers
J. Scott
M. S. DeWolfe
E. S. MacFarlane

Postdoctoral Fellows
V. Saini
J. Prchal

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, it 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. English 100.
2. Language 100.
3. Mathematics 100.
4. One of Chemistry 101, 102 or 103.

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 240.

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.
17-18. Two of Biochemistry 405, 406, or 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.
Texts: Mahler and Cordes, *Basic Biological Chemistry;* Christensen and Palmer, *Enzyme 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.

405/505 Seminar in Biochemistry
Recently published work in the field of biochemistry is presented and discussed. Each week, during the first 35-40 minutes, a student summarizes a paper chosen by himself. The remaining time is devoted to discussion. Undergraduate students normally present one paper during the course of the academic year. All graduate students registered in the department are expected to participate, and selected undergraduates may also do so.
Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry.

406 Advanced Laboratory Techniques
Individual instruction is provided for advanced students in the solution of a practical laboratory problem in biochemistry. Many of the research workers in the department are available to assist students in becoming acquainted with the principles and operation of the equipment they use in their work. This includes spectrophotometers, ultracentrifuges, liquid and crystal scintillation counters, gas chromatographs, spectropolarimeters, flame spectrometers, and column chromatographic equipment. Prospective students are encouraged to consult with the staff regarding a project suited to their individual needs.
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.
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 Lecture 2 hours, C. W. Helleiner

This class is intended to complement Biochemistry 404/504 and 405/505. 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
Graduate studies leading to the degrees of M.Sc. and Ph.D. are offered by the department. Interested students should consult the Calendar of the Faculty of Graduate Studies.

47.3 / *Biology*

Professors
M. L. Cameron
E. S. Deevey (Killam Professor)
F. R. Hayes (Killam Professor)
K. E. von Maltzahn (Chairman)
I. A. McLaren
A. C. Neish
J. G. Ogden
J. C. Ritchie

Professor (Oceanography)
G. A. Riley

Associate Professors
L. M. Dickie
J. Farley (on leave 1970-71)
E. T. Garside
M. J. Harvey
O. P. Kamra
W. C. Kimmins
K. H. Mann
L. C. Vining

Associate Professors (Oceanography)
C. M. Boyd
E. L. Mills

Assistant Professors
E. W. Angelopoulos
R. G. Brown
B. K. Hall
L. A. Hanic
P. C. Kesavan
M. D. Ross

Assistant Professor (Oceanography)
W. D. Watt

Research Associates
D. Brewer
J. S. Craigie
A. Taylor

Postdoctoral Fellow
R. Hughes

Biology is the science which deals with the properties of living things: what they are, what they do, and how they do it. It encompasses all knowledge of the form, function, origins and development of living things. It explores and organizes these themes at different integrative levels in the total span of organic diversity.

At the centre of all studies on living systems is the organism itself. Today, some biologists study parts of the organism. Their studies may be at the molecular level; at the level of the organelles, the formed particles which are found in the living cell and are made up of molecules of special kinds; at the level of the cell where the organelles perform their functions in cooperation with one another and with other cell constituents; at the level of the tissue, groups of cells organized for a specific function; at the level of the organ, groups of tissues organized for a higher function. Other biologists study the whole organism or the organism as part of a higher order of complexity. Organisms of a single kind form populations; populations of different kinds of organisms form communities; communities form ecosystems; the types of ecosystems depend in part on the prevailing climates, all the organized states of living things form the biota, the world system of living things. Biology is concerned with all these states of organization.

When we approach a certain subject matter or level in biology from one or more viewpoints, a discipline or branch of biology emerges, as is illustrated in the following chart.

Approach or view point	Integrative levels						
	Molecule	Organelle	Cell	Tissue	Organ	Individual	Population Ecosystem Community Biota
Form	Molecular Biology		Cytology and Cell Biology	Anatomy	Morphology		Ecology
Function				Physiology			
Origin				Morphogenesis		Genetics	
Development						Embryology	
Classification						Systematics	

In this chart you can see how parts of the study of biology are organized to make possible a scientific study of the levels of organization from the points of view of form, function, origin, development and classification. In general, it is a hierarchical arrangement, so that disciplines to the right depend to some extent on disciplines to the left of the chart. Thus physiology, a science of function at the organic levels of the tissue, organ and individual, is dependent on information coming from the studies of molecular biology and cell biology, and in turn supplies information of use in ecology. You may easily determine other types of interdependence from the chart. To a certain extent, one studies biology in this same hierarchical order when one comes to university; hence the need for prerequisites among classes.

The essential bases of modern biology are the unifying concepts of the lower integrative level (molecular biology) and the upper (ecology). They simplify and interlock the central body of the more traditional disciplines. To understand and appreciate the lower integrative levels there must be a free flow of information to and from the more formal disciplines of physics and chemistry. At the upper level of ecology, biology must interact with psychology, sociology, anthropology and the earth sciences. In fact, psychology, sociology and anthropology are in essence biological disciplines of such large scope that they are now treated as separate sciences.

The study of biology is made difficult because of the great diversity of types (not less than three million species). One of the oldest of biological studies is the naming and identifying of species. Each species appears to have a unique place in the order of things and much of the fascination of biology depends on this. Another kind of difficulty and of interest comes from the observation that living things obey the same physical and chemical laws which govern reactions of non-living things, so that the competent biologist must also have a good knowledge of the other natural sciences in order to understand what goes on in living things. It is also now abundantly clear that, in spite of diversities of form and habitat, living things are fundamentally similar, and that the life processes of a bacterium and a man differ in detail and complexity rather than in kind.

It was the discovery of the principle a century ago, that new species arise only from pre-existing species, that led to the statement of the theory of natural selection in 1859. So pervasive are the implications of this theory that they have been applied to other systems than the living world, all the way from the evolution of galaxies to the evolution of computer systems. A clear understanding of the theory and an appreciation of what it implies is an indispensable requirement for a clear understanding of the contemporary world. It has been the biologist's chief contribution to human thought and philosophy.

More and more, as our technological control of the environment increases, it becomes necessary to apply known biological principles to our actions, so as to understand and predict their effects on other living things. Many years ago, T. H. Huxley made the wise remark that no one would try to play a successful game of chess who had not first learned the rules of the game. We are living things in a world which is for us chiefly important because of the other living things in it. We have tended to play the game of life with little knowledge of the rules. It is inevitable that we should receive checks from time to time, and eventually, if we do not learn, a checkmate. There is ample evidence today that the game often goes against us; it does so because we neglect to consider, or do not know enough to consider, the implications of our moves. For example, medicine has greatly extended the average span of human life, and so has done much to increase the human population, at the same time as inefficient and unintelligent land use practices have failed to provide the extra food to prevent starvation. There is no doubt that very soon the biologist will be asked to provide sensible solutions to such dilemmas. Much of the education of future biologists should be such as will equip them to give sensible solutions.

Degree Programmes

The programme in biology is designed to provide the student with 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. 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.

The department offers courses leading to the General B.A. and General B.Sc. degree in biology, a combined and major Honours B.Sc. programme in biology.

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.Sc. with Concentration in Biology
Students reading for the General B.Sc. degree in biology should arrange their classes in consultation with the Chairman of the Department.

General B.A. with Concentration in Biology
Students who plan to read for a Bachelor of Arts degree in biology must obtain permission from the department before registration and satisfy the requirements of the General B.A. degree and should arrange their classes in the following pattern:

Year I
1. Biology 101.
2. One other introductory science (preferably Chemistry 100) or mathematics class.

3-4. 2 classes in humanities, social sciences and languages.
5. One other class.

Year II
6. Biology 200
7. Two half-classes of Biology 201-206.
8. Class from the 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.
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.
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 groups 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 whose number 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 to a lesser extent second-year students.

Arts students with no senior matriculation in sciences may satisfy their science requirements by taking Biology 100.

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 similar to that outlined for Biology 101, below, 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 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 programs with the Chairman of the Department.

100 Biology for Non-Scientists, Lecture 3 hours; laboratory 3 hours, J. C. Ritchie

Biology 100 serves as a modest, at times rather shaky, bridge between the "two cultures" by introducing students to the two basic conceptual foci of modern biology — molecular biology on the one hand, and ecology and evolution on the other.

The concepts of molecular biology appear, on first acquaintance, rather formidable and unduly physico-chemical in nature. In fact, they actually simplify many of the large problems of biology. The predictable direction of science in the next two decades or so, particularly as it impinges on human affairs, compels us to come to grips with this new vocabulary.

The class is designed primarily for students who are not majoring in the sciences. It is centered on the unifying theory of biology — evolution. In method, the class revolves on the private study of each student. Readings are suggested, special library arrangements are made, essays are written on a group of main topics and small (6) tutorial groups meet regularly to discuss these topics. Few, if any, lectures will be given.

101 Principles of General Biology, Lecture 3 hours; laboratory 3 hours, M. L. Cameron and others.

Biology 101 is the introductory class 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. It is also the class which should be taken by science students who choose a single class in biology as an elective from Group D (Sciences). It has no prerequisites, although it may be supposed that the study of biology, chemistry and physics in high school should lighten the load on the student in the first term of Biology 101.

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 level, and an attempt is made to give 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 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.

Students are encouraged to discuss with the lecturer the papers they have written at mid-term and at Christmas. (Any student in doubt about any aspect of his work should get in touch with the lecturer at any time.)
Texts: Ramsay, *The Experimental Basis of Modern Biology;* Swanson, *The Cell;* Grobstein, *The Strategy of Life.* The University Bookstore will also keep available a supply of Scientific American reprints dealing with subjects of particular and current interest. Some of these will also be available on the reserved reading list in the Biology Library.

200 Diversity of Organisms, Lecture 3 hours; laboratory 3 hours. 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. Of course, the difficulty is not sought out for its own sake, nor will the fascinstion always be evident for the temperamentally unreceptive.

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 lecture discussions 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 a 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.

Intermediate Classes Offered

Intermediate Classes (mainly for second and third-year students)

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, Lecture 3 hours; laboratory 3 hours, W. C. Kimmins

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.

203A/B Genetics, Lecture 2 hours; laboratory 3 hours, O. P. Kamra and others.

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,

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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.

202A/B Cellular Biology, Lecture 2 hours, discussion 1 hour, laboratory 3 hours, E. W. Angelopoulos

Correct use of microscopes (light and phase) is stressed in parctice and theory. Some important laboratory methods and research techniques are included in lectures, laboratories, or as demonstrations.

The class studies cells and cell systems and the relationships between structure and function of these systems. Mitosis and meiosis (oogenesis and spermatogenesis) are treated in detail in both lectures and laboratory work, using living material and slides. Sex determination, giant chromosomes and chromosome fine structure are considered.
Prerequisites: Biology 101, Biology 200.

204A Evolutionary Biology. Lecture 2 hours; laboratory 3 hours, I. A. McLaren

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 2 hours; laboratory 3 hours, B. K. Hall, K. E. von Maltzahn

The principles of animal and plant development; the initiation and maintenance of form; cell differentiation; tissue specialization; growth mechanisms.

206A/B Principles of Ecology, Lecture 2 hours; laboratory 3 hours, J. G. Ogden, 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. 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.

The following classes have no prerequisite beyond Biology 200 and they may be taken before completion of the core of six half-classes. The classes below 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 micro-organisms 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 interaction 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.

312B Algology, Lecture 2 hours; laboratory 3 hours, L. A. Hanic

This class presents an introductory survey of freshwater and marine algae, emphasizing their biology, morphological diversity, ecology, evolutionary relationships and economic value. Laboratory work will involve careful study of material representative of the major algal groups. Living material collected from a variety of habitats will be used, supplemented with preserved material of scarcer or "hard-to-maintain"forms.

Basic techniques in collecting, preserving, sectioning, mounting and identifying algae will be explored briefly. Several field trips (number depending on the weather) will be arranged apart from regular laboratory sessions to allow observation of algae in their natural habitat. One of these trips will include a study of vertical zonation of marine algae which will involve the use of surveying gear.
Prerequisites: Normally Biology 201A/B, 203A/B,202A/B.

312A Lichenology, Bryology, Lecture 2 hours; laboratory 3 hours, L. A. Hanic

This class studies lichens, liverworts and mosses emphasizing their biology, morphological diversity, ecology and evolutionary relationships with the algae, fungi and vascular cryptogams. Students will be required to make a collection of local forms for study in the laboratory where identification, isolation and cultivation of representative forms will be explored. To assist in this, special field trips will be arranged during the first term. Identification will be based on morphology mainly, but in the lichens, this will be supplemented with elementary chromatography and cytochemistry. Students will be assigned problems on current areas of research in these groups for subsequent presentation and class discussion.

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, Lecture 2 hours; laboratory 3 hours, M. J. Harvey

Classification, experimental taxonomy and evolution of the higher plants.

321 Invertebrates I, Lecture 2 hours; laboratory 3 hours, C. M. Boyd/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.

322A Entomology, Lecture 2 hours; laboratory 3 hours, E. Angelopoulos/M. L. Cameron

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.
Text: Noble and Noble, *Parasitology*

323 Vertebrates, Lecture 2 hours; laboratory 3 hours, E. T. Garside

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, of 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 of 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 course.

330A Bioenergetics, Lecture 2 hours; laboratory 3 hours, W. C. Kimmins

Bioenergetics: study of biological transformation of energy in living organisms. Consideration of this topic will be confined to the cellular level. (Students who have taken 203, 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 2 hours; laboratory 3 hours, C. M. Boyd

The class explores physiological systems (regulation of metabolism, gaseous transport phenomena, excretion, neuro and sensory physiology, and muscle systems) by use of a text in conjunction with lectures and selected references dealing more intensively with topics of interest. Both cold and warm blooded animals are considered. Lectures and laboratory.

322B Plant Physiology, Lecture 2 hours; laboratory 3 hours, W. C. Kimmins

Rather than attempt a comprehensive study of the subject this class will deal with a few selected topics.

Solute and solvent relationships; responses to light and temperature, are obvious examples.
Prerequisite: Biology 330A

340A Physiological and Developmental Genetics
Prerequisites: Biology 203A/B and 205A/B.

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340B Population Genetics (1971-72)*
Prerequisites: Biology 203A/B and 204A

350A Development and Morphogenesis in Animals (1970-71), Lecture 2 hours; laboratory 3 hours, B. K. Hall

Descriptive and experimental embryology of the invertebrates and the vertebrates; the growth and replacement of body parts; mechanisms of development; regulation of body and organ size.
Prerequisite: Biology 205A/B.

350B Development and Morphogenesis in Plants, Lecture 2 hours; laboratory 3 hours, K. E. von Maltzahn
Descriptive and experimental analysis of form development in plants and its regulation.

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 prey-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.

400 Ethology, Lecture 2 hours, F. J. Mortenson

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.

401A Biometrics, Lecture 2 hours, P. J. Wangersky

This class studies the application of mathematical models to biological systems.

401B Biometrics, Lecture 2 hours; problem session, 1 hour, W. D. Watt.

This class studies the experimental design and the statistical handling of biological data.

402 History of Science and Biology (1971-72), Lecture 3 hours, J. Farley and others

The first part of the class deals with the development of Natural Philosophy from the beginning of civilization to the Scientific Revolution of the 16th and 17th centuries. The second part deals with the growth of modern biology and emphasizes those disciplines necessary for the development and acceptance of evolutionary theories. Students will be expected to have a basic knowledge of the history of Western Europe and a familiarity with biological terminology especially in genetics, embryology and comparative anatomy, but no formal prerequisites are required.

403/503 Man in Ecosystems, Seminar 2 hours, E. S. Deevey and others

This class considers, in discussion of student reports and occasional lectures, some topics in the ecology of man and culture: Human populations past and present, production of human substance, Pleistocene paleoecology and evolution of culture, effect of disturbance on ecosystems, resources, pollution and garbage. An attempt is made to develop an ecological view of economic man.
Prerequisite: University classes in biology, economics and social science.

404 Applied Biology (1971-72), Seminar 2 hours

Study of physical systems by analogy with living systems and of living systems by analogy with physical systems.

A class designed primarily for students in physical and social sciences and engineering.

Special Classes Offered

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

405A Trophic Ecology, Lecture 2 hours, K. H. Mann, J. G. Ogden III.
The analyses of ecosystems on the bases of productivity and trophodynamics. Ecological energetics. Interactions between populations and trophic levels and their exploration by mathematical models and systems analysis techniques.

406/506 Plant Ecology and Quaternary History, J. C. Ritchie (1971-72).

407/507 Introduction to Oceanography, Lecture, G. A. Riley/P. J. Wangersky

A survey class designed to present major principles and to orient the student toward the subject matter of the field as a whole, including physical and chemical oceanography, geophysics, marine geology and biology, and engineering aspects of oceanography. Particular emphasis is placed upon inter-disciplinary approaches to the study of marine problems.

408/508 Biological Oceanography (1971-72), Lecture 2 hours, G. A. Riley and members of staff

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 306

410A/510A Marine Algology (1971-72), Lecture 2 hours; laboratory 3 hours, plus additional field trips.

The class will study the diversity, distribution and ecology of attached and planktonic marine algae. The laboratory work will consist of field surveys, collections, identifications, studies of ecological relations and current experimental methods. There will be seminars in which discussions are emphasized.

Each student will be required to make a collection of marine algae and conduct a small research problem of his choice.
Prerequisite: Biology 312B or its equivalent.

410B/510B Freshwater Algology (1971-72), Lecture 2 hours; laboratory 3 hours, plus additional field trips.

The class will study the diversity, distribution and ecology of freshwater algae. The laboratory work will consist of studies of culture, cytological techniques and experimental methods. There will be seminars in which discussions are emphasized.

Each student will be required to analyze the algal content of a river, ditch, pond or lake, etc., isolate the forms therein, get these into unialgal culture where possible and, finally, present the results in a formal write-up.
Prerequisite: Biology 312B or its equivalent.

414/515 Biochemistry of Plants and Micro-organisms, Lecture 2 hours; laboratory 3 hours, L. C. Vining
Prerequisite: An introductory class in biochemistry. Permission of instructor is required.

419/519 Bacteriology Lecture 2 hours plus tutorials, R. Brown

This class will consist of lectures and tutorials and will cover selected topics in advanced bacteriology.

421B/521B Biological Effects of Radiation (1970-71), 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/523B Cytogenetics, O. P. Kamra (1971-72).

425B/525B Plant Biosystematics, M. J. Harvey

431/531 General Virology, R. G. Brown/W. C. Kimmins

433A/533A Mycology, Lecture 2 hours; laboratory, R. Brown (1971-72).

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.

Aspects of fungal genetics and taxonomy will reflect resources available.
Prerequisite: Biology 311 or Microbiology 302.

437/537 Theoretical and Experimental Embryology, Seminar 2 hours; laboratory projects, B. K. Hall (1971-72).

Advanced reading and project-study in development, morphogenesis, differentiation, regeneration, growth.
Prerequisites: Biology 205A/B and 350A or their equivalent.

439B/539B Ichthyology, E. T. Garside

447/547 Influence of Chemical Agents on Living Organisms, C. R. Dean/D. J. Ecobichon

480/580 Special Topics in Biology, Members of staff

490 Honours Research and Thesis

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 mocrobial structure.

3. Microbiology. 403/Biology 419/519. A class for advanced students in bacteriology Two of three topics will be chosen and covered in depth.

4. Microbiology 404/Biology 431/531. 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 twelve students.

6. Biology 415/515. A class for advanced students in microbial chemistry.

7. Biology 433A/533A. 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 433A/533A (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 433A/533A (mycology).

