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GENERAL UNIVERSITY ALMANAC 1969-70
June 22 Su. -The Atlantic Summer School for Advanced Business Administration begins.

July 5 S. -Last day for receiving applications for supplemental examinations in Arts and Science to be written at outside centres. ${ }^{1}$
9 W. -Last day for receiving applications for Fall Supplemental examinations in all faculties. ${ }^{2}$
26 S. -The Atlantic Summer School for Advanced Business Administration ends.

Aug. 11 Tu. -Supplemental examinations begin in Arts and Science.
29 F. -Last day for receiving applications for admission to Faculties of Arts and Science and Divinity.

Sept. 8 M. -Supplemental examinations begin in Divinity. Registration (and payment of fees) begins for NEW students in Faculty of Arts and Science, ${ }^{3}$ and in the School of Divinity. The only regular registration day for new students from Halifax and Dartmouth area.

9 Tu. -Registration (and payment of fees) begins for other NEW students in Arts and Science (Full Time) ${ }^{4}$ and in the school of Divinity No students from Halifax or Dartmouth.

Sept. 10 W. -Registration and payment of fees for RETURNING students in Arts and Science ${ }^{5}$ and Divinity.
11 Th. -Registration continues for students in Arts and Science and Divinity. (Full Time).

1. Fee must accompany application. No late applications will be considered.
2. 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 (maximum $\$ 5.00$ ) must be paid. The late fee applies between July refund of fee will be paid after this date.
"3,4,5. Students whose surnames begin A to J inclusive register from 9 a.m. to $1 \mathrm{p} . \mathrm{m}$.; those whose surnames begin K to Z inclusive register from 1:00 p.m. to 5:00 p.m.

Sept. 12 F. -Registration ends for students in Arts and Science and Divinity (Full Time) ${ }^{1}$.
13 S. -Registration for Part Time and Special Students in Arts and Science and in the School of Divinity.
—Late Registration Fee payable after this date for Students in Arts and Science.
Sept. 14 Su. -University Service with Academic Procession at All Saints' Cathedral. Assemble at Diocesan Centre (College Street) 10:30 a.m.
15 M. -8:30 a.m. Classes begin in Arts and Science. Meetinos of Divinity School Faculty and students.
17 W. - 9:00 a.m. classes begin in Divinity.
22 M. -Last day for change of course or class in Faculty of Arts and Science and School of Divinity without penalty.
-Fee of $\$ 1.00$ for changing class or course after this date. For refund of fees after this date see "Fees" schedule.
Oct. 1 W. -Final date for late admission of students who have been accepted before September 14 (Arts and Science and Divinity).

13 M. -Thanksgiving Day. No classes.
14 Tu . -Last day for change of course or class in Arts and Science.
Nov. 11 Tu. -Remembrance Day. No classes.
Dec. 9 Tu. -Last day of classes in Divinity.
11 Th. -Last day of classes in Arts and Science.
20 S. -12.30 p.m. Christmas vacation begins.

1. Students in Arts and Science whose names begin A to J inclusive register from 9 a.m. to 1 p.m. Students whose names begin K to Z inclusive register from 1 p.m. to 5 p.m.

## 1970

Jan. 5 M. -Class resumes in Arts, Science, and Divinity.
30 F. -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 in applying Faculty Regulation 14 in the calendar.

6

Feb. 6 F. -Munro Day. No classes.
7 S. -Winter Carnival. No classes.

Mar. 2 M. -Study break.
9 M. -Classes resume.
27 F. -Good Friday. No classes.
31 Tu . -Last day for receiving applications for Spring supplemental examinations. (Fee must accompany application).

Apr. 10 F. -Last day of classes in Divinity.
15 W. -Last day of classes in Arts and Science.
20 M. -Spring examinations begin in Arts and Science and Divinity.

May 10 Su. - 11.00 a.m. Baccalaureate Service (King's)
13 W. -Encaenia Day - King's Convocation-Arts and Science, Divinity, and Social Work.
14 Th. -University Convocation.
15 F. -University Convocation. 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: 1969-70

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* On leave



## University of King's College

## 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, and a Master's Degree in Social Work on recommendation of the Maritime School of Social Work.

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 vigorous 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, one member 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 ViceChancellor, 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 Maritime School of Social Work was incorporated in 1941.

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.

The University of London exempts Bachelors of this University from the preliminary examinations leading to the LL.B. degree of that University; and students in Medicine are exempted from the Course of Study anterior to the First and Second Examinations for Medical degrees if they have pursued equivalent courses at this University.