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. Biochem. 302 (Intro. Biochem.) *or* Biol. 201A/B (Cell Chem. and Function)
12. Microbiol. 404/Biol. 431 (Virology) *or* Microbiol. 403/Biol. 419 (Bacteriology)
13. Microbiol. 406A (Microbial Genetics *or* Biol. 433A/533A (Mycology). Microbiol. 303B (Microbial Structure) *or* Biol. 322B (Parasitology)
14. Elective (Humanities or Social Science beyond 100 series)
15. Elective (Science beyond 100 series)

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Year IV
16. Microbiol. 407 *or* Biol. 490 (Thesis)
17. Microbiol. 404/Biol. 431 (Virol.) *or* Microbiol. 403/Biol. 419 (Bacteriology)
18. Choice of Microbiol. 405 (Immunology) *or* Biol. 415/515 (Microbial Chemistry)
19. Biol 401B (Statistics), Choice of Microbiol. 406A (Microbial Genetics) *or* Biol. 433A/533A (Mycology)
20. Biochem. 400 series *or* Chemistry beyond 100 series.

Classes to be Given Annually
Biology 311 – General Microbiology
Microbiology 302 – General Microbiology
Microbiology 403/Biology 419 – Bacteriology
Microbiology 404/Biology 431 – 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 433A/533A – Mycology

47.4 / *Chemistry*

Professors
W. J. Chute
O. Knop
D. E. Ryan (Chairman)
L. Sommer (Senior Killam Fellow)
P. J. Wangersky (Oceanography)

Associate Professors
T. P. Forrest
K. E. Hayes
J. W. S. Jamieson
W. E. Jones
K. T. Leffek

Assistant Professors
C. A. Armour
G. A. Dauphinee
R. W. Frei
J. S. Grossert
D. L. Hooper
D. J. Stewart
K. K. Yee

Killam Postdoctoral Fellows
W. W. Barker
A. N. Kardos

Postdoctoral Fellows
S. A. Berger
A. Jarczewski
E. Ko
O. Navratil
V. Zatka

Chemistry is one of the physical sciences and the language of physical science is mathematics. Any student who does not enjoy mathematics should not contemplete 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, though 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 second 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 100 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 100
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 General Chemistry Lecture 3 hours; laboratory 3 hours. G. A. Dauphinee/D. L. Hooper/J. W. S. Jamieson/D. J. Stewart/K. K. Yee.

This class provides an introduction to the fundamentals of physical chemistry which are necessary to the study of any second-year class in chemistry. These fundamentals include atomic structure, chemical bonding, periodic properties, gases, liquids, solids, solutions, acids and bases, stoichiometry, chemical equilibrium, thermodynamics, oxidation-reduction and chemical kinetics.

For each topic, stress 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: (1969-70) Crockford and Knight, *Fundamentals of Physical Chemistry, 2nd. ed.,* Wiley, 1959; Sisler, *Electronic Structures, Properties and the Periodic Law,* Reinhold, 1963. *These texts will not necessarily be used in 1970-71.*

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 Inorganic Chemistry Lecture 2 hours; laboratory 3 hours, R. W. Frei

In the first part of this class an intensive discussion of chemical equilibria with and without the use of approximations will be given. A correlation of this material to qualitative and quantitative analytical chemistry (i.e. competing solubility products, titration curves of weak and polyprotic acids and bases) is attempted.

The second part of the class will include a discussion of the electronic structure of atoms with a basic introduction to quantum mechanics. These same principles will then be used for the prediction of chemical properties of the elements and for a treatment of chemical bonding, structure of molecules and compounds, transition metal complexes and chelates. The theoretical part will also include a discussion of modern physical separation methods (i.e. ion exchange, chromatography) in connection with laboratory work.

The laboratory work will consist of the qualitative testing of cations and anions and an investigation of their chemical behaviour. During the second term, analysis of a complex solid unknown will be carried out. The more advanced students will do experiments in ion exchange and thin-layer chromatography of cations and some quantitative analytical work (volumetric and gravimetric analysis). The preparation of an inorganic compound may be chosen as an alternative if time permits.

This class is required for chemistry majors and recommended for other science majors such as geologists, oceanographers, biologists, etc.

The essential knowledge and skills needed for Chemistry 210 are outlined below:

Chemistry: The student should be familiar with chemical nomenclature, stoichiometry, balancing equations of the acid-base, redox, complex formation, type, etc., and be familiar with concentration terms. He should have a basic knowledge of equilibria dealing with slightly soluble compounds, coordination compounds; acid-base and redox equilibria, gases, etc. Basic knowledge of electrochemistry, electrolysis, batteries, etc. is desirable.

He should possess some understanding of gas laws, kinetics (first order) and the 1st and 2nd law of thermodynamics and have an introductory knowledge of the types of chemical bonding, electron structure of atoms and some periodic properties, as well as some basic properties of solids and solutions.

Laboratory: The student should have been exposed to a chemistry laboratory class and should be familiar with safety measures for handling dangerous chemicals. He should have a basic set of laboratory techniques, i.e., filtration, decantation, digestion, preparation of solutions, weighing procedures, titration, etc., and he should be able to keep a good record of his laboratory procedures and observations.

Mathematics: A thorough knowledge of algebra and geometry and handling of logarithms and exponents is required. Calculus is not absolutely necessary and could be taken concurrently with Chemistry 210.
Prerequisite: Chemistry 100 (Mathematics 100 at least concurrently).
Texts: (1969-70) Clifford, *Inorganic Chemistry of Qualitative Analysis,* Prentice-Hall, 1964; Cartmell and Fowles, *Valency and Molecular Structure 3rd. ed.,* Butterworths, 1966. *These texts will not necessarily be used in 1970-71.*

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 100; Mathematics 100.
Text: (1969-70) Barrow, *Physical Chemistry, 2nd. ed.,* McGraw-Hill, 1966. *This text will not necessarily be used in 1970-71.*

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 100. 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: (1969-70) Kice and Marvell, *Modern Principles of Organic Chemistry,* MacMillan, 1966. *This text will not necessarily be used in 1970-71.*

242 Introductory Organic Chemistry Lecture 2 hours; laboratory 3 hours, J. S. Grossert

Chemistry 242 is an introductory class in organic chemistry and is intended primarily for science students.

It is begun by reviewing elementary theory concerning the structure and formation of molecules which contain carbon atoms and one or more atoms of elements such as hydrogen, oxygen, nitrogen, halogens, etc. This is followed by a systematic survey of the properties and reactions of some of these molecules. This survey attempts to show how these properties and the way in which reactions take place may be explained in terms of the electron distribution within the molecules. Concurrently, the laboratory section of the class is designed to give instruction in the recognition and preparation of pure compounds. This is then followed up with a study of reactions intended to illustrate topics presented in the lecture room. The content of the class should provide a sound basis for further studies in organic chemistry or biochemistry.

Required knowledge for Chemistry 242:
1. Knowledge of elementary physical and inorganic chemistry as covered in a modern freshman class. This should include the properties of gases, liquids and solids; basic thermodynamics and thermochemistry; solutions, electrolytes, pH measurements, equilibrium, kinetics, and oxidation-reduction systems. Laboratory skills should include general basic manipulation, with some emphasis on qualitative analysis and titrations.

2. Knowledge at a freshman level should also include modern atomic theory and bonding in simple descriptive terms.
Prerequisite: Chemistry 100 or equivalent.
Texts: (1969-70) Roberts and Caserio, *Basic Principles of Organic Chemistry,* Benjamin, 1965 (also used in 340); Benfey, *The Names and Structures of Organic Compounds,* Wiley, 1966. *These texts will not necessarily be used in 1970-71.*

243 Introductory Organic Chemistry with Biochemistry. Lecture 2 hours, laboratory 3 hours, K. T. Leffek

This class is taken by nursing students. It will not serve as a prerequisite to third-year classes in chemistry. During the first term a basic introduction to the chemistry of carbon compounds is given. In the second term students transfer to the Biochemistry Department.

Required knowledge: The same level of knowledge and understanding of the principles studied in Chemistry 100 is required for this class as described for Chemistry 241.

320 Analytical Chemistry Lecture 2 hours, laboratory 6 hours (first term), 3 hours (second term), D. E. Ryan

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: (1969-70) Skoog and West, *Fundamentals of Analytical Chemistry,* Holt, Rinehart, Winston, 1969. *This text will not necessarily be used in 1970-71.*

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 and 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.
Prerequisities: 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 100 and 242 or equivalents.
Texts: (1969-70) 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.
(a) These texts will not necessarily be used in 1970-71.
(b) All classes, and particularly the advanced classes, are required to consult references beyond the minimum stated in this list.

400 Theoretical Chemistry Lecture 2 hours, J. W. S. Jamieson

This class includes an introduction to quantum mechanics, valence bond and molecular orbital theories, lattice energy calculations, ligand field theory, and other theoretical aspects of physical-inorganic chemistry.

Useful preparation would include as many classes as possible in chemistry, mathematics and physics.
(References) 1969-70 Royer, *Bonding Theory,* McGraw-Hill, 1968, Murrell, Kettle and Teddar, *Valence Theory,* Wiley, 1965; Glasstone, *Theoretical Chemistry,* Van Nostrand, 1944, Pauling and Wilson, *Introduction to Quantum Mechanics,* McGraw-Hill, 1935; Coulson, *Valence 2nd. ed.,* Oxford, 1961; Heitler, *Elementary Wave Mechanics, 2nd. ed.,* Oxford, 1956.
(a) These texts will not necessarily be used in 1970-71.
(b) All classes, and particularly the advanced classes, are required to consult references beyond the minimum stated in this list.

410 Advanced Inorganic Chemistry Lecture 2 hours; laboratory 3 hours

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: (1969-70) Evans, *An Introduction to Crystal Chemistry, 2nd. ed.,* Cambridge; Wells, *The Third Dimension in Chemistry,* Oxford. *These texts will not necessarily be used in 1970-71.*

420 Instruments in Chemistry Lecture 2 hours; laboratory 3 hours, R. W. Frei/D. E. Ryan

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: (1969-70) Reilly and Sawyer, *Experiments for Instrumental Methods,* McGraw-Hill, 1961. *These texts will not necessarily be used in 1970-71.*

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: (1969-70) 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: (1960-70) 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 1970-71.*

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.

Programmes of Study 47.4 Chemistry

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

Lecturer
R. Friedrich

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 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, 236 (same as Philosophy 236) and 240 (same as Philosophy 240) 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 236 (same as Classics 236).

Year III
11. Greek 200 or 300.
12. Latin 200 or 300.
13. A Classics 200-level (Ancient History) class or Philosophy 236 (same as Classics 236).
14. A further class in ancient history.
15. Philosophy 236 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 240 (same as Classics 240).

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 236 (Greek Philosophy, same as Classics 236).
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 240 (Medieval Philosophy, same as Classics 240).
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 236 or 240 (same as Classics 236 or 240).
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 236 or 240 (same as Classics 236 or 240).
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 chapterrs 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 Homeric 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 Poetry (Sophoclean Drama) Lecture 2 hours, R. Friedrich
Prerequisite: Greek 200.

301 Greek Historians Lecture 2 hours, B. W. W. Dombrowski

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

Programmes of Study 47.5 Classics

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.

Since this is an advanced class in Greek, the instructor assumes that the students possess a sound knowledge of Greek grammar and syntax. They ought to be familiar with the history of Greek literature and ancient philosophy. Students are therefore advised to read or to have read at the outset of the class the *History of Greek Literature* by either Moses Hadas or C. M. Bowra and *An Introduction to Ancient Philosophy* by A. H. Armstrong.

Students will participate in setting up the programme of the class. The instructor will propose a detailed programme to the class which will be discussed by all of its members. They may then suggest other topics in which they are interested, or revisions and modifications of the programme as proposed by the instructor.
Prerequisite: Greek 200.
Texts: The Republic by Plato; *The Poetics* by Aristotle.

Latin
099 Introductory Latin Lecture 3 hours

Special (non-credit) classes will be provided upon request for students who wish to begin the study of Latin in the University.

100 Latin Language and Literature Lecture 3 hours, M. A. Usmiani

The purpose of this class is twofold: a general introduction to Latin literature through the reading of some basic works of prose and poetry, and a survey of Latin syntax. The class is therefore divided in two parts; two hours a week will be devoted to reading of Latin texts, with discussions and commentary, and one hour a week to Latin composition.

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 099.

200 Latin Poetry Lecture 2 hours, M. A. Usmiani

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 1970-71 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, M. A. Usmiani

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 themsleves 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. Usmiani

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. Usmiani

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
202 Intermediate Hebrew
303 Advanced Hebrew

Coptic
101 Introduction to the Coptic (Sahidic) language and literature (not offered in 1970-71). 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 (not offered in 1970-71). 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 (not offered in 1970-71). D. W. W. Dombrowski

200 Intermediate Akkadian (Babylonian) 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 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.

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 Civilization Lecture 3 hours; J. A. Doull/J. P. Atherton/R. D. Crouse/R. Friedrich

Classics 100 is intended to introduce the student to the history, literature and philosophy of classical and Christian antiquity, by means of a study, in English translation, of a few of the greatest works of ancient authors. After a series of lectures on the political and institutional history of Greece and Rome, students will read Homer's *Iliad,* one or two Greek plays, Aristotle's *Politics,* Vergil's *Aeneid* and St. Augustine's *City of God,* concentrating on some of the most important literary themes and political and philosophical ideas expressed in these works. Thus, the class should serve as an introduction to the several areas of classical studies, and should also be of value to students in other fields in the humanities and social sciences in that it shows the origins and significance of many of the ideas and institutions which have been of central importance in the formation of the traditions of European thought and society.

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. 1970-71: first term – the history of the Hittites; second term – the history of Ancient Persia.
Prerequisite: History 100 or Classics 100.

Classics 251/551 Seminar on Problems of Ancient Near Eastern History (not offered in 1970-71). Seminar 2 hours, E. Segelberg/B. W. W. Dombrowski

This class is primarily for honours and graduate students. Others may be admitted at the discretion of the instructor.
Prerequisite: History 100 or Classics 100.

Classics 222 Greek History Lecture 3 hours, J. P. Atherton/B. W. W. Dombrowski

A study is made of the main features of the history of the Greek world and of Hellenism.
Prerequisite: History 100 or Classics 100.

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. In 1970-71 the class will deal with the development of the liturgy and the fight of the Church to preserve its identity, studied against the background of both Jewish traditions and the Hellenistic world. The teaching of the Twelve Apostles (Didache), the Apostolic Fathers, and the Apostolic Tradition of Hippolytus will be especially used as sources.

Characteristics of the Hellenistic Age will be studied in detail as warranted.
Prerequisite: History 100 or Classics 100.

Classics 223 Roman History (offered in 1971-72), 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 "Great Society" of the Roman Empire. Students are expected to read extensively.
Prerequisite: History 100 or Classics 100.

Programmes of Study 47.5 Classics

Classics 253/533 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: Classics 100 or History 100.

Classics 224 The Bible in Relation to Classical Culture (offered in 1971-72), Lecture 3 hours

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 236 Ancient Philosophy from Aristotle to St. Augustine (same as Philosophy 236) Lecture 2 hours, R. D. Crouse/J. A. Doull

Classics 236 (Philosophy 236) 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 the 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.
Prerequisite: While previous work in earlier Greek philosophy, ancient history and literature would be useful preparation, Philosophy 100 is the only prerequisite.

Classics 240 Medieval Philosophy (same as Philosophy 240) Lecture 2 hours, R. D. Crouse

Classics 240 (Philosophy 240) 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.
Prerequisite: Previous work in ancient philosophy or in other areas of classical or medieval studies would be useful preparation, but Philosophy 100 is the only prerequisite.

Classics 461/561 Seminar on the Philosophy of Aristotle (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 Seminar 2 hours, J. A. Doull

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.

Classics 465/565 Seminar on Neoplatonism, Visiting Professor

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
C. R. Brookbank (Chairman)
R. S. Cumming
R. E. George
C. W. Schandl

Associate Professors
H. I. Bishara
R. C. Shook

Assistant Professors
J. D. Misick
E. W. Scott
G. E. R. Zinck

Lecturers
G. R. Chesley
R. H. R. Glube
C.W. Hayward
H. A. MacKinley
S. M. Oland

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.

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 102
Economics 100A and 100B
Mathematics 110

II Electives: Two classes outside the business area (i.e., not titled "Commerce" or "Economics".

Year II
I Core requirements:
Commerce 213B (1 term)
Commerce 206A (1 term)
Commerce 204 (was 304 in 69/70)
Commerce 210 (was 101 in 69/70)
Commerce 207A (1 term)
Commerce 208A/B (1 term)
Commerce 209B (1 term)
Economics 200A *or* Economics 200B (1 term)

II Electives: None (unless above classes have been elected in the first year).

Year III
I Core requirements:
Commerce 302

II Electives: Two classes chosen without restriction, except that overall requirements must be met (see above).

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.

Year I and Year II
As for General Bachelor of Commerce.

Year III and Year IV
Not in operation until future years. Consult the Department.

Students Entering in 1969 and Earlier Years

(see 4 for students entering 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 Fundamentals of Accounting

Renumbered Commerce 210 below.

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

Managerial Accounting – This class gives an introduction to the accounting methods and reports which provide information for managements' special decision-making needs. Emphasis is placed on the analysis of cost behaviour for use in planning and controlling business operations.

Introductory Finance – An introduction is given to the problems faced by business managers in raising funds for their enterprise and in deciding on the best way to use the funds to fulfill its goals. This necessarily involves some examination of the nature and operation of the money and capital markets from which funds are obtained.

Essential background knowledge and technical skill – An understanding of economic principles and the economic environment in which a business operates, and sufficient knowledge of accounting process and principles to enable the student to use financial data intelligently.

Commerce 202 is a terminal class designed for those commerce students who do not wish to undertake further study in the fields of accounting and finance.

203 Legal Aspects of Business (old programme only).

Requirement may be satisfied by completing both Commerce 213B and 203B below.

203B Commercial Transactions (1 term)

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.

204 Quantitative Analysis – Statistics for Economics and Business, Lecture 3 hours; workshop 2 hours, R. E. George

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; 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 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.

206A Quantitative Analysis – Computer Applications to Business Problems (1 term)

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 Introduction to Managerial Finance (1 term), Lecture 3 hours

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. Commerce 210 should be taken either before or concurrently.

208A/B Marketing Management (1 term), Lecture 3 hours, S. M. Oland

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 208A/B in their first year.

There are no prerequisites for this class, although some knowledge of accounting would be helpful.

209B Production (1 term)

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.

210 Quantitative Analysis – Introductory Accounting, Lecture 3 hours; workshop 1 hour, G. E. R. Zinck

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 preprequisites for this class.

213B Legal Aspects of Business – Contracts (1 term)

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.

301 Cost Administration, Lecture 2 hours, G. E. R. Zinck

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 210 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. Misick

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 204/304 above.

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 317A, Commerce 317B, Commerce 318A or Commerce 318B.
Prerequisites: Commerce 210, Commerce 102.

310 Quantitative Analysis – Financial Accounting, Lecture 3 hours; workshop 1 hour

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 210

317A Marketing – Mass Distribution (1 term) (not offered every year)

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 evironment, 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 Marketing Management

317B Marketing – Sales Management (1 term) (not offered every year)

In this course 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 Marketing Management.

318A Marketing Research and Information Systems (1 term) (not offered every year)

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 – Marketing Management; Commerce 204 – Statistics

318B Marketing – Advertising and Consumer Behaviour (1 term) (not offered every year)

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

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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 – Marketing Management; Commerce 204 – Statistics

350 Special Class for Honours Students

354 Finance and Taxation (old programme only), Lecture 3½ hours, H. A. MacKinley – Taxation

This class gives an introduction to the theory of finance, emphasizing two main aspects: (1) the decisions required by management in raising and using funds in ways best suited to meeting the objectives of the enterprise; and (2) the nature and operation of the money and capital markets as a major environmental influence on the decisions taken by financial managers of individual businesses.

To provide an additional perspective on both these aspects, an introduction to the taxation system in Canada is included, 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 in some detail.
Prerequisites: Commerce 310 and Economics 100A and 100B.

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

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 The Economic History of North and South America *and*
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 / *Economics*

Professors
J. F. Graham
J. G. Head
Z. A. Konczacki
N. H. Morse (Chairman)
A. M. Sinclair

Associate Professors
R. L. Comeau
C. Steinberg

Assistant Professors
J. M. Beaubroy
F. M. Bradfield
P. B. Huber
E. Klein
C. T. Marfels
C. M. Ouellette
T. A. Pinfold
U. L. G. Rao

Postdoctoral Fellow
V. Sverak

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 11aA/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 440.
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 100A and 100B, Lecture 2 hours; tutorial 1 hour, J. Graham/M. Bradfield/R. Comeau

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.

The first half year has been designated *Economics 100A.* In this half, 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 who have completed Economics 100A are offered an option for the second half. It is expected that most students will continue into the *Economics 100B* class which will devote the remainder of the year to economic problems and policy applications. At the completion of Economics 100A and 100B, 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 (A and B) 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 Economics 100A, have
(a) already decided that they wish to do major or honours work in economics; and
(b) completed the Economics 100A segment with at least second-class standing,
the option is offered either to continue into Economics 100B or to go directly into a first level theory course, *Economics 220A/B or 221A/B.* 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 take the Economics 100B 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 take Economics 100B 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 in both terms), C. Marfels

This class analyzes the functioning of certain types of decision-making units in an economic system. It starts with a discussion of consumer demand theory, and the decision-making process of the household is analyzed by means of indifference-curve theory. The class then looks to the other side of the market; that is, to supply, and it is mainly concerned with the theory of cost. The last and most extensive part of the class material deals with the theory of price formation in various market situations; i.e., competitive, monopolistic and oligopolistic pricing. Empirical findings about pricing under various market conditions are examined in the light of special case studies of selected industries.
Prerequisite: Economics 100(old), Economics 100A(new).
Text: R. H. Leftwich, *The Price System and Resource Allocation, 3e.*

Economics 221A/B Macro-Economic Theory, Lecture 3 hours (offered in both terms), A. M. Sinclair

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" economics are considered. Major emphasis is placed on the development of the theoretical ideas.
Prerequisite: Economics 100A (Economics 100 in old programme).

222 Economic Statistics I (same as Commerce 204), Lecture 3 hours; workshop 2 hours, R. E. George

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; 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 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.

231 Comparative Economic Systems, 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 information on the structure and performance of a variety of economies. Readings on specific countries provide the basis for several short papers in the first term. Much of the assigned reading in the second term compares aspects of economies or deals with macro-economic and micro-economic organization theories.

The student taking this class must understand the interrelated character of economic activity and have a good grasp of the way in which the price system operates. Both of these can be obtained in Economics 100. Preliminary reading should have included *The Making of Economic Society* by R. L. Heilbroner and *Soviet Economic Power* by R. W. Campbell.
Prerequisite: Economics 100.

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.

233 Economic Development in Historical Perspective, Lecture 3 hours, J. M. Beauroy

Economics 312 is divided into two parts. First, it 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. Secondly, the 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 100A. Students may be admitted by permission of the instructor.

234 Economic History of Pre-Industrial Europe (Not offered in 1970-71)

235A Introduction to Economic History of Sub-Saharan Africa, Lecture 2 hours (first term), Z. A. Konczacki

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 colonization on Africans, an economic balance-sheet of colonialism.

236B Recent Economic Developments in Sub-Saharan Africa, Seminar 2 hours (second term), Z. A. Konczacki

This seminar centers 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 XVIIth and XVIIIth Centuries – 1600-1800.

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 100A as prerequisite.

Economics 320B Micro-Economic Theory II, Lecture 3 hours, Instructor: to be announced

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 work in Industrial Organization.
Prerequisites: Mathematics 110 and Economics 220A/B which may not be taken concurrently.

Economics 321 A Macro-Economics Theory, Lecture 3 hours, A. M. Sinclair

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 (Economics 200 in old programme) 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. Konczacki

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

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and the typology of planning, plan strategy, planning models, problems of implementation, and some case studies.
Prerequisite: Economics 100. A class in macro-economics equivalent to Economics 221A/B is desirable but not required in 1970-71.

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. For the 1970-71 year the former Calendar requirement of Economics 100 will be a sufficient prerequisite.

Economics 325 Labour Economics, Lecture and seminar 3 hours, C. Steinberg

Some twelve million Canadians are directly dependent upon wages and salaries for a living, and their income constitutes about 65% of the National Income. Almost two million of these workers belong to trade unions in critical sectors of our economy. Thus, an economic analysis of the factors affecting wages and salaries, employment and unemployment, the conditions of labour, and the labour market becomes important to an understanding of the economy as a whole.

As an introduction to the subject we review: 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:
(a) Analysis of the supply and demand for labour, opening with a review of classical wage theory.
(b) 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.
(c) Study of labour's share of the national income and the relative effect of unions on it.
(d) Analysis of the determinants of employment in the macroeconomic sense, and of the measurement and character 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 100A and an interest in social science and its methods. Economics 220A/B and 221A/B are desirable but are not required in 1970-71.

Economics 326B Money and Banking, Lecture 3 hours, A. M. Sinclair

This class is concerned with tracing the impact that the financial system as a whole has 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, with special emphasis on the periods 1945-1950, 1957-1961, and 1967 to the present. A knowledge of macro-economics is assumed.
Prerequisite: Economics 221A/B.

327 History of Economic Thought, Lecture 3 hours, N. H. Morse

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 but will not be required in 1970-71. Economics 100 (or 100A)) is required.

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 market-share 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 in 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: A course in micro-economics (old: Economics 200, new Economics 220A/B).
Text: J. S. Bain, *Industrial Organization, 2e.*

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 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 **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-buliding. 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. After the 1970-71 term, the prerequisites will be specified as Economics 322 and 220A/B and 221A/B.

Economics 426B Monetary Policy, Lecture 3 hours, R. L. Comeau

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 (or Economics 200 in the old calendar).

427 Philosophy, Politics and Economics, Seminar 2 hours, D. Braybrooke

See Philosophy 340 and Political Science 349 (Not offered in 1970-71).

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 descussed. Depending upon class interest, certain issues of international development finance and problems of instability and growth in the international economy may be discussedd 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 329A and 326B or equivalents in the old calendar. In special cases this requirement may be waived by the instructor.

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 (or Economics 200 in the old calendar). 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.

435 The Canadian Economy in the Twentieth Century, Seminar 2 hours, N. H. Morse/A. M. Sinclair

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.

Programmes of Study 47.7 Economics

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.

47.8 / Education

Professors
D. G. Lewis
A. S. Mowat
H. J. Uhlman

Associate Professors
B. M. Engel
E. T. Marriott
S. W. Semple (Acting Chairman)

Assistant Professors
P. I. Bartolome
V. R. Blake
R. Gamberg
L. D. Karagianis
H. E. Poole
P. N. Ross
E. M. Semple

Special Lecturers
M. Ardenne
D. Aydelott
E. S. Clark
E. Coles
L. H. Lawrence
Sister M. Olga McKenna
V. Mowat
V. Ojha
G. Walford

Research Assistant
M. J. Grant

Teaching Assistants
H. M. Cooper
W. D. VanZoost

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, 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 that 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 Teacher's 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.

Degree Programmes

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, 404, 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 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 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 402, 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 Groups 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 407 or another academic class may be taken, subject to the approval of the Department. Candidates must also complete successfully Education 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 maybe 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 Teacher's 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 Dipoma 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.

Note: The Diploma in Education course previously offered to students who had completed 10 or more classes towards the degree of B.A., B.Sc. 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. and complete successfully Education 401 and 402. (If either Education 401 or Education 402 has been completed already, another class in Education may be substituted, subject to the 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 Professional Certificate must submit with his application, documentary evidence (in a form prescribed by the Minister of Education) respecting the applicant's moral charater, 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.

401 General Principles of Education, Lecture 3 hours

This is an introductory class in education which provides for a comparative and historical treatment of recently developed educational theories and methods. Attention is also given to the analysis of some of the more important educational principles which give direction to 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).
Text: To be selected.

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 for Nova Scotia. Lectures on method will be given covering seven subjects: English (405A/B), history (415A/B), 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 (M 405A) or economics (475C).
Texts: to be arranged.

M405A 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 aspets 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.

47.9 / Engineering and Engineering-Physics

Professors
K. F. Marginson (Chairman)
G. W. Holbrook
A. Levin

Assistant Professors
D. M. Lewis
E. T. Nugent
F. N. Patterson

Special Lecturer
A. F. Chisholm
J. Strasser

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 onthe 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 110
2. Engineering 001
3. Mathematics 100
4. Chemistry 102
5. Elective (Arts)
6. Language 100

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. Language 100

Year II
6-7. Physics 211 and 231
8. Mathematics 220
9. Mathematics 200
10. Elective (Science)

Year III
11-12. Physics 300, 315
13-14. Engineering 330A, 330B and 335
15. Mathematics 300
16. Elective (Arts)

Year IV
17. Physics 400
18. One other Physics 400-level class
19. Engineering 433
20. Engineering 420 or other 400-level Engineering 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, A. F. Chisholm

This class is an introduction to the principles and approved methods 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 observations will be presented. Construction surveying such as the lay-out of alignments and curves will be discussed.
Text: (1969-70) Rayner and Schmidt, *Elementary Surveying*

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: ICES COGO 1, User's Manual.

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 self-contained treatment of vectors will be given. The student will then consider the equivalence, resultant and equilibrium of force systems acting on particles 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: (1969-70) 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. Holbrook

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 310 (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, TABLE and ECAP. Students will be given limited exposure to the analog computer.
Prerequisites: Registration in third-year engineering, or consent of instructors.
Text: (1969-70) 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.

It is expected that the prescribed material, which is mainly that of the text, will be completed by the spring break. The remainder of the work of the class will be decided by the students.
Prerequisites: Mathematics 100; Engineering 220A, 220B, Engineering 310 (taken concurrently).
Text: (1969-70) Huang, *Engineering Mechanics Volume 2.*

330B Strength of Materials Lecture 3 hours; laboratory 3 hours (one term only), E. N. Patterson

This class is an introduction to that aspect of mechanics which is sometimes called strength of materials 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: (1969-70) Higdon, Ohlsen, Stiles, Weese, *Mechanics of Materials.*

330A Materials Science Lecture 3 hours (one term only), E. N. Patterson

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: Engineering 230 or Physics 231, Mathematics 220 or 228 to 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 apppications other than those involving chemical reactions.
Prerequisites: Mathematics 100; Physics 110; Chemistry 230 (may be taken concurrently).
Text: (1969-70) Van Wylen, *Thermodynamics.*

340B An Introduction to Fluid Mechanics Lecture 3 hours; laboratory 3 hours (one term only), E. N. Patterson

Fluid mechanics is the engineering science upon which such specialities 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: (1969-70) 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; thermonic 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.

Programmes of Study 47.9 Engineering and Engineering-Physics

420/520 Communication and Control Theory Lecture 3 hours, S. T. Nugent

The first term is intended to introduce the student to the principles of communication theory. Topics include: the frequency and time domain, random signal theory, network analysis, basic information theory, modulation and noise.

The second term will provide an introductory study of the principles and techniques used in the analysis and design of feedback control systems. Topics include: transfer functions of linear systems, transient response, frequency response, stability of linear systems, root locus technique, state variable characterization of linear systems and the design of feedback control systems.
Texts: TBA

433 Semiconductors Lecture 3 hours, A. Levin

Term 1: 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.

Term 2: **Systems and Applications:** Circuit analysis, system logic, signal processing, noise and signal degradation; circuit techniques, analogue and digital.
Prerequisites: 4th-year standing and permission of instructor.
Text: Millman and Halkias, *Electronic Devices and Circuits.*

47.10 / English Language and Literature

Professors
A. R. Bevan
C. L. Bennet
M. G. Parks (Chairman)
M. M. Ross
S. E. Sprott
D. P. Varma

Associate Professors
R. MacG. Dawson
J. Fraser
A. J. Hartley
S. Mendel
A. N. Raspa
H. S. Whittier

Assistant Professors
A. G. Cannon
S. A. Cowan
R. S. Hafter
M. A. Klug
C. J. Myers
R. L. Raymond
R. J. Smith
H. D. Sproule

Killam Visiting Fellow (1969-70)
H. David Scott

Dalhousie Visiting Fellow (1969-70)
Robert Morris

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. 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 seven 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; one other (to be announced).
Section E. (to be announced).
Section F. English 453; English 455.

The student may choose his two 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 250 (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 45.1).*

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:
a) to involve the student in the serious study of literature as a crucial part of education;
b) 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.

Instructors make up their syllabuses from a list of twenty-seven titles, seven of which are studied in each individual section. Thus each section has as required subject matter three novels, two plays, and two long poems (or collections of shorter poems by two poets). In addition, all sections spend the first two months on critical reading, with short stories and short poems used as texts and examples. 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.

201 The English Language, Lecture 3 hours, A. G. Cannon

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.
Texts: Introductory Readings on Language, ed. Anderson and Stageberg; *The Words We Use,* Sheard.

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 representative novels of the last two hundred years in translation.
Prerequisite: English 100.
Texts: Goethe, *The Sorrows of Young Werther* (Signet); Constant, *Adolphe* (Signet); Stendhal, *Scarlet and Black* (Penguin); Turgenev, *Fathers and Sons* (Signet); Flaubert, *Madame Bovary* (Norton); Dostoyévsky, *Crime and Punishment* (Penguin); Tolstoy, *Anna Karenina* (Signet); Gide, *The Immoralist* (Vintage); Mann, *The Magic Mountain* (Penguin); Kafka, *The Trial* (Modern Library); Koestler, *Darkness at Noon* (Signet); Sartre, *Nausea* (New Directions).

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.
Texts: To be announced.

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.
Texts: Bradley, Beatty and Long, *The American Tradition in Literature*, 3rd ed. (single volume edition); Cooper, *The Prairie* (Signet); Hawthorne, *The Scarlet Letter* (Houghton Mifflin): Melville, *Moby-Dick* (Bobbs-Merrill); Twain, *Adventures of Huckleberry Finn* (Houghton Mifflin); Crane, *The Red Badge of Courage and Four Great Stories* (Dell); Dreiser, *Sister Carrie* (Houghton Mifflin). Summer reading of the novels is advisable.

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 representatives writers of the nineteenth century (Howe, Haliburton, Susanna Moodie, Richardson, 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 periodicals and novels. Twentieth-century novels and poetry are studied in the last month of the first term and throughout the second term.
Prerequisite: English 100.
Texts: T. C. Haliburton, *The Clockmaker,* 1st. Series; Susanna Moodie, *Roughing It in the Bush;* Richardson, *Wacousta;* DeMille, *A Strange Manuscript Found in a Copper Cylinder;* Leacock, *Sunshine Sketches of a Little Town,* and *Arcadian Adventures With the Idle Rich;* Grove, *Fruits of the Earth;* MacLennan, *Two Solitudes;* Robertson Davies, *Leaven of Malice;* Callaghan, *Such is My Beloved;* Buckler, *The Mountain and the Valley;* Sheila Watson, *The Double Hook;* Margaret Laurence, *The Stone Angel.* The text for poetry is Klinck and Watters, *Canadian Anthology.*

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.
Texts: Theodore Dreiser, *Sister Carrie;* H. G. Wells, *Tono-Bungay;* Joseph Conrad, *The Secret Agent;* D. H. Lawrence, *Women in Love;* James Joyce, *Ulysses;* F. Scott Fitzgerald, *Great Gatsby;* Ernest Hemingway, *Farewell to Arms;* William Faulkner, *Light in August;* Henry Roth, *Call it Sleep;* Nathaniel West, *Miss Lonelyhearts;* Joyce Cary, *The Horse's Mouth;* Ralph Ellison, *The Invisible Man;* Saul Bellow, *The Victim;* John Hawkes, *The Cannibal;* Kingsley Amis, *Lucky Jim;* Iris Murdoch, *Under the Net;* Alexander Trocchi, *Cain's Book:* Thomas Pynchon, *V.;* J. P. Donleavy, *The Ginger Man:* Leonard Cohen, *Beautiful Losers.*

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.
Texts: To be announced.

214 Shakespeare, Lecture 2 hours, C. J. Myers

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 three 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).

250 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, R. L. Raymond

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.
Texts: More, *Utopia* (Yale); *The Essential Erasmus* (Mentor); *Two Early Tudor Lives* (Yale); Ashley and Moseley, *Elizabethan Fiction;* Spenser, *The Shepherd's Calendar and other Poems* (Everyman) and *The Faerie Queene, Vol. I* (Everyman); Rollins and Baker, *The Renaissance in England.*

252 Shakespare and the Drama of His Time, Lecture 2 hours, S. E. Sprott

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.
Texts: To be announced.

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.
Texts: To be announced.

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.
Text: To be announced.

351 Middle English, Lecture 3 hours, A. G. Cannon

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.
Texts: Early Middle English Verse & Prose, ed. Bennett & Smithers; *Complete Works of Geoffrey Chaucer,* ed. Robinson; *Age of Chaucer* (Pelican), ed. Ford.

352 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.
Texts: Hughes (ed.), *John Milton: Complete Poems and Major Prose* (Odyssey); Witherspoon and Warnke (eds.), *Seventeenth-Century Prose and Poetry,* 2nd ed. (Harcourt, Brace).

354 The Nineteenth-Century English Novel. Instructor and texts to be announced.

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, A. J. Hartley

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.
Texts: To be announced

452 Nineteenth-Century Thought, Lecture 2 hours

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.

Programmes of Study
47.10
English

Texts: J. S. Mill, *Essays on Bentham and Coleridge, On Liberty, Autobiography;* James Mill, *Essay on Government;* Thomas Carlyle, *Past and Present, Sartor Resartus;* John Ruskin, *Unto This Last;* William Morris, *News from Nowhere;* Matthew Arnold, *Culture and Anarchy;* J. H. Newman, *Apologia Pro Vita Sua, The Idea of a University;* T. H. Huxley, selected essays; Samuel Butler, *Erewhon.*

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.
Texts: To be announced.

455 Twentieth-Century American Literature

Details of this class had not been decided upon at the time of writing.

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 finalized, there may be significant changes in the classes listed above. Students should consult the Department or the Associate Registrar before registration.

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.

47.10A / European Literature

The Departments of German and Romance Languages offer a class in European Literature in Translation (European Literature 100) which may be offered as a credit in Group B (Humanities).

European Literature 100, Lecture 3 hours

European Literature 100 is an introduction to the history of modern European literature from its beginnings in the times of the Renaissance and the Reformation to the bourgeois revolution. Some of the greatest works by authors from different countries will be studied in English translation, such as Cervantes' *Don Quixote,* Tirso do Molina's *Don Juan,* Moliere's *Don Juan,* Corneille's *The Cid,* Racine's *Phaedra,* Goethe's *Faust,* Holderlin's *Bread and Wine.* By including the works of authors from different countries the class will acquaint students with the common tradition of modern European culture. In particular, it should prepare students for a more advanced study of literary works in the original language.

47.11 / Geology

Professors
H. B. S. Cooke
M. J. Keen (Chairman)
G. C. Milligan
A. Volborth (Visiting Killam Professor)

Associate Professors
R. A. Gees
P. E. Schenk

Assistant Professors
D. B. Clarke
F. Medioli

Senior Killam Fellow
F. Aumento

Special Lecturers
G. Davidson
D. Johnston
J. F. Jones
L. H. King
B. D. Loncarevic
D. H. Loring
J. I. Marlowe
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 salt 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 in 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.

Degree Programmes

Table I: **General Degree**

YEAR I	Geology 100 Language elective Humanities or Social Sciences elective Mathematics 100 Physics 110 or Biology 101 or Chemistry 100
YEAR II	Geology 201A and 201B Geology 202A and 202B Elective Two classes from Physics, Chemistry, Biology or Mathematics
YEAR III	Geology 301 Geology 302 Geology 303 One class from Geology, Physics, Chemistry or Biology 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 second year 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 is a sensible second class in Mathematics. Mathematics 228 could be taken instead, but students should note the restrictions on this class as a prerequisite for other classes.