## 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.

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 $\$ 5.00$.

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.

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 $5.00 \mathrm{p} . \mathrm{m}$., and $7.00 \mathrm{p} . \mathrm{m}$. to $10.45 \mathrm{p} . \mathrm{m}$. On Saturdays the hours are $9.00 \mathrm{a} . \mathrm{m}$. to 12.00 noon. For part of the session the reading room will be open on Saturday and Sunday 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 overnight only. Overnight books may be used in the library during the day and taken out anytime after 3.30 p.m. They are due at 10.00 a.m. the following morning.

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. Overnight reserves will have an overdue charge of five cents an hour while the library is open.

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), Master of Social Work (on the recommendation of the Maritime School of Social Work), Bachelor of Sacred Letters, Bachelor of Sacred Theology and Master of Sacred Theology. Courses are prescribed for the diplomas: Licentiate of 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 Social Work

King's, like most other Maritime Universities, has entered into an agreement with the Maritime School of Social Work to confer the degree of Master of Social Work on those students who have completed successfully the requirements laid down for this degree. For further details a prospective student should write to the Director, Maritime School of Social Work, 6414 Coburg Road, Halifax.

## 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.

## Bachelor of Education

King's College graduates are eligible for the course leading to a degree in Education. Either Education 1 or 2 may be taken by undergraduates for credit towards a degree; but not both.

## KING'S COLLEGE RESIDENCE 1969-70

## Dean of Women-Mrs. G. S. Clark

Dons-Professor G. Dalton Crowder, Senior Don
Mr. Glen Kent
Mr. Petr Hanel
Professor G. Rey
Mr. Lee D. Doran
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 a resident Don. 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. Coinoperated 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 reading room, lounges, a service elevator and ample storage space.

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

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

Students accepted in residence by the Deans 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 7th, 1969 (returning students September 9th) until December 20th, 1969, and from the evening of January 4th, 1970, to the morning of May 15th, 1970. 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.
(Students not in their graduating year will be expected to vacate the residence 24 hours following their last examination).

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. Applica-
tions 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.

## GENERAL UNIVERSITY REGULATIONS $\dagger$

## 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 notify the Registrar and the Bursar.

## 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.
$\dagger$ 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

## 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.

## 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 Legislative Assembly 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 exceptional cases, in absentia. Written application giving reasons for the request must be made well in advance to the Secretary of Senate. The additional fee for such degrees conferred at Convocation is $\$ 10.00$.

## Student Employment

The Department of Manpower and Immigration, in cooperation 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.

* These regulations do not apply to the Dramatic Society.

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.

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. Counsellors with broad experience in solving personal problems offer a free confidential service to students.

Office hours: 9 a.m. to 5 p.m., Monday through Friday, Student Union Building.

## Tutors

Senior students conduct free tutorials, and each freshman has his own academic advisor.

## University Health Services

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 students returning to the University 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 resubmit 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.
4. Tuberculin Tests.
(1) All students are required to have an annual tuberculin test. The purpose of this test is to protect them from the risk of infection by carriers who may not display any visible signs of disease or be aware of their condition. 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.
(2) Students will be required to return for the interpretation of the test. If the reaction is positive a chest X-ray will be required.
(3) The tuberculin test 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.
5. Medical Care available.

Students must be able to provide proof that they are properly enrolled in any Hospital-Medicare Scheme in their their home province in order to qualify for service. This applies particularly to residents of Ontario and Saskatchewan or any other Province requiring a premium for Medicare Insurance. 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, and staff appointments are keeping pace with the needs of the students, at present there are two full time general practitioners employed to provide twenty-four hour comprehensive medical care. In addition, two psychiatrists are retained by the 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.

A ten 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.
6. Emergency Treatment.

In the event of a medical emergency students should telephone the Student Health Service.
7. 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 province with similar regulations) this requires 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,
8. The University Health Services do not provide for the following:
(a) Medical or Surgical care other than that provided by, or arranged through, the Student Health Service.
(b) X-ray or Laboratory service, except as authorized by the University Health Services.
(c) Prescriptions other than those prescribed in the University Health Services. (WARNING: Except in emergencies, students who are admitted to hospital or have other medical services, to include X-ray laboratory services, and prescriptions, except by prior arrangement with the University Health Services will not have their accounts for hospital or medical services paid.)
(d) Dental treatment.
(e) Illnesses attributable to misconduct.
(f) Eyeglasses and examinations for same.
9. All students entering the University who can not present certificates of having been successfully vaccinated against smallpox will be required to submit to vaccination.
10. Further services or requirements may be announced at the time of registration.