Table II: Honours (Major)

	I Economic Geology	II Geophysics	III Geochemistry	IV Biological & Stratigraphic
YEAR I		Geology 100 Language elective Humanities or Social Sciences elective Mathematics 100		
	Physics 110	Physics 110	Chemistry 100	Biology 100
YEAR II		Geology 201A and 201B Geology 202A and 202B Elective		
	Chemistry 100 Mathematics 200	Physics 221 Mathematics 200	Chemistry 210 Physics 110 or Biology 100	Biology 200 Chemistry 100 or Physics 110 or Mathematics 200
YEAR III		Geology 301 Geology 302 Elective		
	Geology 303 Geology 304	Geology 405 Physics 231 or Mathematics 200, 206, 227 or 228	Geology 303 Chemistry 230	Geology 303 Biology 321
YEAR IV	Geology 401 or 406 Geology 403 Geology 404 Engineering 210, 211 Chemistry 210	Geology 303 Geology 304 Geology 401 or 407 Geology 452 Math. 200, 206 or Physics 231, 227 or 228	Geology 304 Geology 401 or 407 Geology 454 Geology 459 Physics 221 or Biology 200	Geology 304 Geology 401 Geology 455 Geology 457 or 456 Chem. 210 or Phys. 221 or Math. 200, 206, 207, or 228

Table III: Honours (Combined)

	I with Physics	II with Chemistry	III with Biology
YEAR I		Mathematics 100 Language elective Humanities or Social Sciences elective Geology 100	
	Physics 110	Chemistry 100	Biology 101
YEAR II		Geology 201A and 201B Geology 202A and 202B Elective	
	Physics 221 Mathematics 200	Chemistry 210 Mathematics 200, 206, 227, or 228	Biology 200 Chemistry 100 or Physics 110 or Mathematics 200
YEAR III		Geology 301 Elective	
	Physics 230 Physics 315 or 335 Geology 303	Chemistry 230 Chemistry 320 Geology 304	Biology 321 Biology 323 Geology 302
YEAR IV	Physics 320 Mathematics 200, 206, 227 or 228 Geology 305 Geology 401 or Geology 405 Geology elective	Chemistry 410 Physics 110 or Biol. 100 Geology 454 Geology 407 Geology elective	Biology elective Chemistry 210 or Physics 221 or Math 200 or 227 or 206 Geology 401 Geology 455 Geology elective

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
306 General Ecology
321 Invertebrates I
403 Marine Ecosystems
404 Advanced Ecology

Chemistry
310 Chemical Crystallography

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
501 Introduction to Oceanography
502 Physical Oceanography
503 Biological Oceanography
504 Marine Geology and Geophysics
505 Chemical Oceanography

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 pm 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

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.

Two-Hundred-Level Classes in Geology

These classes have been extensively revised for the year 1970-1971. A comparable revision will be made in three-hundred-level classes for 1971-1972 which will allow a logical progression of classes for students in their second year in 1970-1971. For example, a 300-level class in structural geology will be available, following 203B.

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 Introduction to the Study of Minerals and Rocks Lectures 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 course is divided into two halves.

201A Macroscopic Crystallography, Mineralogy and Petrology

This section of the course will deal with the study of crystal form, or morphological crystallography, as well as with the

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physical and chemical properties of minerals and rocks. In the laboratory, crystals, minerals and rocks will be examined in hand specimen.

201B Microscopic Mineralogy and Petrography

The lectures will cover the theory of determinative optical mineralogy as well as the characteristic textures of common rocks as seen under the microscope. The laboratory will deal with the practical application of microscopy in the determination of unknown minerals in thin section and in powders.

202A Introduction to Invertebrate 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 the 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 groups of invertebrate organisms of particular geological interest, together with consideration of their palaeoecologic significance and stratigraphic distribution.

202B Introduction to Sedimentology and Stratigraphy Lectures 3 hours; laboratory 3 hours, F. Medioli/P. E. Schenk

Sediments are formed in a variety of ways – particles of rock and the tests of organisms settle out of bodies of water, inorganic substances precipitate from solution, and masses of sediment from the continental margins sometimes slump or slide down catastrophically to cover the abyssal plains of the ocean floors. The textures and structures of sediments, together with their fossil content, are keys to the environments of deposition. The stratigraphic succession provides clues to the earth's history. Fossils preserved in sediments provide the basis for correlation of rocks in time and space.

This class follows naturally from 202A; a student who has not taken 202A will be expected to make up the background himself.

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 geological, geophysical or geochemical studies. It will include topics such as: elementary surveying – the use of a plane table, for example; the use of aerial photographs in geological interpretation, the application and use of geophysical methods: studies of stratigraphic sections. None of these topics can be covered in depth in the time available, and it is hoped that the course will provide a guide for further study, and be useful for students seeking summer employment in the field.

This 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 behaviour of rocks during deformation. The emphasis will be upon the geometrical aspects of the rock structures, and the laboratory work is essentially a brief course in descriptive geometry. This trains the student to visualize the three-dimensional geometry of rock structures and teaches techniques for the solution of many problems of a graphic and geometrical character encountered in cartography and other geological work, especially in mining.

This class may be taken by any student who has had a first-year class in geology, or can demonstrate an equivalent background. It can be followed by Geology 303 in a natural way.

204B Elements 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 courses 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.

Three-Hundred-Level Classes in Geology

The 300-level classes offered in 1970-1971 are designed for those who have taken the second-year classes prior to their revision in this year's Calendar. They will be revised extensively for 1971-9172.

301 Petrology Lecture 3 hours; laboratory 3 hours, D. B. Clarke/P. E. Schenk/F. Aumento

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. This class will deal with petrological aspects of igneous, sedimentary and metamorphic rocks.

Igneous rocks will be discussed under topics such as classification based on mineralogical and chemical composition, methods of depicting chemical data, mechanisms and environment of magma production, mechanisms of magmatic evolution, and comagmatic provinces. The provinces include orogenic igneous rocks, rift valleys, the continental environment, and oceanic islands, arcs and ridges.

The investigation of sedimentary rocks will include classification, and a study of mineralogy, textures and structures as a guide to both the environment of deposition, whether marine, estuarine, deltaic or continental, and to the nature and location of the source rocks. Certain aspects of diagenesis such as recrystallization, compaction and cementation will also be studied.

Metamorphic rocks will be considered as the products of thermal and dynamic processes operating on pre-existing rocks. Stability relations of minerals under varying temperature-pressure conditions and the concept of metamorphic facies will be stressed. Illustrations will be made from rocks of the Canadian shield.

302 Stratigraphy and Historical Geology Lecture 2 hours; laboratory 3 hours, P. E. Schenk

This class in stratigraphy and historical geology is divided into four main divisions. The first division, an introduction to stratigraphy, is essentially an historical account of the development of stratigraphy. The second division deals with the materials of stratigraphy, during which topics are covered such as classification, textures and structures of sedimentary rock, paleoecology, and sedimentary tectonics. The third division considers stratigraphic bodies and relations such as stratification and the vertical sequence, unconformities, stratigraphic classification, and nomenclature, lateral variation and facies, and problems of correlation. The final division deals with an areal historical account of the evolution of North America. The purpose of the class is to introduce the study of sedimentary rock so that the student can interpret paleogeography and specific paleoenvironments.

A weekend field-trip to the Antigonish area is scheduled each fall. A report is required on this trip. Other field trips may be planned. Laboratories consist of problems involving stratigraphic maps and illustrations, emphasizing quantitative, computer-oriented data, Précis on outside reading from the current literature are requested. Lecture notes are distributed before class so that class-time will be spent in discussion.
Prerequisites: Students should have taken Geology 100, 201, 202. Geology 301 may be taken concurrently. Geology 302 is prerequisite for Geology 455.
Texts Krumbein and Sloss, *Sedimentation and Stratigraphy*, and Clark and Stearn, *Geological Evolution of North America.*

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, and teaches the techniques for the solution 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.

304 Introduction to Ore Deposits (offered in 1971-1972). 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.

401 Sedimentation and Sedimentary Petrology Lecture 2 hours; laboratory 3 hours, R. A. Gees

The following topics are discussed: 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 lithification and 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.

403 Advanced Structural Geology (offered in 1971-1972). Lecture 3 hours. G. C. Milligan

This seminar includes discussion of major structural problems such as orogeny, isostasy, geosynclinical development, granitization, etc. Exercises in interpretation of geological maps are also assigned.
Prerequisites: Geology 100, 201, 303.

404 Ore Deposits, Advanced Class. G. C. Milligan

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 Principles of Exploration Geophysics Lecture 3 hours; laboratory 3 hours, M. J. Keen

This class introduces the use of geophysical methods in studying the earth from the point of view of the person particularly interested in the outer few kilometres of the earth. We will be concerned with the principles of the methods, not the details of all of them. Seismic reflection and refraction seismology; the earth's gravity field; the earth's magnetic field; magnetotellurics; geomagnetic depth sounding; resistivity; radioactivity; thermal studies. There is considerable emphasis on the principles behind the processing and analysis of data, common to many of the methods.

405B Geophysical Studies of the Earth Lecture 3 hours; laboratory 3 hours, M. J. Keen

Geophysical and geological studies in the past few years have shown that the ocean floors are spreading at rates in the vicinity of centimetres per year, with new oceanic crust generated at the mid-ocean ridges. The earth's surface can be divided into rigid plates which overlie a less rigid region of the mantle. The boundaries of the plates are ridges, where crust is created, oceanic trenches, where crust is destroyed in the sense that it returns to the earth's interior, or transform faults, where plates slide past one another.

This theory, called by some "ocean floor spreading", by others "plate tectonics", rests upon studies of the earth's main morphological features, of the earth's magnetic field, of earthquakes and of ocean floor sediments. The class will consider the theory and its consequences in some detail.

406 Examination of Mining Properties, D. Johnston

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 students of various facets of the operation. No texts are prescribed but extensive use will be made of technical literature from library files.

407 Phase Equilibria and the Petrogenesis of Igneous Rocks Lecture 3 hours; laboratory 3 hours, D. B. Clarke

The phase rule relates the number of chemical components to the number and kinds of phases present in a rock under given conditions of temperature and pressure. Simple two, three and four component systems will be shown to be relevant to the study of the origin of natural igneous rocks. The petrogenesis of such igneous rocks as basalts (both

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tholeiitic and alkaline), K-mafic lavas, andesites, anorthosites, granites and rhyolites, syenites and trachytes, peridotities and serpentinites, kimberlites and carbonatites, will be discussed.

The laboratory will consist of exercises with phase diagrams and the petrographic investigation of igneous rock types.

422/522 Introduction to Vertebrate Palaeontology Hours to be arranged, H. B. S. Cooke

A seminar class concerned with discussion of the major features of vertebrate evolution as displayed by fossil material and evidence. Emphasis is on the geologic history of vertebrate groups, particularly the mammals. Laboratory work is expected. This class is offered only to students who have special reasons for taking it. Some background in geology and biology is essential.

451/501 Advanced Petrology. Hours to be arranged, D. B. Clarke/F. Aumento

This is a seminar class which discusses current problems in igneous petrology. It will involve consideration of recent work described in the journals.

452/502 Advanced Geophysics. One afternoon per week, P. Reynolds/R. Ravindra/R. Hyndaman/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 Historical Geology. Lectures and seminars: hours to be arranged. P. E. Schenk

This class in advanced historical geology is designed for the fourth-year and graduate student to discuss specific areas of interest in the development and history of the earth. It considers the evolution of the continental perimeter of North America, beginning in the Northern Appalachians and unravelling the relations clockwise down the Appalachians through the Ouachita-Marathon belt, northward up the Cordillera and eastward through the Arctic Islands.

After the various margins have been tied together by considering the mid-continent, the remainder of the class deals with the Precambrian, and with specific areas of Europe, Africa and Australia. Approximately half of the classes are seminars. A weekend field trip to the famous Arisaig section is scheduled for each fall and is integrated into the class material. A report is required after this trip. Other trips may be planned.
Prerequisites: Geology 301, 302, and 303.

456/506 Introduction to Micropalaeontology Hours to be arranged, F. Medioli

The class gives a general systematic study of the main groups of microfossils, mainly foraminifera, 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 (offered in 1971-1972). 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 origin, distribution and nature of snow and ice; movement in glaciers and ice caps; glacial stratigraphy; sea level fluctuations; ocean floor deposits; climatic changes evidenced in non-glaciated regions; theories of ice ages.

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.

458/508 Advanced Marine Geology Hours to be arranged, R. A. Gees

This class is divided into two parts. The first part is concerned with the main elements of ocean basins such as the continental shelves, slopes, rises, the abyssal plains, trenches, midoceanic ridges, rift valleys and fracture zones. These elements are discussed in detail as to their origin and history.

In part two, marine sediments and sedimentary processes are discussed. Students are encouraged to participate in one or two seminars. Two term papers are required.

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 silicate 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.

Geology Seminar
Papers are presented by guest speakers, members of the staff, and senior students.

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 installment of university fees.

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 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.

47.12 / German

Associate Professor
Detlev Steffen (Acting Chairman)

Assistant Professors
Klaus Fricke
Friedrich Gaede
Auguste Roulston

Lecturers
Richard Ilgner
Gerta Josenhans
Reiner Zeeb

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, 200) and advanced classes (German 202, 351) 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, History 100, Philosophy 100.
4. A social science class.

Students without science matriculation
5. A class in a natural science.

Students with science matriculation
5. English 100.

Year II
6-8. German 200, 202, 221.
9. One class from Classics 100, History 100, Philosophy 100.
10. English 100 (if not taken in the first year; otherwise, 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. A second social science class.

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.

European Literature 100 *(see 47.10A)*, 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 the same or 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 emphasis is given to the spoken language than is customary in high schools and more independent work is demanded of the student.

This class or its equivalent is a prerequisite for all classes on the 200 level.

The class is taught in two different methods, of which the student can choose either one.

1. The conventional method stresses a thorough grounding in the fundamentals of grammar, practice in pronunciation and development of a reasonable vocabulary. Conversational practice is strongly emphasized in class throughout the year and students are encouraged to converse on subjects chosen to develop an everyday vocabulary and to discuss reading selections taken from the texts. The German language laboratory will be available throughout the academic year, where students may listen to reading selections in German from the textbook and other sources.

2. The direct method emphasizes spoken modern German. The class is taught (almost) entirely in German; it studies basic grammar through texts with a modern vocabulary and should lead to greater speaking fluency than method (1). Intensive language laboratory work is required as an aid to the classes.

For both groups (1) and (2), attendance at small conversation groups once a week is compulsory.
Texts: Method (1): Cunz, Groenke, Vail, *German for Beginners,* The Ronald Press Company; Durer, Goedsche, Spann, *Cultural Graded Readers, New German series: I,* American Book Company. Selections from other sources. Method (2): Pfister, *Deutsch durch Deutsch,* Harper and Row; Pfister, *Übungsbuch,* Harper and Row.

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 (see the description of German 100/2; the teaching method used in that class, "direct method", will be applied to this class in its first stage). 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.

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 word lists.

200 Intermediate German Lecture 3 hours, 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 stress 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 in smaller groups. 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 to 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. Ample time will be given to this purpose in order to ensure that students become used to it gradually.

The class work includes the reading of simple and moderately difficult modern German literature and a complete review of the basic grammar as well as studies of more difficult grammatical problems.
Prerequisite: German 100 or equivalent.
Texts: Richmond/Kirby, *Auslese,* McGraw-Hill; L. Kahn, *Intermediate Conversational German,* American Book Company; A. Pfeffer, *Basic (Spoken) German Word List,* Prentice Hall.

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 is 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.
Texts: Eichner and Hein, *Reading German for Scientists,* Chapman and Hall, London; Phelps and Stein, *The German Scientific Heritage,* Holt, Rinehart and Winston, New York.

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.

221 Introduction to German Literature Lecture 2 hours

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

The class studies German literature between the 16th and 18th centuries as a direct reflection of religious, social and scientific developments in Germany after the Reformation and during Absolutism, particularly the 30 years war. Poetry, drama, prose and their origins in Humanism and the Renaissance will be studied on the basis of texts from Sebastian Brant to Gryphius and Grimmelshausen. An introduction will be given to rhetorics, the art of emblemata and allegory which determine and characterize the European literature of the Baroque Age.
Prerequisite: German 200 or equivalent.

302 German Literature in the Age of Enlightenment Lecture 2 hours (offered in 1971-72), 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 is 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 topics -- fables (Gellert, Lessing), theoretic writings (Gottsched, Baumgarten, Lessing), poetical 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

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) (Offered in 1971-72). 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 examina-

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tion 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

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, R. Zeeb

A study is made of trends in modern German literature of the 20th century. The course of Germany's history in the 20th century has deeply influenced both the form and content of modern literature which will be studied mainly in the writings of Bertolt Brecht, Franz Kafka and Thomas Mann. The insufficiency of the traditional literary language to express the experience of a new reality caused experiments with new literary forms during Naturalism and Expressionism.
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 history of the central motif will also be analyzed.
Prerequisites: German 200 or equivalent; German 303 or 400.

452 German Philosophy: Hegel's Phaenomenologie des Geistes. Seminar 2 hours, D. Steffen

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.

47.13 / History

Professors
J. E. Flint (Chairman)
P. B. Waite
G. R. MacLean
H. S. Granter
A. C. Gluek

Associate Professors
R. P. Bonine
P. Burroughs
D. H. Crook
C. B. Fergusson
R. M. Haines
P. D. Pillay

Assistant Professors
J. Fingard
L. D. Stokes

Special Lecturers
J. M. Beck
D. W. Stairs

History as a Subject for Study at University
A sense of history is primitive, a 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 in history at the university level; 200-level classes cover broad geographical areas within a limited time period; and 300-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.

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 and 300 level 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, but in any case should register for History 199, a language, English 100, Political Science 100, together with Economics 100, if the Group D requirement has been met (*see section 45.1*).

Classes Offered at the 100 Level

100-level history classes introduce university students to the study of history. There are two distinct approaches. The first is History 100. History 100 is a general consideration of the politics and social history of Europe from the fall of the Roman Empire to the Second World War. It is a class for students who may not intend to do further work in history or allied subjects. Specific reading is assigned. The second approach is History 199, a class designed for students who plan to continue in history or closely allied subjects.

100 European History and Civilization, Lecture 3 hours (2 sections), D. H. Crook/P. B. Waite

199 Problems of Historical Study and Writing

This class is intended to introduce the university student who wishes to major in history to the problems of historical study, including the nature of evidence of history, 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 through wide reading and 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 an essay each fortnight. 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 teaching each section and the problems to be considered in each section will be available at the time of registration for the class.

Classes Offered at the 200 Level

There are no prerequisites for entry into 200-level history classes. However, History 100 or History 199 is a valuable preparation for these studies.

History 200-level 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.

In this way second year students who wish to concentrate and specialize further in history prepare themselves for entry into 300-level classes in history and allied subjects.

European History
Three classes in European history are offered, mediaeval and modern. In both, Europe is viewed, as far as possible, as a whole.

Lectures deal with broad topics – land tenure and property rights, political institutions, religious belief and organization, education – common to all parts of Europe, studying 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 Mediaeval Europe, from the Fifth Century to the Renaissance, Lecture 2 hours plus tutorial sections, R. M. Haines

History 201 Early Modern Europe and its Expansion Overseas, Lecture 2 hours plus tutorial sections

205 Modern Europe, from the French Revolution to the Present, Lecture 2 hours plus tutorial sections, R. P. Bonine/L. D. Stokes

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 placed 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 develops, through guidance in lectures and independent reading, a broad understanding of British colonial expansion from its beginnings in Tudor times to the development of the modern Commonwealth. In addition, tutorial sessions allow students to read more deeply into particular problems and topics. The class concentrates on the overall development of British colonial expansion and policies, and the history of individual colonies or regions of the Empire and Commonwealth is used to illustrate general themes of colonial history.

210 The History of England, Lecture 2 hours plus tutorial sections, H. S. Granter

213 British Empire and Commonwealth, Lecture 2 hours plus tutorial sections, P. Burroughs/J. E. Flint/P. D. Pillay

North American History
The class in Canadian history ranges from early beginnings to contemporary affairs. 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

230 American History, Lecture 2 hours plus tutorial sections, P. Burroughs/D. H. Crook/J. Fingard

Classes Offered at the 300 Level

300-level classes in history are intended for third year students who have completed work in the 100 and 200 levels. In general, these classes are more concentrated in area and time, and allow students to develop interests gained in the 200-level classes. The department will be offering additional 300-level classes which could not be listed below at the time this calendar was printed. Details of these classes will be available at registration.

European History
300 The Mediaeval Church, Discussion tutorial 2 hours, R. M. Haines

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 the history of the Church as a whole can be studied. For instance, this year the topics are: monasticism, universities, Papal government, and the late Mediaeval English Church. 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 these main areas, but will also be encouraged to develop special interests 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.

303 Modern Political Ideologies (not offered 1970/71), Lecture/tutorial 2 hours, R. P. Bonine

History 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.

307 History of Modern Germany, Discussion/tutorial 2 hours, L. D. Stokes

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 bibliography is available in advance from the instructor. In the second term, students will prepare and present a research paper. A reading knowledge of German is highly desirable, but not essential.

309 Economic Development in a Historical Perspective, J. P. Beauroy

(for details see Economics 312)

English History
314 England Under the Tudors and Stuarts, 1485-1714, Lecture/tutorial 2 hours, H. S. Granter

History 210 provides the appropriate background for this class which examimes 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.

North American History
322 Canadian Economic History, N. H. Morse

(for details see Economics 302)

327 History of Nova Scotia and the Atlantic Provinces, Lecture/tutorial 2 hours, J. Fingard

History 220 provides the appropriate background for this class. Students will be expected to prepare and present papers using original sources.

History 330 The History of Canadian/American Relations, Lecture/tutorial 2 hours, A. C. Gluek

History 230 provides the appropriate preparation for this class which considers Canadian-American relations from the eighteenth century to the present day. It begins with the American Revolution and its consequences, then considers Anglo-American diplomacy and continental confrontation 1783-1825. American ideas of manifest destiny in relation to Canada are traced up to the outbreak of the Civil War and the Anglo-American diplomacy which resulted from it from 1861-71. Canadian-American questions are examined in relation to Canada's national policy with a discussion of the resolution of issues between United States and Canada from 1896 to 1914. The pattern of relations between the first and second World Wars is examined against a background of growing economic penetration from the U.S.A. The class concludes with an examination of postwar problems such as identity, defence, continentalism, the cold war and the alliance system.

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.

Economics **310 Economic History of Sub-Saharan Africa,** Lecture 2 hours, 1st term; seminar 2 hours 2nd term,, Z. A. Konczacki

This class is offered in the Department of Economics as Economics 310A/561A and Economics 310B/561B. The first term is spent in considering topics which include economic prehistory, economic contacts between the different cultures and regions of Africa, the introduction and spread of agricultural crops, the development of landholding systems, mining and metal working, long distance trade routes and trade centres, overseas trade, slavery and the slave trade, economic aspects of European colonization, economic policies of the colonial powers, patterns of economic development during the colonial period, and the economic balance sheet of colonialism.

In the second term the seminar centers on discussion of the impact of the colonial heritage, the present structure of African economies, problems of economic infra-structure, African culture, mineral development, industrialization with particular emphasis on import – substitution, problems of trade, foreign investment and aid programmes, economic planning and prospects for the future of African economic development.

Classes Offered at the 400/500 Level

Classes numbered 400/500 in history are primarily intended for graduate study and research. All are seminars in which students prepare and present papers for discussion in the meetings. Honours students in their final year of study are admitted to some seminars, but all students require the permission of the instructor before entering these seminars.

The department will be offering additional seminars which could not be listed below at the time this calendar went to press. Details of these seminars will be available from the Department of History.

European History
405/505 The Weimar Republic and Hitler's Germany, Seminar 2 hours, L. D. Stokes

Selected topics in the history of Germany between 1918 and 1945, which seek to explain why National Socialism came to power and to examine the nature of the Nazi revolution, are studied in depth. Among the topics treated are the German party system, the growth of anti-democratic thought, the political role of the army, the ideology of Nazism, and Nazi social and economic policy. Students will prepare research papers on specific aspects of these general topics. A reading knowledge of German is highly desirable.

406/506 History of Russia, 1898-1921 (not offered 1970-71). Seminar 2 hours, R. P. Bonine

This seminar is concerned with the origins, events and immediate consequences of the Russian Revolution.

History 407/507 France 1600-1800, J. M. Beauroy

Selected topics in the economic and social history of France in the seventeenth and eighteenth centuries. This seminar considers the problems of the nature of the "Ancien Régime" and of the French Revolution which are approached from the economic and social structures of the period. A reading knowledge of French is highly recommended.

British and British Imperial History
414/514 Britain and the Empire, 1783-1855, P. Burroughs

This seminar studies the development of British colonial policy and practice in the period between American independence and the grant of responsible government, the various movements for administrative and colonial reform, and the attitudes of Englishmen to the expanding Empire.

417/517 England in the Nineteenth Century, H. S. Granter

This seminar is concerned with English history between 1800 and 1867.

418/518 The Age of "Imperalism", 1870-1914, J. E. Flint

This seminar considers the themes and problems of imperialism, its economic background, political and international aspects and its ideology. Students will undertake studies of individual "imperialists" as well as case studies of particular areas. A preliminary reading guide is available.

419/519 England after 1867

The seminar traces developments in English domestic politics from 1867 and their effects on British overseas activities up to and after the Anglo-Boer War.

Canadian History
420/520 History of Canada, 1837-1896, P. B. Waite

Selected topics on the political, economic and social history of British North America before 1867, the Confederation movement, and the Dominion of Canada after 1867 are studied.
Prerequisite: History 220.

Programmes of Study
47.13
History

422/522 Canada and the Canadian-American Relationship in the Twentieth Century, A. C. Gluek

This seminar is intended primarily for students writing theses in twentieth-century Canadian history or in Canadian-American Relations. It is a working seminar which concentrates on examining the truth and techniques of the professional historian and the methods used in documentary research. Students will present short papers and write a formal essay of substantial proportions dealing with themes of their research.

424/524 Canadian Constitutional Law, W. A. MacKay

This seminar is given by special arrangement with the Faculty of Law. Permission of the instructor will be required. Preparatory summer reading may be assigned.
Prerequisite: History 220, Political Science 100.

426/526 Social History of the Atlantic Provinces, 1749-1851, J. Fingard

This is a seminar class in which the main emphasis will be placed on colonization, religion, education, and the general social and cultural development of the four Atlantic colonies. Students will be required to write research papers using primary material.
Prerequisite: History 220.

427/527 Canadian History with Special Reference to Nova Scotia, C. B. Fergusson

Students will have opportunity for some training in the use of original records.
Prerequisite: History 220.

428/528 Politics in Nova Scotia since Confederation, J. M. Beck

This seminar class is given with the Department of Political Science. The topics to be discussed will deal with the evolution of Nova Soctian governmental and political institutions, and with the current state of Nova Scotian politics.

American History
433/533 The Americans, 1878-1916, D. H. Crook

In this seminar, work is directed to the preparation of a scholarly paper from primary sources. Topics are concerned with specific aspects of general tendencies in political, economic, social or cultural development from the end of the post Civil War reconstruction to the beginning of Wilson's second term.

African History
445/545 South Africa 1806-1960, P. D. Pillay.

Students will be required to examine special topics serving to illustrate some of the problems of interpreting aspects of South African history. The seminar will then turn to studies which will focus attention on leading political figures, on the imperial factor, on the development of political and socio-economic relations between black and white peoples, and on the rise of Afrikaner and African Nationalisms.

501 Palaeography, Reading/tutorial sessions 4 hours, R. M. Haines

This is intended as a practical introduction to the reading, extension, and critical use of mediaeval manuscripts, mainly those written in Latin. Availability of photostat and microfilm material makes possible a reasonably comprehensive introduction to source materials, and concentration can be caried in accordance with individual student requirements.

Graduate Studies
M. A. and Ph.D. programmes in history are offered. For details, see the Calendar of the Faculty of Graduate Studies.

47.14 / Mathematics

Professors
M. Edelstein
F. W. Lawvere (Killam Professor)
A. J. Tingley (Chairman)

Associate Professors
J. R. Baines
E. Blum
M. J. L. Kirby
J. Lions
S. Swaminathan
A. C. Thompson

Assistant Professors
C. Atherton
H. Brunner
R. P. Gupta
E. L. Heighton
A. H. Larson
K. V. Menon
E. B. Mercer (part-time)
S. B. Nadler
K. Powls
R. M. Raphael

Senior Research Fellows
W. Flescher
F. E. J. Linton
B. Mitchell
M. Tierney

Postdoctoral Fellows
C. A. Field
R. B. Fraser
A. Kock
E. Manes
R. Paré
G. H. Rousseau
K. Swarup

Visiting Professor
J. B. Roberts

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 hypoteneuse is equal to the sum of the squares on the other two sides.

Another set of problems for mathematicians arises 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 arose 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 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: $\log(ab) = \log$

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

B.A. with Major in Mathematics
Students registered for the degree of B.A. who intend to major in mathematics, and those who register for other degrees 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.

B.A. and B.Sc. with 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.

B.A. with Honours in Mathematics (Major Programme)
The following programme will normally be followed by students who plan to take a B.A. with 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 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:
a) an appreciation of the natural origin and evolutionary growth of the basic mathematical ideas from antiquity to the present;
b) a critical, logical attitude, a wholesome respect for correct reasoning, precise definitions, and a clear grasp of underlying assumptions;
c) 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;
d) 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;
e) 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 involves 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 Social Scientists, Lecture 2 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 100. 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 R (as a complete ordered Archimedean field); basic topology for R; the concept of mappings, in particular those of 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, not offered 1970-71, 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

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.

220 Applied Mathematics, Lecture 3 hours

Students of physics and engineering need a fair amount of mathematical knowledge. The topics of Mathematics 100 and 200 are generally not sufficient to cover all the requirements. There are important pure mathematical methods which are used extensively in physics and engineering, e.g. the theory of matrices and determinants, line and surface integrals, integral theorems, Fourier series and integrals, power series solutions for differential equations, Bessel functions, Legendre polynomials, Laplace transforms and complex analytic functions.

At the beginning, the class uses only the material covered in Mathematics 100. However, as the sequence of topics advances, normal skill of partial differentiation, integration, the concepts of series, power series, convergence, etc. are needed, such that at least a concurrent registration in Mathematics 200 is required.

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 1970-71), 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

Programmes of Study *47.14* Mathematics

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.
Prerequisite: Mathematics 100, which, with the consent of the instructor, may be taken simultaneously.

240 Introduction to Computer Science, Lecture 3 hours

This class is designed to introduce the computer as a device for problem-solving. Emphasis is given to the solution of non-numerical problems as well as numerical ones. The class has three main aspects, which, due to the introductory nature of the class, must be developed in parallel:
a) methods of communication between man and the computer (especially programming languages);
b) the components of computer systems;
c) the formulation of problems and methods for their solution by computer.

Topics discussed include: Fortran programming; algorithms; components of computer systems; a simple, hypothetical computer; preparation of machine language programs; random numbers, statistics and random number generators; computer simulation; some aspects of the COBOL programming language; introduction to data structures; computer systems.
Prerequisite: Mathematics 100.
Texts: Introduction to Computing, T. E. Hull, (Prentice-Hall, 1966); *Problems for Computer Solution,* Gorenberger and Jaffray, (Wiley, 1965); *Fortran IV with Watfor,* Cress, Dirksen, Graham, (Prentice-Hall, 1968).

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 Analysis, Lecture 3 hours

The main objective of this class is to provide a justification and an amplification of the methods of calculus.

Topics covered: basic properties of the real line, sequences and series, Euclidean n-space and some of its topology; functions of one or more variables, continuity, differentiability, sequences of functions, uniform convergence, approximation; integration: the Riemann integral relation between differentiation and integration, the Riemann-Stieltjes integral, the Lebasgue integral and some of its properties; power series and Fourier series, curves, surfaces, and integrals on them.
Prerequisite: Mathematics 200.
Text: J. Gronin-Scanlon, *Advanced Calculus,* D. C. Heath and Company, Boston, 1967.

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 (not offered in 1970-71), 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 geodesy (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 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 compatibile 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. Ingeresting 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.

Arithemetic functions; Euler's function ϕ (n) - "Möbius function w (n); the function d(n) and δ_k (n).

Algebraic fields; algebraic numbers and integers; uniqueness of factorization; feninition and elementary properties of ideals; ideal classes and class number.

Properties of binomial and Q – Binomial coefficients.

312 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.

In mathematics, differential equations are classified and studies with great care. This class contains 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. If contains various applications, e.g. most of the above mentioned problems, the motion of a stellite, etc. The part of the class which deals with ordinary differential equations includes the topics: linear differential equations, Laplace transforms, solution by series, special functions which occur frequently in mathematics, and physics engineering, 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 second order and problems of mathematical physics solved by Fourier's method (Fourier series) are included.

The class requires normal skill in partical differentiation, differentiation of implicit and composite functions, integration, improper integrals, series and power series. Some initial concepts of differential equations (given in Mathematics 200) are also required.

320 Introduction to Numerical Analysis, Lecture 2 hours

Topics to be discussed will include:
a) Lagrangian interpolation: interpolating polynomial, error term, finite difference interpolation formulas, Hermite interpolation.
b) Numerical differentiation: extrapolation to the limit, numerical integration: closed and open Newton-Cotes formulas, error, orthogonal polynomials, Gaussian quadrature, Romberg integration.
c) 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.
d) Functional approximation: least-squares techniques, curve fitting, minimum-maximum error techniques, Chevychev approximations.
e) Nonlinear equations: elementary methods, Newton-Raphson method, zeros of polynomials, Bernoulli's method, QD-algorithm.
f) Systems of linear equations: Gaussian elimination, matrix decomposition, Choleski's method, iterative methods, Gauss-Seidel method, relaxation and overrelaxation.
g) 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:
a) 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.

Programmes of Study 47.14 Mathematics

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.

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 universe limits of algebraic systems and then universal properties.

406 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 parameters, 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 studies "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 metrization; compactifications, uniform spaces and completion problems, function spaces.
Prerequisite: Mathematics 304.

421 Eigenvale and Boundary Value Problems (not offered in 1970-71), Lecture 2 hours

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, Helmolz equation and Green's functions.
Prerequisite: Mathematics 100, 200, 312 or consent of instructor.

430 Analysis of Inventory Systems (not offered in 1970-71), Lecture 2 hours

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 or one year after an honours degree. For details of such courses, see the Calendar of the Faculty of Graduate Studies.

Programmes of Study *47.14* Mathematics

47.15 / Music

Associate Professor
David F. Wilson (Head of Department)

Assistant Professors
Ray D. Byham (Music History)
Vernon A. Ellis (Music Education)
Dennis M. Farrell (Theory)
H. Philip May (Voice)
Raymond Schutt (Piano)

Instructors*
Maitland Farmer (Organ)
Eleanor Ritcey May (Piano)
Constance Hubley (Piano)
Ninette Babineau (Violin)
Christopher Wilcox (Clarinet)
Robert Riggs (Saxophone)
Hervoje Hrestak (Trumpet)
Roberta Phillips (French Horn)
Richard Raum (Trombone)
J. Chalmers Doane (Band)

*Other 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. Similarily music making in our comtemporary 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 – into a completely integrated course of study with the object of producing fully developed musicians, rather than mere players of notes.

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 the home of a professional symphony orchestra and one of the centres of musical activity in Canada. Music students may observe rehearsals of the Atlantic Symphony as a part of their training and have the opportunity to hear many fine performers during the concert season. The Halifax area offers over fifty professional concerts each year.

Dalhousie University itself offers a series of twelve or more free concerts as well as many student recitals. The presentation of workshops by visiting artists is a special feature of this series.

Vocal and Instrumental Ensembles
Dalhousie Chorale
David Wilson, director

Dalhousie Opera Workshop
Philip May, director

Dalhousie Orchestra
David Wilson, conductor

Dalhousie Band
Chalmers Doane, conductor

Chamber Ensembles

Recorder Groups
Vernon Ellis

These ensembles are open to all qualifed students in the University.

Arts Centre
In September 1970, the Department of Music will move into its new home in a centre for the performing and visual arts now under construction on University Avenue. Included in this building will be teaching and practice facilities for music, a music auditorium, a drama theatre with adjacent teaching facilities, and an art gallery.

Admission
Students intending to take the Bachelor of Music Education course or either of the Bachelor of Arts courses described below must not only be academically admissible *(see section 42.1)* but must also show that they can either sing competently or play an instrument competently before they will be accepted in any of these programmes. When making their original application for admission, such students should request the special, supplementary application form for music students. This form must be completed and submitted to the Admissions Office before the application can be processed. Arrangements for an audition will then be made.

Degree Programmes

Bachelor of Music Education
The purpose of this four-year course is to give students a thorough training in all aspects of music combined with intensive professional instruction in music education.

The public schools of the Halifax-Dartmouth area have the largest concentration of music teachers eastt of Montreal. A close relationship has been established between the public schools and the University which will give students an opportunity to be taught by specialists who are active in public school teaching, and to observe and teach in firmly established general music, orchestra and band classes.

By arrangement with the Nova Scotia Department of Education, students completing this course receive a Teacher's Certificate (Class 5).

Year I
1. Applied major (instrument or voice) and Ensemble.
2. Music 100
3. Music 210
4-5. Two Arts electives.

Year II
Applied major (instrument or voice) and Ensemble.
7. Secondary Studies and Classroom Observation
8. Music 310
9. Music 231
10. Arts elective

Year III
11. Applied major (instrument or voice) and Ensemble.
12. Secondary Studies
13. Music 300
14. Music 410
15. Music 330 or 332
16. Music 335

Year IV
17. Applied major (instrument or voice) and Ensemble.
18. Secondary Studies
19. Music 420
20. Education 401
21. One of Music 330, 332, or 430
22. Music 435

General B.A. with Major in Music
Year I
1. Applied major (instrument or voice) and Ensemble.
2. Music 100
3. Music 210
4. A class in the humanities.
5. A class in the social sciences.

Year II
6. Applied major (instrument or voice) and Ensemble.
7. Music 310
8. A class in the humanities.
9. A class in the social sciences.

Students Without Science Matriculation
10. A class in the natural sciences.

Students With Science Matriculation
10. A class in a language or the humanities.

Year III
11-12. Two classes in music beyond the 100-level.
13-15. Three other Arts classes.

Participation in instrumental or choral ensembles is required of all students.

General B.A. with Minor in Music
Students wishing to take music as their minor subject should begin with the sequence Music 105 (History and appreciation of Music), and Music 205 (Materials of Music).

B.A. with Honours in Music
Year I
1. Applied major (instrument or voice) and Ensemble.
2. Music 100
3. Music 210
4. A class in the humanities.
5. A class in the social sciences.

Year II
6. Applied major (instrument or voice) and Ensemble.
7. Music 310
8. History 100
9. A class in a language or the humanities.

Students Without Science Matriculation
10. A class in the natural sciences.

Students With Science Matriculation
10. A class in the social sciences.

Year III
11. Applied major (instrument or voice) and Ensemble.
12. Music 300
13. Music 410
14-15. Two classes in a language and/or the humanities.

Year IV
16-18. Three additional advanced classes in music.
19-20. Two Arts electives to conform with the overall requirements for an honours degree *(see section 46.3 and 46.4)*.

Participation in instrumental or choral ensembles is required of all students.

Music History and Literature Classes

100 History of Music Survey, Lecture 3 hours

An introductory class in the history of music. The styles, musical forms and composers of each period of musical history are introduced through guided listening to recorded and live performances of music and through elementary analysis. The development of music is related to concurrent events in history and the fine arts.
Prerequisite: A knowledge of music gained from the study of an instrument or singing and a knowledge of the rudiments of music (notation, scales intervals, chords). (See Music Fundamentals Programme).