## 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 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, 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.
JEWISH: Rabbi Daniel Levine, 6674 Quinpool Road
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. Agnes 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 Univversity 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 SUBSIDIZED PLANS

## Regular Officer Training Plan - Undergraduates

1. Approved students may obtain subsidization under ROTP$\dot{\mathrm{U}}$ by undertaking to do the prescribed Cadet training and, mandatory period of service upon completion of their university course.

Medical Officer Training Plan
2. Medical students may be subsidized from the beginning of their second year through their internship, by undertaking to do the required summer training and, the mandatory period of service, upon being licensed to practice medicine.

## Dental Officer Training Plan

3. Dental students may be subsidized from the beginning of their first year. Subsidized students are required to undertake summer training and mandatory period of service upon being licensed to practise dentistry.

## Subsidized Dietetic Internship

4. Application may be made through the university directors to the Internship directors of the Victoria General Hospital, Halifax, N. S. or the Halifax Infirmary, Halifax, N. S.
5. Further information concerning these plans can be obtained by contacting a military Career Counsellor at the Canadian Forces Recruiting Centre, 1256 Barrington Street, Halifax, N. S. or Victoria Park, Sydney, N. S.

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*

## Resident Students

The annual charges for board, light, etc., to resident students from Arts and Science registration day (including Sunday, September 7th) until Dalhousie Convocation Day (except that students not in their graduating year will be xpected to vacate the residence 24 hours following their last examination) are as follows:

|  | Double | Single |
| :--- | ---: | ---: |
| Men's Residence $\ldots . . . . .$. | $\$ 850.00$ | $\$ 925.00$ |
| Women's Residence | 850.00 | 925.00 |

Students in residence must make a deposit of $\$ 450.00$ 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 $\ldots .$. | $\$ 30.00$ |
| :--- | ---: |
| Gown | 15.00 |
| Cap (Women only) $\ldots .$. | 5.00 |

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.

* Payment must be made at par, Halifax, N. S. Please make cheques - Payment must be made at par, Halifax, N. S. Please make cheques payable to the Und "plus exchange", if outside Halifax area.


## Fee For Student Organizations

At the request of the King's student body, a fee of $\$ 30.00$ collected on enrolment from each student who takes more han one class. This fee entitles the student to the privileges f 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 eaves, 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.

## 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 on registration or in two instalments. The first instalment is $\$ 360.00$ including deposit. The second instalment, $\$ 203.00$, is due by January 10th. Any student whose fees are not paid in full by January 31st will be suspended from the university. A carrying charge of $\$ 5.00$ is added if fees are not completely paid on registration.

FOR PART TIME STUDENTS, registering for one or two classes only, the total fees due must be paid on registration.

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

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

## Tuition and Residence Deposits

Within a maximum of ten days of being advised of acceptance, the student must pay a deposit of $\$ 50$ to Dalhousie, which will be credited to his fee amount; failure to do this will result automatically in cancellation of the acceptance and a fresh application must be then made. The $\$ 50$ deposit is forfeited if the student fails to register or fails to advise the Registrar by registered letter before August 30th that he will not attend.

King's College requires a deposit of $\$ 50.00$ for each student requesting residence. The tuition fee deposit is returnable by Dalhousie if the application is withdrawn before August 30th and the residence deposit is returnable by King's if the application for residence is withdrawn by August 30th.

## LATE REGISTRATION

Students are required to register on the regular registration date as shown on page 4. Late registration requires approval of the Dean of the Faculty and an extra fee not to exceed $\$ 5.00$ per day or a total of $\$ 35.00$.

## 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, examination and diploma fees, instrument rental charges, and
hospital clinic where applicable, and the following incidental fees:
a. Registration Fee
b. Student Health Fee
c. Library Fee
d. Faculty Society Fees (Arts and Science) .50

But does not include student council fee of $\$ 30.00$ payable to King's.

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 ... 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

## EVENING CLASSES

For students wishing to enrol in a single Arts class, take the examination and obtain a certificate
For students wishing to audit such a class without writing the examination or obtaining a certificate
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 fee, or the Rink and Athletic Field fee. However, any King's studen
who wishes to participate in the Dalhousie Council of Students' activities must pay both of the above Dalhousie fees. Dalhousie students residen at King's College must pay King's College Council of Students' fee of $\$ 25.50$ ).