105 History and Appreciation of Music (previously Music 101), Lecture 2 hours; tutorial 1 hour

An introductory class in music for students taking a general degree course. The development of music is traced from about 100 A.D. to the present, with greater emphasis given to the music of recent times. Students are taught how to listen to music; an excellent set of musical examples is available for listening practice. The instruments of the orchestra are discussed and demonstrated by members of the Atlantic Symphony, and live demonstrations of music are incorporated into the class whenever possible. This class (or Music 100) must be taken by students minoring in music. It may not be taken by students majoring in music.

300 History of Music, Lecture 3 hours

A detailed study of the history of music including the study and analysis of works of all periods.
Prerequisites: Music 100 and 310. Students should be familiar with the forms, composers and musical styles of all periods of music from 100 A.D. to the present, Renaissance Counter point, and 19th and 19th-century harmony. They should be able to identify music aurally by style and period.

400 Music History Seminar, Seminar 2 hours

Advanced study of selected periods of music.
Prerequisites: Music 200 and 310.

Music Theory Classes

Theory Fundamentals Programme
As from September 1969, all students enrolled in either Music 100 or Music 210 will be given an examination in the rudiments of music. This examination will take place during registration week and will be based on the materials covered in the programmed text: *Scales, Intervals, Keys and Triads* by John Clough, published by the W. W. Norton Co., N.Y. The successful completion of this examination is a prerequisite to entry into these music classes.

205 Materials of Music, Lecture 3 hours

A class in elementary music theory for students taking a general degree. An understanding of the materials of music is developed by the study of harmony (up to and including dominant seventh chords), elementary counterpoint, analysis and aural recognition of style. This class may not be taken by students majoring in music.
Prerequisite: Music 100 or 105 or permission of the instructor. Students should be familiar with the rudiments of music (notation, scales, intervals, chords) and should have been exposed to musical listening, either through a class in music history or by the study of singing or of an instrument.

210 Theory of Music, Lecture 5 hours

An integrated course of study in music theory which will include harmony and analysis up to and including dominant seventh chords, modulation, non-harmonic tones, figured bass, and composition in small forms; keyboard harmany, sightsinging, dictation and ear training.
Prerequisite: A knowledge of the rudiments of music (notation, scales, intervals, chords) and previous exposure to music through the study of singing or of an instrument.

310 Theory of Music, Lecture 5 hours

An integrated course of study in theory including harmony and analysis of nineteenth-century harmony (dominant embellishments, less common chord progressions, altered chords, ninth-, eleventh-, and thirteenth-chords), Renaissance counterpoint, keyboard harmony, sightsinging, dictation and ear training.
Prerequisite: Music 210. Students should be familiar with harmony through dominant seventh chords, modulation, non-harmonic tones, figured bass, keyboard harmony, sight-singing, dictation and ear training to the level achieved in Music 210.

Programmes of Study 47.15 Music

410 Theory of Music, Lecture 5 hours

A study of partwriting, analysis, composition and keyboard harmony in twentieth-century techniques, Baroque and nineteenth-century counterpoint, advanced rhythmic, harmonic and melodic dictation, sight-singing and theory pedagogy.
Prerequisite: Music 310. Students should be familiar with 18th and 19th.-century harmony and analysis, Renaissance counterpoint, keyboard harmony, sight-singing and dictation to the level achieved in Music 310.

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 conduction.
Prerequisites: Music 100 and 310.

Music Education Classes
(Open only to Students Majoring in Music.)

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 Classes
(Open only to Music Education Students)

The numbers following the class descriptions in the programmes which follow indicate class numbers in each programme and the sequence and year of study in which the classes are to be taken.

Each student must take a minimum of one credit hour in Ensemble and five credit hours in major instruments or voice in each academic year.

Ensemble (1 credit hour)
Participation in assigned large and small ensembles. Required of all students. 170, 270, 370, 470

Major Instrument or Voice (5 credit hours).

Private instruction in the student's major applied subject.
Prerequisites: The standards of performance required in each applied music subject are published by the Department of Music.

Piano; 150, 250, 350, 450

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

Secondary Studies

A series of classes in secondary applied music subjects for Music Education students. The classes to be studied, and their order, are determined by the student's applied major and his declared field of interest.

Each student must take a minimum of six credit hours in secondary studies.

Secondary Voice (4 credit hours), 240

Lessons in voice for instrumental majors.

Secondary Piano 241 (4 credit hours) 341 (2 credit hours) 441 (2 credit hours)

A course of study for voice, string and wind majors stressing general keyboard facility and including work in keyboard harmony, accompaniment and the playing of choral and instrumental scores on the piano.

Secondary Orchestral Instrument (2 credit hours) *342, 442*

Choral Techniques (2 credit hours) 343, 443

Choral conducting; voice production in the choral situation at all levels: rehearsal techniques, programme development.

String Class (2 credit hours) 244, 344, 444

Class instruction on stringed instruments, using the Bornoff method. The three-year course of study will include 50 hours of instruction on violin, 50 hours on cello, 25 hours on viola, and 25 hours on doublebass.

Brass Class (2 credit hours) 345

Class instruction in the playing of brass instruments.

Woodwind Class (1 credit hour) 446

Class instruction in the playing of woodwind instruments.

Percussion Class and Secondary Wind Ensemble (1 credit hour) 447

The playing of secondary wind instruments in ensemble and class instruction on percussion instruments.

Recorder Class (2 credit hours) 448

Class instruction in the playing of recorders.

Classroom Instruments (2 credit hours) 348

The study of ukulele and other classroom instruments as an aid to the teaching of theory.

Accompaniment (2 credit hours) 449

47.16 / 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 is an introductory class which surveys 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.

47.17 / Philosophy

Professors
F. H. Page (Chairman)
D. Braybrooke

Associate Professors
R. H. Vingoe
I. A. MacLennan

Assistant Professors
R. M. Campbell
R. M. Martin
R. Ravindra

Special Lecturers
S. A. M. Burns
J. A. Doull
R. D. Crouse

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.

Degree Programmes

General B.A. with Major in Philosophy
There are no special departmental stipulations. It should be noted, however, that for admission to graduate study the minimum requirement is four classes in philosophy beyond Philosophy 100, including Philosophy 200 and Philosophy 230. All students proposing to take a general degree with a major in philosophy should consult 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. The prerequisite class, Philosophy 100, should be taken in the first year, together with a social science and, unless exempted, a class in science or mathematics. If exemptions are permitted, Philosophy 200 may be taken in the first year in addition to Philosophy 100, and another class in philosophy substituted in the second year. While normally begun in the second year, the honours course may be entered in the third year, with permission of the department, if a satisfactory grouping of the classes can be arranged. Beyond the work of the first year, the honours

course generally consists of nine 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. A suggested order of classes is as follows:

Year I
1. Philosophy 100.
2-5 Four other first-year classes as stated above.

Year II
6. Philosophy 200.
7. Philosophy 205 or 210.
8. Philosophy 230.
9. One class in a minor subject.
10. Elective.

Year III
11. Philosophy 210 or 205.
12. Philosophy 320. *Philosophy 320 is offered only in alternate years. If offered in a student's third year it must be taken then; if not, it is to be deferred until the fourth year, and another class in philosophy taken in its place in the third year.*
13. One other class in philosophy.
14. A class in the minor subject.
15. Elective.

Year IV
16-18 Three classes in philosophy including Philosophy 320, *Philosophy 320 is offered only in alternate years. If offered in a student's third year it must be taken then; if not, it is to be deferred until the fourth year, and another class in philosophy taken in its place in the third year, if not already taken.*
19-20 Two electives.

Note: The effect of the general regulations for the degree of B.A. with Honours is to require the inclusion among the ancillary classes of Classics 100 or History 100, and a class in a second subject in social science. There will be a comprehensive examination at the end of the final year. Each student's honours programme will be arranged individually in consultation with the department and in relation to the student's special interests.

All students wishing to take honours in philosophy should consult Professor I. A. MacLennan.

Combined Honours
There are several combined honours programmes:
Philosophy and Economics
Philosophy and English
Philosophy and Political Science
Philosophy and Psychology
Philosophy and Sociology
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 discussion 3 hours. I. A. MacLennan / R. H. Vingoe / R. M. Campbell / R. M. Martin / S. A. M. Burns.

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 alternatives courses of action really an illusion? Are value judgments always subjective, depending upon one's personal point of 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 Logic. Seminar 2 hours. I. A. MacLennan.

This class is designed as a introduction to the processes of formal reasoning. It will not require any previous knowledge of symbolic logic. Because many students have some initial difficulty in grasping techniques of this kind of reasoning, 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. This will be extended to cover the theory of descriptions. Then an attempt will be made to relate symbolic logic to the foundations of mathematics. Cantor's theory of transfinite cardinal numbers will be discussed. Finally, some time will be devoted to metalogic, emphasis being given to Gödel's theorem.
Texts: Copi, I.M.: *Symbolic Logic,* N.Y.: MacMillan, 1961; Kalish, D. and Montague, R., *Logic; Techniques of Formal Reasoning,* N.Y.: Harcourt, 1964; Strawson, P. F., *Introduction to Logical Theory,* London: Methuen, 1952; Stupecki, J. and Borkowski, L., *Elements of Mathematical Logic and Set Theory,* tr. Wojtasiewicz, O., Oxford: Pergamon, 1967; Nagel, E. and Newman, J. R., *Gödel's proof,* London: Routledge, 1959.

205 Epistemology, (offered in 1971-72 and alternate years). Seminar 2 hours. R. M. Martin

This class makes a close and critical investigation into the traditional questions in the philosophical theory of knowledge. Subjects covered may include many of the following: the problem of induction; conceptions and criteria of truth; the possibility of a priori knowledge; perception and its relation to knowledge. Readings will consist largely of a number of short related articles mostly written during this century. Students will be given the opportunity to do independent research during part of the year.

210 Ethics. Seminar 2 hours. R. M. Campbell.

This class will discuss: the concepts of pleasure and happiness; the apparent conflict between moral obligation and personal interest; the nature of moral belief and argument; utilitarian versus rule oriented theories about what course(s) of action would be morally right in a given situation; the rationale for punishment; conditions for moral responsibility.
Prerequisite: Philosophy 100.
Texts: Plato, *Republic;* Aristotle, *Nichomachean Ethics;* Henry Aiken (ed.), *Hume's Moral and Political Philosophy;* Kant, *Groundwork of the Metaphysic of Morals;* Mill, *Utilitarianism;* John Hospers, *Human Conduct.*

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.
Prerequisite: Philosophy 100.
Texts: W. P. Alston, *Religious Belief and Philosophical Understanding: Readings in the Philosophy of Religion,* New York: 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; J. 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), New York: 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.
Prerequisite: Philosophy 100 or Psychology 100.
Texts: W. H. Clark, *The Phychology of Religion: An Introduction to Religious Experience and Behaviour,* New York: 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), New York: 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), New York: Collier Books.

230 General History of Philosophy. Lecture and seminar 3 hours. R. H. Vingoe.

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.

235 Greek Philosophy from Thales to Aristotle. Lecture and seminar 2 hours. S. A. M. Burns.

In which a study is made of the Presocratic fragments, the major works of Plato, and Aristotle's *Organon.*
Prerequisite: Philosophy 100.
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: New York, 1963); Richard McKeon (Ed.), *The Basic Works of Aristotle,* (Random House: New York, 1941).

236 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.

240 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.

270 Philosophy in Literature; Lecture and discussion 2 hours; R.M. Martin

Many important works of literature contain much philosophical material. Sometimes, in fact, it is impossible to appreciate these works fully unless the reader has some knowledge of the philosophical traditions involved. The class is designed both for those with literary interests who wish to learn about and discuss the philosophical issues related to literature, and for those students of philosophy who would like to investigate literary occurrences of philosophical ideas. Authors such as Dostoevsky, Kafka and Sartre will be read, as well as more explicitly philosophical works.

315 Rationalism and Empiricism. (offered in 1971-72 and alternate years) Lecture and seminar 2 hours. R. H. Vingoe.

The purpose of this class is to acquaint students with some of the dominant and novel themes of early modern western 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. A selection of writings from representative thinkers such as Locke, Berkeley, Hume, Descartes, Spinoza and Leibniz will be studied. Particular emphasis will be placed on Hume, Descartes and Leibniz. Students will be expected to write short papers outlining and evaluating some parts of a given philosopher's writings.
Prerequisite: Philosophy 100.
Texts: R. H. Popkin (ed.), *The Philosophy of the 16th and 17th Centuries,* Collier-Macmillan Ltd., Toronto, 1966; L. W. Beck (ed.), *18-Century Philosophy,* Collier-Macmillan Ltd., Toronto, 1966; W. Kaufmann (ed.), *Philosophic Classics, Bacon to Kant,* Prentice-Hall Inc., Englewood Cliffs, N.J., 1961.

320 The Philosophy of Kant. Seminar 2 hours. I. A. MacLennan.

This seminar is devoted to an intensive study of the *Critique of Pure Reason.* However, other aspects of Kant's philosophy will also be treated, and an attempt will be made to relate his philosophy as a whole to that of his predecessors and contemporaries. Finally, his influence on later philosophers will be considered.
Prerequisite: Philosophy 100.
Texts: Kant, *Critique of Pure Reason* (tr. Norman Kemp Smith); Strawson, *The Bounds of Sense.*

325 Contemporary Continental Philosophy. (offered 1971-72 and alternate years) 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

Programmes of Study 47.17 Philosophy

be made to the works of Heidegger, Jaspers, Sartre, Husserl, Marcel and Buber.
Prerequisite: Philosophy 100.
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; Satre, 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; Urmson, J. O., *Philosophical Analysis,* Oxford; O.U.P., 1956.

330 Twentieth-Century British Philosophy, Lecture and seminar 2 hours, S. A. M. Burns

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.

340 Philosophy, Politics, and Economics. (offered 1971-72 and alternate years). Discussion (once weekly) 2 hours. D. Braybrooke.

The work of this class varies considerably from one time of offering to another. The topics taken up range over (1) the nature of explanations in social science; (2) the effects of advances in social science upon both the formulation of issues and their resolution; (3) the relation between value judgments and preference; (4) the concept of rational choice and the concept of action; (5) the interplay of facts and values in the issue-processing programmes by which policies are arrived at in orderly political systems. Currently, the class tends to emphasize the last topic, as illustrated in British discussions of traffic policy and wage control; but all the other topics mentioned are at least looked at in passing. There are readings designed to unfold the illustrations mentioned; theoretical readings in social science, including Dalhl and Lindbolm's *Politics, Economics, and Welfare* (perennially a staple ingredient of the work done by the class); and philosophical readings, especially in authors concerned with value theory, like Kurt Baier, Nicholas Rescher, and G. H. von Wright.

345 Problems of Self. Seminar 2 hours. R. M. Campbell.

These traditional problems of self will be explored: (1) How are a person's corresponding *mental* and *physical* states related? Are they related contingently, e.g., casually? Or are they related through logical necessity, as the philosophical behaviourists believe? Or are they identical, e.g.. a certain pain being one and the same thing as a certain state of the nervous system. The first alternative may lead to skepticism about other minds and the possibility of a logically private language, while the second and third suggest the possibility of machines that think and feel. (2) What is the self – *the subject* of both mental and physical states? Here are the problems of self-knowledge and self-identity. (3) How is *action* by a person or self possible if this action is, as it appears, not a physical or mental state or even a relation between these states?
Prerequisite: Philosophy 100.
Texts: Vere Chappell (ed.), *The Philosophy of Mind;* Herbert Feigl, *The "Mental" and the "Physical";* Alvin Plantinga, *God and Other minds;* Jerome Shaffer, *Philosophy of Mind;* Sidney Shoemaker, *Self-Knowledge and Self-Identity;* Alan White (ed.), *The Philosophy of Action.*

350 Philosophy of Language. Seminar 2 hours. D. Braybrooke.

There are important philosophical questions about the significance of having a language; Is having one indispensable to being fully rational? Does having one thus distinguish human beings sharply from other animals? Can a language be private or must it be essentially public? So far as it is public – a social possession, kept up and imparted in society – does recognization of this fact rescue men from the egocentric predicament (solipsism, the problem of other minds)? There are further important philosophical questions about the significance of the elements found within a language: What is the meaning of "meaning"? If the meanings of words are not things separate from their uses, just how are those uses to be described in the analysis of statements of the form "*x* has meaning in language L" and of the form "The meaning of *x* in L is . . . . . "? These questions in their turn relate intimately to questions about how people come not only to understand the meaning of words and sentences offered them by others, but also to make new applications of those words for themselves and to construct new sentences. Can such achievements be explained entirely by the ordinary methods of behavioristic psychology? Or do they depend (if this is truly an alternative) on human beings having an extraordinary innate capacity for perceiving complex formal relationships?
Prerequisite: Philosophy 100.
Texts: K. Z. Lorenz, *King Solomon's Ring,* London: Methuen, 1952, paperback edition; J. Bennett, *Rationality,* London: Routledge, 1964; P. Ziff, *Semantic Analysis,* Ithaca, N.Y.: Cornell University Press, 1960, paperback edition; B. F. Skinner, *Verbal Behavior,* New York: Appleton Century Crofts, 1957; J. A. Fodor and J. J. Katz, (eds.), *The Structure of Language,* Englewood Cliffs, N.J.: Prentice-Hall, 1964; L. Wittgenstein, *Philosophical Investigations,* Oxford: Basil Blackwell, 1953.

355B Marxist Theory. (offered in 1971-72 and alternate years) Discussion (once weekly) 2 hours. D. Braybrooke.

See Political Science 355B.

380 Hegelian Idealism and Its Critics. Lecture and 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 disintergration 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 paper outlining and evaluating a selection of writings.
Prerequisite: Philosophy 100.
Texts: Patrick L. Gardiner, (ed.), *19th-Century Philosophy,* Collier-Macmillan Canada Ltd., Toronto, 1969; James B. Hartman (ed.), *Philosophy of Recent Times,* Vol. 1: *Readings in Nineteenth-Century Philosophy,* McGraw-Hill, Inc., Toronto, 1967.

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 The Relevance of Science. (offered in 1971-72 and alternate years) Seminar 2 hours. R. Ravindra.

This class examines the nature, methods, and limitations of scientific inquiry, with special emphasis on the relevance of science to other aspects of human culture. This is primarily a seminar class. Students from any department and at any level may take the class as long as they have read carefully the following books: Kuhn, *Structure of Scientific Revolutions* Kuhn, *Copernican Revolution,* Gillespie, *Edge of Objectivity;* Hempel, *Philosophy of Natural Science;* Whitehead, *Science and the Modern World.*

Class readings will be taken from a variety of sources. Students wishing to take the class must see the instructor before registering.

466A Problems in Philosophy of Science. Seminar 2 hours. R. Ravindra.

Some special problems in Philosophy of Science will be considered in detail. Discussion in 1970/71 will center on *Space* and *Time.* Students must see the instructor before registering. *No prerequisite.*

466B Experimental Course in Indian Philosophy. Seminar 2 hours. R. Ravindra.

The intention of this experimental course is to compare and contrast the mainstreams of the Indian and the Judeo-Christian spiritual traditions. Emphasis will not be either on religious rituals and practices or on metaphysical theories. Main concern will be with the actions and utterances of the spiritual giants in the two traditions, particularly as it affects the general philosophic expressions. *No prerequisite.*

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.

47.18 / 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
D. J. W. Geldart
M. H. Jericho
D. B. I. Kiang
C. R. Mann (Oceanography)
R. H. March (Chairman)
G. T. Meaden

Assistant Professors
R. L. Blackford
J. G. Cordes
D. F. Goble
R. D. Hyndman (Oceanography)
W. Leiper
R. Overstreet (Oceanography)
R. Ravindra
P. H. Reynolds
A. M. Simpson
C. G. White

Postdoctoral Fellows
M. Hama
J. R. Johnston
K. Nakazawa
K. V. Rao

MacGregor Teaching Fellows
A. Fricker
P. J. Pothier
I. Vlêek

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. Language 100.
2. Chemistry 100.
3. Mathematics 100.
4. Physics 110.
5. Arts or Science 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 trigonomentry, 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 simply 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. W. Ford, *Basic Physics,* Blaisdell, 1968.

110 General Physics. Lecture 3 hours (2 sections); tutorial 3 hours. W. J. Archibald.

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: J. G. Stipe, *The Development of Physical Theories,* McGraw-Hill, 1967.

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. W. Leiper.

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. I *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 electic 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.

Physics 245. Lecture 2 hours.

Physics 245 is an experimental class first offered in 1969-70 and will be given on demand in 1970-71. It is aimed at developing an understanding of our physical environment, large and small. Topics to be covered could include an examination of our solar system; its origins and the interactions of its component parts. This could lead in turn to a closer study of the sun, the earth, and the moon. A study of the earth would probably include a resume of our current knowledge as obtained through geophysical research and a look at out oceans and their physical behaviour.

Quite different from the celestial bodies which surround us (and on which we live) is our technological environment. It is also hoped to look, in as much detail as the students wish, at some of the devices and the other manifestations of technology which interact with our daily lives.
Prerequisite: A physics class.

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. R. Ravindra.

This is an introductory class to selected topics in modern physics. Topics included are: special theory of relativity; waves and particles; wave mechanics; theory of the atom; nuclear physics; elementary particles; and some topics in solid state physics.
Prerequisite: Students are expected to have some knowledge of elementary wave theory and optics, as given in the Berkeley Physics classes 211 and 231; Mathematics 200 and 220, which may be taken concurrently with the class.
Text: Beiser, *Concepts of Modern Physics,* McGraw-Hill, 1967.

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

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Planck's constant determination; thermionic emission and ionization experiments using a vacuum pumping and instrumentation system; properities 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. 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 course.
Prerequisite: Fourth year standing in physics or engineering-physics or permission from the instructor.

410 Advanced Classical Mechanics and Electrodynamics. Lecture 3 hours. M. G. Calkin / 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: Lagrange's equation, Hamilton's principle, the two body central force problem, Hamilton's equations of motion, transformations, and the Hamilton-Jacobi equation.

The following topics will be discussed in the second term: classical electrodynamics, covering, for example, the material in *Jackson,* chapters 6, 7, 9, 13, 14, 15, 17: 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.

411A Special Relativity. Lecture 3 hours.

Topics discussed include: experimental basis of the Lorentz transformations relativistic kinematics; space-time; introduction to tensor calculus; relativistic dynamics; relativistic electrodynamics.
Prerequisite: Physics 211, 231 and 315, or the permission of the instructor.
Text: Rindler, *Special Relativity, 2nd ed.,* Oliver and Boyd.

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 include ordinary differential equations, infinite series, complex variables, integral transforms, vectors 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.).*

422A Nuclear Physics. Lecture 3 hours. W. Leiper.

This is an introductory class in nuclear physics. Topics discussed include: nucleon-nucleon interactions, nuclear structure, gamma transistions, alpha decay, beta decay, nuclear reactions, Mossbauer effect, counting statistics, and nuclear detectors.
Prerequisite: Physics 315 and permission from the instructor.
Text: TBA.

422B Introduction to Solid State Physics. Lecture 3 hours. G. T. Meaden / D. J. W. Geldart.

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 to 9, Wiley, 1966.

433 Advanced Electronics. Lecture 3 hours. A. Levin.

Term I: 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.

Term II: Systems and Applications. Circuit analysis, system logic, signal processing, noise and signal degradation. Circuit techniques; analogue and digital.
Prerequisite: 4th-year standing and permission of instructor.
Text: Millman and Halkias, *Electronic Devices and Circuits.*

440 Waves in Layered Media. Lecture 2 hours. Geophysics staff.

Topics will include: propagation of plane and spherical waves in homogeneous and inhomogeneous media, reflections from plane boundaries and transition layers, surface waves, and related subjects. The emphasis will be on elastic waves.
Prerequisite: Physics 211, 231, and Mathematics 220.

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 Kirchhoff 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.

If time is available, topics in holography and allied subjects of Fourier optics will be included.
Prerequisite: Physics 444A.
Text: Stone, *Radiation and Optics,* McGraw-Hill, 1963 and assigned readings on related topics.

445 Geophysics. Lecture 2 hours. Geophysics Staff.

This is an introductory survey class on the physics of the earth. Topics discussed are: earthquakes and the propagation of seismic waves in the earth, the gravity field, magnetic field, electrical conductivity and thermal state of the earth, its formation and development and the dynamic processes of continental drift and ocean floor spreading.
Prerequisite: Three physics classes or permission of the instructor.

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.

47.19 / Political Science

Professors
J. H. Aitchison (Chairman)
J. M. Beck (Sabbatical Leave 1970-71)
D. Braybrooke
K. A. Heard

Visiting Professor
L. A. Dexter

Assistant Professors
D. M. Cameron
W. R. Mathie
D. H. Poel
A. P. Pross
D. W. Stairs

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 "tradionalists". 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, 210, 217, 235, 311, 312B, 313, 314A, 315, 316, 318, 319B, 330, 349, 350, 351.

2. Political Philosophy: Political Science 240B, 241A, 242A, 343B, 345B, 346, 348B, 355B.

3. International Politics: Political Science 223, 225, 320B, 322, 323, 324A.

Degree Programmes

General B.A. with major in Political Science (recommended programme).
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
6-7 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.
14. A class above the 100-level in philosophy, economics, history or sociology.
15. 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. The staff in Political Science.

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.

Great Britain and the Commonwealth. Lecture and seminar 3 hours. K. A. Heard

This class is designed primarily for second and third year students. It assumes the level of knowledge and training generally expected of students who have successfully completed Political Science 100, i.e., some understanding of the distinctions between democratic, authoritarian and totalitarian systems and their underlying principles, a knowledge of the major institutional forms falling within the category of democratic governments and, specifically, of the principal features of the British political system.

During most of the first term, the main stages in the evolution from the British Empire into the present Commonwealth are examined. Emphasis is given to the changing attitudes and ideas, both in Britain and in the emerging Commonwealth nations, that have shaped these changes; and to contemporary ideas concerning the kind of association the Commonwealth should be, and the sort of role it should play in both domestic and international politics, e.g., should (or does) the Commonwealth seek to formulate and to actualise common political ideals? What is the nature of the Commonwealth interest in the issue of Rhodesian independence? Should the Commonwealth take action in such matters as the Nigerian civil war or the Kashmir dispute between India and Pakistan?

In the advance to self-government and independence, colonial constitutions have tended to take the British constitutional structure ("the Westminster model") as their basis. In the second term the class examines in some depth select areas of British government and politics and then proceeds to a study of such topics as the applicability of the Westminster model to countries with different social structures, traditions and cultures, and the increasing variety of political institutions among the members of the Commonwealth.

The more generalized material presented in the lectures is supplemented by a detailed examination of specific aspects of these topics in seminar papers and discussion.

202 The **Canadian Political System.** Lectures and discussion. D. M. Cameron.

Students entering the class will be expected to have an understanding of the rudiments of political science. This will normally imply successful completion of Political Science 100 or its equivalent.

The lectures will be organized into three major sections dealing respectively with (1) the Canadian political environment, (2) the institutions of government, and (3) the institutions and processes linking the government to its environment. Topics in the political environment will include the economic system, race, religion, ethnicity and social class, regionalism, and urbanization. The second section will contain a descriptive analysis of the structure of government organization at the federal, provincial and local levels and a discussion of the processes and traditions by which they operate. Topics in the third section will include political parties, pressure groups, the media of communication and the agents of political socialization such as the school and voluntary associations.

In addition to lectures, the class will be divided into small groups designed to facilitate less formal discussion of salient issues in Canadian politics which are of mutual concern to members of the group.

205 The **Political System of the United States.** Lectures 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 necessary.

The text on national government will set the traditional aspects of American Government; for example, the presidency, congress or political parties, within the theoretical framework of systems analysis. The emphasis will be on familiarizing the student with the empirical generalizations concerning American political behaviour as supported by current research. Considerable time will be spent investigating the area of comparative state politics which is of especial interest to the professor.

In lieu of the third lecture hour, students will be expected to carry on independent, outside reading in a narrower area of their choice. The end product of this outside work may take the form of either book reviews or term essays.

210 **Comparative Government.** Lectures 2 hours. Instructor to be announced.

217 **Government and Politics in Africa.** Lecture and tutorials 2-3 hours. K. A. Heard.

The only formal prerequisite for this class is Political Science 100 or the equivalent level of knowledge and training. The class is aimed primarily at those upper-year students who are aware of the importance of Africa in the contemporary world and wish to increase their understanding of the nature of politics in that continent, and/or who seek a deeper insight into political forces and processes through a study of their operation in non-Western societies.

The class is normally divided into small tutorial groups, each of which meets with the instructor once a week. One lecture per week is presented to the class meeting as a whole.

The initial task of the class is to promote an understanding of the cultural heritage and cultural and social variety of the peoples of sub-Saharan Africa. Attention is then given to the impact of the colonial experience on Africa, the two principal forms being territorial nationalism (i.e., nationalism in the normal sense of the term) and Pan-Africanism (continental, or macro-nationalism). Each of these seeks institutional expression. The former, in a state structure embodying a sense of national identity and national purpose; the latter, in regional and continental organizations (e.g., Pan-African Movement for East and Central Africa and the Organization of African Unity). Each of these has to face the threats of internal tensions and conflicts, and these are studied both in general terms and with reference to specific cases.

Finally, the political systems of certain select African states are studied in more depth. These usually include a West African state (e.g. Nigeria), an East African state (e.g. Tanzania), and two or more Central and Southern African states (e.g. Zambia and Rhodesia and/or South Africa).
Prerequisite: Political Science 100 or equivalent.

223 Techniques of Statecraft and Problems of Order in International Politics. Lecture 3 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 of the class 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.

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Students taking the class should not expect to be exposed to descriptive accounts of modern diplomatic history or of contemporary international affairs, although illustrations and examples are liberally employed throughout.

No specific prerequisites are required, although students who have taken other classes in political science, or who are familiar with the history of world affairs in the 19th and 20th centuries, may find they have a slight advantage in understanding the significance of some of the discussions.

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. A. Aitchison.

Students entering this class are expected to have at least as much knowledge of world affairs of today as can be gleaned from the reading of the daily press, popular magazines, and other mass media. Among the topics examined are: the general structure of power in the world today; the problems of deterrence, of 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; the Sino-Soviet split; peaceful co-existence between communist and non-communist states; the German problems; the influence of the Triple-A (Asian, African and Arab) state; international and regional organizations.

One weekly hour out of three will be set aside as a "topical hour" at which members of the class will report on current trends and events. Their reports will be followed by discussion. Any student in the University may attend Topical Hour.

235/535 Public Opinion. Lectures 2 hours. D. H. Poel

The class will deal generally with problems of theory, methodology, and technique in the design and analysis of survey research data. Two major topics for consideration are (1) the meaning and measurement of opinion, attitude and preference within the context of contemporary survey research; and (2) the formation of opinions, attitudes and preferences through the socialization process. In addition, the class will trace the developments and findings of voting behaviour studies in the United States and examine the use of survey research for studying broader conceptual and theoretical interests; for example, the notion of system support.

The means for accomplishing the above goals will depend upon whether the class wishes to engage in a survey of political attitudes in the Halifax area by designing and carrying out its own study. Although a class in statistics is not a prerequisite, students entering this class could profit from taking Political Science 350/550 during the same year (if not previously).

240B/540B Political Philosophy: the Stoics to the End of the Middle Ages. Lectures and discussion 3 hours (spring term only). J. H. Aitchison.

The major writings to be examined in this class will be those of the Greek Stoics, Cicero, Seneca, the Roman lawyers, the early Christian fathers, St. Augustine, Aquinas, and Marsilius of Padua. The conflict between the Papacy and the Empire, and the Conciliar Movement will also be examined in some depth.

241A/541A The Political Philosophy of Plato. Lectures 2 hours (Fall term only). 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 Plato's *Republic.*

242A/542A The Political Philosophy of some Great Thinkers of the 17th and 18th Centuries. Lectures and discussion 3 hours (Fall term only). J. H. Aitchison.

The primary objective of this class is to study in some depth the political philosophy of Hobbes, Locke and Rousseau. If time permits others (e.g. Hume) will be examined.

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 arm of government, it is given at an advanced level because the class demands a fairly high level of knowledge of political systems and of the Canadian political system in particular. Students entering the class will be expected to have an understanding of the rudiments of political science and some specific knowledge of the Canadian political system.

The outline of the class is as follows:
1. Bureaucracy and the Political System. A discussion of 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 Public Service. A study in particular of personnel management and administrative organization in Canada.
4. Financial Management of the Canadian Public Service.
5. The Process of Policy Formation. An examination of decision-making and its relationship to policy formation.
6. Policy and the Public. The impact of long range planning on the traditional relationship between the bureaucracy and the public.

312B/512B Provincial Public Administration. Seminar 2 hours (Spring term only). A. P. Pross.

This is an advanced research class designed for those who have taken at least one previous class in public administration and a class in Canadian Government. It is expected that the content of the class will be developed to meet the interests of the instructor and the members of the class.

313/513 Intergovernmental Relations in Canada. Lectures and seminar 2 or 3 hours. D. M. Cameron.

Students enrolling in this class will be required to possess reasonably thorough understanding of the Canadian political system. This requirement can be satisfied by successful completion of Political Science 202.

The course will be divided into three main areas: political theory as related to the territorial division of government power and, respectively, the development and contemporary state of federal-provincial and provincial-local relations in Canada.

In addition to developing a basic understanding of the nature of intergovernmental relations in Canada, students will be expected to acquire a more thorough understanding of at least one functional area in each of the federal-provincial and provincial-local spheres.

314A/514A The Policy Process in Canada. Seminar 2 hours (first term only). A. P. Pross.

A study of the fashion in which policies 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. Students will be encouraged to examine policy formation in fields of interest to them, but some time will be devoted to the discussion of policy making in matters relating to what has been called the "environmental crisis"; e.g., urban problems, pollution, resources depletion, etc.

Admission with the permission of the instructor.

315/515 The Politics, Government and Constitution of Canada. Seminar 2 hours. To be announced.

This class is open to those students who have demonstrated competence in Canadian politics and government by attaining second class honours standing in Political Science 202 or its equivalent, and in exceptional circumstances to those students who have attained 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 25, 1968 constitute one more step towards the complete Americanization of Canadian politics? Has the operation of the first-past-the-post electoral system served to counter the nationalizing effect of Canadian political parties and thereby strengthened the sectional basis of Canadian politics? Did John Diefenbaker re-create the Progressive Conservative party in his own image? What was the nature and significance of Trudeaumania? Have the crucial problems in federal-provincial relations been financial rather than racial or ethnic?

The last question will prepare the way for 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 linquistic 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? To answer this question, there will be a detailed examination of the relevant literature, including the speeches and writings of Daniel Johnson. Pierre Elliot Trudeau, Rene Levesque and the English-speaking premiers.

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 the current crisis in the Canadian federation.

316/516 Politics in Nova Scotia since Confederation. (not offered in 1970-71). J. M. Beck.

318/518 The Politics of Southern Africa. (not offered in 1970-71). Seminar 2 hours. K. A. Heard.

319B/519B The Budgetary Process. Lectures and Seminar 2 hours (Spring term only). D. M. Cameron.

This is an advanced class for students who are prepared to specialize in the study of Canadian politics and, particularly, Canadian public administration. The substantive areas examined will reflect the interests of the participants but major attention will be focused upon the concept and practice of planned programme budgeting systems (PPBS) and their ancillary procedures.

Students intending to enrol in this class should consult the instructor prior to the beginning of the Spring term.

320B/520B The Theory of International Politics, Seminar 2 hours (Spring term only), J. H. Aitchison

This class seeks to provide perspectives for viewing the world of international politics that will be as useful twenty years from now as they are today. Unless facts are firmly grasped in a theoretical and conceptual framework, they cannot be understood.

The main emphasis is on theories, concepts, and approaches, though these are related to the world of today.
Text: Rosenau, *International Politics and Foreign Policy.*

322/522 History of Canadian External Relations (same as History 422/522). Seminar 2 hours. D. W. Stairs.

Designed primarily, but not exclusively, for graduate students in history and political science, this class is intended to acquaint its participants with problems in the formulation and content of Canadian foreign and defence policy from 1896 to the present. Members of the class are expected to prepare research papers based at least in part upon documentary and other "primary" sources, and to present their findings for general discussion.

Within the limits set by the general subject matter of the class, students are encouraged to select and develop topics of their own choosing. In the past, attention has centered on a variety of subjects and themes, of which the following are examples: the development of the Department of External Affairs; Laurier and the Empire; problems in Canadian-American relations, 1896-1911; Borden's conduct of Anglo-Canadian relations during World War I; Canada's role in the Paris Peace Conference; the content and execution of Canadian defence policy, 1919-39; the Canadian role in the post-war evolution of Dominion status; Mackenzie King and the concept of the North Atlantic triangle; Canada and allied diplomacy in World War II; the Canadian role in the founding of the United Nations; Canada and the formation of NATO; the Canadian response to the Korean War; Canada and Suez; peacekeeping in Canadian foreign policy; Canada's external aid programme; foreign policy in the Diefenbaker years; Canada and North American Defence; Canadian policy on disarmament and arms control; Canada and the war in Vietnam; the foreign policy of Quebec; and so on.

It will be clear from the foregoing that the class is largely descriptive in content, but it also raises a number of analytical issues, and these are discussed as the occasion warrants. For obvious reasons, the bulk of the sessions are devoted to the period since the Second World War.

No esoteric technical expertise is required for admission. On the other hand, the class is conducted at a reasonably sophisticated level, and the students themselves are largely responsible for the quality of the discussions. It therefore follows that they should be moderately experienced and proficient in the preparation of essays and in the presentation of historical evidence. Students with a background in Canadian history may have a slight, but certainly not very significant, advantage in classroom debate,particularly in the first term, but anyone who has performed competently in a few undergraduate classes in history, political science and/or similar disciplines should be capable of active participation.

323/523 Seminar on International Politics. (not offered in 1970-71). Seminar 2 hours. D. W. Stairs.

324A/524A The Politics of Development. Lectures and seminar 2 hours (Fall term only), K. A. Heard

This class deals with the internal problems and theories of development. It will cover such topics as: concepts of development and underdevelopment; culture patterns in the 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.

330/530 Political Parties. (not offered in 1970-71). Lectures 2 or 3 hours. J. M. Beck.

343B/543B The Origins of Contemporary Political Theory. Seminar 2 hours (Spring term only). 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

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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 course 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.

While there are no specific prerequisites for membership in the class, some familarity with contemporary political theory; e.g., the work of David Easton, would be helpful. A useful introduction to the kind of question we hope to deal with might consist of reading Arnold Brecht's *Political Theory* and Peter Winch's *Idea of a Social Science.*

345B/545B The Question of Regimes in the Study of Politics. Lectures and discussion 2 hours. (Spring term only). 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 course 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 course 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.

346/546 Problems in Political Philosophy: Ancient and Modern Theories of Republican Government. Lectures and discussion 2 hours. W. R. Mathie.

The course will attempt to analyze the nature of modern theories of republican government through an examination of a number of modern writings including Machiavelli's *Discourses,* Vico's *New Science,* Montesquieu's *Spirit of the Laws,* Rousseau's *Social Contract,* and *The Federalist Papers.* An effort will be made to appreciate and understand the novelty of these theories by contrasting them with, on the one hand, the theory of sovereignty of Hobbes and Locke and, on the other hand, with the account of democratic government given in Aristotle's *Politics.*

348B/548B Social Values, Political Institutions and Political Theory. Seminar 2 hours. (Spring term only). K. A. Heard.

The main purpose of this seminar is to make explicit the social values that are relevant to contemporary society, to examine the extent to which contemporary political institutions are capable of realizing these values, and to discuss some of the major political theories insofar as they bear on these problems.

349/549 Philosophy, Politics, and Economics. (not offered in 1970-71). Seminar 2 hours. D. Braybrooke.

350/550 Statistics and Research Methods. Lecture 3 hours. (same as Sociology 301).

351/551 Introduction to Political Inquiry. Lectures 2 hours. L. A. Dexter / D. H. Poel.

First term (L. A. Dexter): An introduction to the traditional and modern scope and method of political science. Considerable attention will be devoted to the relationship of political science to other social sciences and to the humanities and natural science. An effort will be made to encourage students to formulate and evaluate their own approaches to the study of politics and society with reference to the history of the discipline and its philosophical roots. Time permitting, exercises will be undertaken in some of the technical skills useful in studying institutional processes such as the interview and the analysis of perspectives and data in newspapers and popular books, etc.

Second term (D. H. Poel): The matter of this term will be designed both to complement and contrast that of the first term. It will include problems from the general area of the philosophy of the social sciences concerning the objectives of political inquiry and problems in conceptualization, theory construction, explanation and prediction, the design of research, and the objectivity of the social sciences. Attention will also be given to current, alternative, conceptual frameworks such as system analysis, communication theory, and structural-functionalism.

Undergraduates will be admitted only with the permission of the instructors. Graduate students in related fields concerned with problems of institutional organization are welcome and, if interested, should consult the instructors about registration.

One of the texts to be used in the first term is L. A. Dexter: *Elite and Specialized Interviewing* (to be published in March, 1970).

355B/555B Marxist Theory and Its Upshot in the World Today. Seminar 2 hours. (Spring term only). D. Braybrooke.

Social objectives inherited from earlier socialist thinkers, especially Saint-Simon, inspired Karl Marx's life work and thought; general philosophical ideas imparted by Hegel contributed some crucial features of overall framework and inclination; the analytic apparatus developed by classical economists of the British school, especially Ricardo, gave the thought its cutting edge as a critique of standing social arrangements. The class will spend some time identifying each of these influences. Original texts by Saint-Simon and Hegel will be compared (in translation) with writings by Marx and his long-time collaborator Engels. It will be shown how the idea of alienation governed Marx's attitudes toward social reform and planning even after he ceased to use the term or write in a philosophical manner; it will also be shown how the idea of alienation gave rise to Marx's concept of ideology, which occupied a leading place in his dialectic of the class struggle. The class will then examine the economic analysis that Marx applied to capitalism as he knew it and the economic grounds on which he thought both that the system was due to be transformed and that it was hastening its own transformation. From Marx, the class will turn to some of Marx's followers, and will consider the very different reactions of Bernstein and Sorel to the apparent failure of Marx's predictions, the uses made of Marx's doctrine by Lenin and Trotsky in fomenting, justifying and interpreting the Bolshevik Revolution in Russia, and finally some manifestations of Marxism today. Among the latter, the petrified official ideology of the Soviet Union will figure alongside the attempts of Yugoslav Communists and of some people in Poland to find new beginnings by returning to Marx's original thought. Some attention will be given also to Marxist doctrines in China and Cuba; and to the sweeping critique of industrial bureaucratic culture, currently fashionable among students, that Marcuse has drawn in part from Marx.

Textbooks will include the Anchor books *Writings of the Young Marx on Philosophy and Society* and *Marx and Engels; Basic Writings on Politics and Philosophy;* and Robert Freedman, ed. *Marx on Economics.*
No prerequisites are stipulated for this class.

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.

47.20 / *Psychology*

Professors
W. K. Caird
W. K. Honig
J. A. McNulty

Izaak Walton Killam Research Professors
P. H. B. James
N. J. Mackintosh

Izaak Walton Killam Senior Fellow
R. S. Rodger

Associate Professors
C. J. Brimer (Acting Chairman)
J. W. Clark
P. J. Dunham
B. Earhard
G. V. Goddard
S. Nakajima
R. Over

Assistant Professors
B. S. Clark
M. Earhard
J. M. Fearon
H. Hughes
B. R. Moore
F. J. Mortenson
R. L. Rudolph

Research Associates and Postdoctoral Fellows
D. N. W. Doig
V. Gray
H. A. Kuechler
D. Lander
C. Leech
C. Turner

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 the *four* classes beyond Psychology 100 that are listed below. All students who intend to major in psychology should consult with Dr. J. A. McNulty

Year I
Psychology 100.

Year II
Psychology 200; Psychology 201.

Year III
One of Psychology 304, 305, or 307; one of Psychology 308, 309, 310, or 312.

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 308, 309, 310, 312, 356, 358, or 463.

Year IV
Psychology 465; Psychology 470; one of Psychology 308, 309, 310, 312, 356, 358, or 463.

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, 356, 358, or 463.

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/W. K. Honig/J. A. McNulty/R. Over

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 four class sections. Although the sequence will vary for different sections, the material covered during the year will consist of the four areas described below.

1. The evolution and development of behaviour
J. W. Clark

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.

Konràd Lorenz's *On Aggression* (a paperback published by Methuen in 1967) is recommended for preliminary reading.

2. Learning and motivation
W. K. Honig

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 has 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
R. Over

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.

R. L. Gregory, *Eye and Brain* (a paperback published by McGraw-Hill in 1966) is recommended as preliminary reading.

4. Human Performance
J. A. McNulty

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 purely 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.

These descriptions refer to the currently offered class. Class content and instructors may change in 1970-71.

200 Problems in Experimental Psychology, Lecture 2 hours; laboratory 2 hours, P. Dunham

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 Garmezy, 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 zoology, 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:
a) preliminary experiments to familiarize you with animal research procedures in psychology;
b) an independent research project with animals which is formulated with the help of your instructor;
c) final written and oral research reports concerning your independent research projects.

After Christmas holidays:
a) preliminary experiments to familiarize you with human research procedures in psychology;
b) an independent research project with humans which is formulated with the help of your instructor;
c) final written and oral research reports concerning your independent research projects.
Prerequisite: Psychology 100

201 Applied Psychology, Lecture 3 hours, S. Dutta/H. A. Kuechler/B. Clark

Three major areas of applied psychology are discussed in this class:

1. Industrial Psychology
This part of the class is concerned with the relationship of man to the organization in which he works, the machines he handles and the products he consumes.

2. Behaviour Modification
The symptoms of a physical disease are obviously not always the same as the disease itself; aspirin may lower the fever, fut it will not kill the virus which causes the fever. Until recently it was universally believed that the same distinction – between the symptoms and the cause – had to be made in the case of the mental 'diseases'. The patient's bizarre behaviour was thought to be a mere symptom of an underlying physical or psychological disease. Most people still believe this, and thus devote their energies to discovering the site of the brain injury, the nature of the metabolic disorder, or the circumstances of the disaster in childhood which causes the patient's symptoms. There is, however, a second and more recently developed view that some forms of abnormal behaviour are learned in the same way as normal behaviour is learned. Those who take this view believe that the symptom *is* the disease, and that it is irrelevant to search for original causes of the symptom. The consequences of these views are examined in some detail, and the student is provided with research evidence which will allow him to form his own judgement.

3. Psychology Applied to Social Issues
Lectures and readings in this part of the class will be concerned with the analysis of contemporary social issues, such as, aggression and violence, alienation and revolt, from the point of view of the psychologist.

This description refers to the currently offered class. Class content and instructors may change in 1970-71.
Prerequisite: Psychology 100 or Biology 101.

304 Learning and Motivation, Lecture 2 hours; laboratory 2 hours, R. Rudolph

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

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phenomena, such as forgetting and transfer of 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 (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. Forgus: *Perception.*
Prerequisites: Psychology 100 (honours students); Psychology 200 (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 required of all honours students and 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 304 or 305 (honours students); Psychology 200 (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 (general students).

309 Developmental Psychology, Lecture 2 hours; laboratory 2½ hours, Barbara Clark

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 (general students).

310 Theories of Personality, Lecture 2 hours: laboratory 2 hours, Not offered 1970-71

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 Garmezy, N. *Principles of General Psychology*, 3rd edition, New York: Ronald Press, 1968).
Prerequisite: Psychology 100 (honours students); Psychology 200 (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-complusive 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. Garmezy: *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 (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

Programmes of Study
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Psychology

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.

463 Cognitive Processes, Lecture 3 hours, B. Earhard

A child enters this world without memory, thought or language – with only the requirement that certain basic 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.
Prerequisites: This class is primarily intended for honours students, but other students may be admitted with the consent of the instructor.

464 Ethology, Lecture 2 hours, F. J. Mortenson

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.

47.21 / 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

This class attempts to acquaint 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 to their chief literary characteristics and their historical and religious significance.
Reference Texts: William Neil, *The Rediscovery of the Bible;* B. W. Anderson, *Understanding the Old Testament;* T. Henshaw, *New Testament Literature.*

47.22 / Romance Languages

FRENCH
Professors
Harry Aikens (Acting Chairman)
Paul Chavy
Harold Rasmussen (Chairman designate)

Assistant Professors
Edmund Boyd (on leave 70-71)
Edward Gesner
Sylvain Journoud
Frank Kretschmer
Derek Lawrence
Marcelle Sandhu
Claude Simon
Leonard Sugden

Lecturers
Elizabeth Bednarski
Joseph Enguehard
Alain LeBerre
Robert Ryan (on leave 70-71)

SPANISH
Assistant Professors
Peter Bly
Vicente Romano

Lecturers
Barbara Lotito
Irena Pittas
Stephen Rogge
Irene Zatka

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 must include:
French 102, 130, 202
Two, three or four of French 204, 230, 231, 304.
Any 400-level French class(es).

With French as minor, course must include one of the following sequences:
(a) French 103, 203, 303; and, if desired, one of French 204, 230, 231.
(b) French 106, 204, and one or two of French 230, 231, 304.

Bachelor of Arts with Honours in French
Year I
1-2. French 102, 130
3. A class in the minor subject or a science subject.
4-5. Two other classes.

Year II
6-8. French 202, 250, 251
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 bear in mind, however, that the number of classes taken in either subject would probably be insufficient for admission to most graduate programmes without at least an extra year's work.

Notes
(1) The classes chosen as electives in the programmes outlined above must be such that they also satisfy general degree requirements.

(2) Combinations of classes other than those set forth above cannot be taken to fulfill degree requirements except with the express permission 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 and who obtains credit for a class at that level, may not later take a lower level class 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; no more than three at the 200 level, except with the express permission of the Department.

French Classes Offered

102 Spoken and Written French I(a), Lecture 3 hours; language laboratory 5-8 hours per week

For majoring and honours students with good aptitude for language study but little or no previous experience of oral French, this class provides intensive training in the use of the basic structures of the language as it is spoken and written.

103 Spoken and Written French I(b), Lecture 3 hours; language laboratory 5-8 hours per week.

For other than majoring and honours students with good aptitude for language study but little or no previous experience of oral French. Similar in purpose and method to French 102 but proceeding at a somewhat less rapid pace.

106 Proficiency in Reading, Lecture 3 hours

Systematic training in the skills needed for reading French rapidly and with accuracy. Although designed primarily for undergraduates, this class also suits the needs of graduate students having to show evidence of a basic reading knowledge of French.

130 Introduction to French Literature, Lecture 3 hours

For majoring and honours students. A general introduction to French literature through the study of a small number of texts of varied nature: analysis, appreciation, criticism, discussion.

European Literature 100 *(see section 47.10A/ European Literature),* Lecture 3 hours

202 Spoken and Written French II(a), Lecture 3 hours; language laboratory 5-8 hours per week.

For majoring and honours students, this class continues and completes the work begun in French 102.
Prerequisite: French 102.

203 Spoken and Written French II(b), (not offered in 1970-71)

This class will continue and complete the work begun in French 103.

204 Composition, Lecture 3 hours

Training for accuracy in reading and writing French: exercises in translation from French to English and from English to French, grammar and 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.

303 Spoken and Written French III(b), (not offered in 1970-71)

This class will continue and complete the work begun in French 203.

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, with introduction to the elements of style in French.
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, more particularly those of French, English and other languages familiar to students: how they are produced, how they may be classified and represented in writing, how they can be taught. (Not a class in remedial pronunciation.)
Prerequisite: thorough knowledge of English and French.

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 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 must include:
Spanish 102, 110, 202
Two, three, or four of Spanish 230, 234, 304, 335, 336, 420, 432, 440, 445.

With Spanish as Minor, course must include:
Spanish 102, 202.
One or two of Spanish 230, 234, 304, 335, 336, 420, 432, 440, 445.

Bachelor of Arts with Honours in Spanish

Year I
1-2. Spanish 102, 110
3. A class in the minor subject or a science subject.
4-5. Two other classes.

Year II
6-8. Spanish 202, 230, 234.
9. A class in the minor subject.
10. One other class.

Years III and IV
Details of the honours programme in Spanish 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 bear in mind, however, that the number of classes taken in either subject would probably be insufficient for admission to most graduate programmes without at least an extra year's work.

Notes

(1) The classes chosen as electives in the programmes outlined above must be such that they also satisfy general degree requirements.

(2) Combinations of classes other than those set forth above cannot be taken to fulfill degree requirements except with the express permission of the Department.

(3) A student may, with the permission of the Department, be admitted to a Spanish course at an advanced point because of prior knowledge of the language. Such a student, however (except as he may be granted transfer credits in the usual way), must normally take the same *total* number of classes as other students in the same course.

(4) A student admitted to a Spanish course at an advanced level and who obtains credit for a class at that level, may not later take a lower level class for credit except with the express permission of the Department.

Spanish Classes Offered

102 Spoken and Written Spanish I, Lecture 3 hours; language laboratory 3-5 hours per week.

For beginners or students with only a slight knowledge of Spanish. Intensive training in the use of the basic structures of the language as it is spoken and written; practice in reading.

110 Spanish Civilization, Lecture 2 hours

This class is designed to complement Spanish 102; talks and discussions (in both English and Spanish) on Hispanic affairs (living habits, politics, art, sport, etc. in the various parts of the Spanish-speaking world).
Prerequisite: Spanish 102 (which may be taken concurrently).

202 Spoken and Written Spanish II, Lecture 3 hours; language laboratory 2-3 hours per week.

Continues and completes the work begun in Spanish 102.
Prerequisite: Spanish 102.

230 Survey of Spanish Literature, Lecture 3 hours

Introduces students to the main works and trends in Spanish literature from the 10th century to the present day and aims at developing a critical point of view.
Prerequisite: Spanish 202 (which may be taken concurrently).

234 Literature of the 19th Century, Lecture 3 hours

Prerequisite: Spanish 202 (which may be taken concurrently).

304 Composition, Lecture 3 hours

Training for accuracy in reading and writing Spanish; exercises in translation from Spanish to English and from English to Spanish, grammar and free composition.
Prerequisite: Spanish 202

335 The Generation of '98, Lecture 3 hours

Prerequisite: Spanish 202 (Spanish 304, which may be taken concurrently is also strongly recommended).

336 Literature of the 20th Century in Spain, Lecture 3 hours

Prerequisite: Spanish 202 (Spanish 304, which may be taken concurrently, is also strongly recommended).

420 History of the Spanish Language, Lecture 2 hours

Study of the development of the Spanish language from its origins to the present day.

432 The Golden Age, Lecture 2 hours

440 The Latin-American Novel in the 20th Century, Lecture 2 hours

445 Cervantes (not offered in 1970-71), Lecture 2 hours

The literary theories of Cervantes are discussed with reference to certain of his works and with a view to discovering the key to his originality as a novelist.

Programmes of Study 47.22 Romance Languages

47.23 / *Russian*

Associate Professor
Irène Coffin

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.

Students interested in the environmental sciences (e.g. biology, geology, oceanography) should seriously consider Russian as a second language. Russian scientists contribute much in their own language to these sciences and, although leading papers are now being translated into English, the bulk of their work remains in the Russian language, especially the older material, much of which is still valuable.

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 (3 Sections), Lecture 3 hours, Iréne 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 grammer 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.

This 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, Iréne 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 201.

301 Conversational and Literary Russian, Lecture 3 hours, Iréne 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.

47.24 / *Sociology and Anthropology*

Professor
W. N. Stephens (Chairman)

Associate Professors
D. H. Clairmont
H. Gamberg

Assistant Professors
G. D. Bouma
D. Q. Brodie
D. H. Elliott
J. L. Elliott
J. G. Morgan
J. A. Spanagel
J. D. Stolzman

Sociology and social anthropology are based on the fact that man is a social creature. We all are born, live and die as members of, and contributors to, common social traditions. Society as an organized body of attitudes, beliefs and behaviour, exists before our entry into it. At birth we do not choose the language we will speak, our father's income, or our parents' political preferences.

These social facts, such as language, values, level of education or parental income, exist as common and predictable properties which can be investigated in the same manner as the behaviour of gases or molecules or rats in a maze. Sociologists and anthropologists investigate and attempt to explain these facts using many methods, ranging from the setting up of artificial groups in a laboratory to the actual participation in the total life of a primitive tribe.

The sociologist is concerned in general with the growth and development of societies, from small, preliterate tribal 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. 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.

Undergraduate Advising
Dr. Gamberg is the undergraduate advisor for the department. Undergraduate programmes and problems concerning specific classes may be discussed with him.

Sociology Classes Offered

100 Sociology/Anthropology Lecture 2 hours; tutorial 1 hour

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.

203 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

This class analyzes the principal aspects of social inequality in modern, industrial society. The formation of classes, status groups and their 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, J. G. Morgan

The class analyzes the relations between religious beliefs, social action and social structure. Approximately one half of the class is concerned with religion in primitive societies, the other half dealing with religion in the context of modern western societies.

Some topics of the class are: witchcraft, magic, shamanism, totemism, myth, modification of religious beliefs and practices as a result of modernization and culture contact, secularization, the structure of religious organizations, religion and social class.

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 the 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.

209B 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.

211A Canadian Society Lecture 3 hours, J. L. Elliott

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

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.

215A Mass Society: Perspectives and Problems Lecture 3 hours, D. H. Elliott

This class deals with concepts and theories of modern, industrial "mass society". The structure and functions of the mass media and mass culture in society are examined in detail. The course focuses upon problems of the "triple revolution", technological-militarism, cybernation and human rights in the mass society.

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 family, as a social institution, will be viewed in historical and in cross-cultural perspective.

301 Statistics and Research Methods Lecture 3 hours, D. Q. Brodie

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 compute correlations, analyses of variance and covariance and how to use non-parametric tests. He will also be given a general introduction to factor analysis.

A detailed survey is made of the basic methods employed at various stages of social research. The topics discussed in the class include the formulation of a research problem, research designs, measurement, methods of data collection, and analysis. Special attention is given to the sample survey as one of the main techniques of social science research. Practical experience in survey methods is provided through a class project.

308A 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.

311A 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.

312B 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, Glumpowitz, Ratzenhofer, Sumner, Small and Oppenheimer. The current contributions of Vold and Coser will be assessed. Section size will be limited to fifteen.

313B 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/H. V. Gamberg

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

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.

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.

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 M.A. programme in sociology is offered. For details see the Calendar of the Faculty of Graduate Studies.

47.25 / *Theatre*

Associate Professors
A. R. Andrews (Chairman)
L. H. Lawrence
R. G. Merritt

Assistant Professors
B. T. Marchiafava
D. R. Overton
R. W. Ward

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 completion of the new arts centre at Dalhousie, which is expected during the 1970-71 academic year, will for the first time provide 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, at present at 6188 South Street, will also be located in the arts centre on its completion.

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. A class from Group A.
2. A class from Group B.
3. A class from Group C.
4. Theatre 100: Introduction to Theatre.

Students with science matriculation.
5. A class in a third subject from Group B.

Students without science matriculation.
5. A class from Group D.

Year II:
6. Theatre 250: The Classic Theatres and their Origins.
7. Theatre 270: Design in the Theatre.
8. A class in a second subject from Group C.
9. A class in art history.
10. A class in the student's minor subject.

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 are also possible. 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 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