## DIPLOMAS

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 | $\$ 75.0$ |
| Part-time students for each course at Master's level | $125.0$ |
| Arts and Science courses, when ne | 15 |
| A.K.C. Registration . . . . . . . . . on | + |
| A.K.C. Examinations: per paper by the preceding December 1, |  |

## 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
(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 12th, and 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.

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 |
| M.S.W. | 20.00 |
| B.D., A.Th. | 40.00 |
| Additional fee for any d the Spring Convocation | $10.00$ |

## TRANSCRIPT

A student may receive only an unofficial transcript. Official transcripts will be sent at a student's request to other universities, or to business organizations. The first transcript after graduation will be issued free of charge. All other requests for either unofficial or official transcripts must be accompanied by a fee of $\$ 1.00$ for the first copy, and .50 for each additional copy made at the same time.

## 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.

## REFUND OF FEES

Within two weeks of registration date a student may retire from a class or course for which he was registered, and his fee will be refunded

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 instalment of fees.

No refund shall be made for reduction in classes by action of the Faculty, dismissal from classes or from the University, or for a class or classes voluntarily discontinued by the student.

In cases of withdrawal from the University or from a class during a session the student must obtain an interview with the Dean of his or her Faculty and a written report must be made by the student to the office of the Registrar at Dalhousie, stating date and reason of withdrawal. A student withdrawing from the University must report personally to the Dalhousie Business Manager before any refund of tuition fees will be considered.
N.B.-King's College students must report AS WELL to the Registrar and Bursar, King's College.
(No transcript will be issued until all charges owing by the student to the University have been paid in full).

## Admissions and Programmes: <br> 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 September 1.
(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 the Admissions Officer.

## 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 admisation, provided that the applicant can show (by his preparat, 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 mission 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.

EQUIVALENT CERTIFICATES OF MATRICULATION AND RECORDS OF MARKS: For purposes of consideration for admission, official certificates and records of marks at the completion of the following levels are considered as Senior Matriculation:

ATLANTIC PROVINCES OF CANADA
Nova Scotia-Grade XII.
New Brunswick - The former Grade XIII; or first year of a university, or Junior College, which admits students at the Junior Matriculation level (but see *)

Newfoundland - First year Memorial University.
Prince Edward Island - First year Prince of Wales College or St. Dunstan's University (but see *)

Quebec - McGill Senior Matriculation; or Senior High School leaving Certificate; or Certificat d'immatriculation (BellesLettres) of Laval, Montreal or Sherebrooke Universities.

Ontario - Grade XIII (Secondary School Honour Graduation Diploma).
$\left.\begin{array}{l}\text { Manitoba } \\ \text { Alberta } \\ \text { Saskatchewan }\end{array}\right\}$ - 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) : You are strongly advised to take either the Service for Admission to College and University (SACU), or the College Entrance Examination Board (CEEB) tests, and to have your scores in either the one or the other forwarded to the Admissions Officer.

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 Convent of the Sacred Heart in Halifax, and 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 many 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'sDalhousie University. No credit will be given unless the classes are credited to you unconditionally at the other university.
5. You will not be granted credit for more than ten classes taken elsewhere, beyond the Senior Matriculation level (unless you are enrolling in an Engineering course, in which case you may be granted credit for up to twelve classes).
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.
8. Official academic transcripts (or certified copies).
9. A copy of your university calendar in which each of the classes that you have taken has been marked clearly.
Admission of Students Educated Outside of Canada
If you wish to be admitted to the Faculty of Arts and Science and your native language is not English, you must take the English Language test of the University of Michigan. These tests are administered locally throughout the world. You can arrange for the test to be given to you by writing to the English Language Institute, Testing and Certification, University of Michigan, Ann Arbor, Michigan, U.S.A.
ADMISSION REQUIREMENTS
If you have the following academic qualifications which are accepted as equivalent to the Canadian Senior Matriculation, you will be admitted to the first year of a degree programme in the Faculty of Arts and Science.
U.S.A.
10. High School graduation with high standing.
11. High scores on CEEB or advanced placement tests (for information about CEEB tests see p. 40).

You will normally be admitted to the first year of a three year Bachelor's degree programme only if you have already completed one year of study (minimum 30 semester hours) at an accredited institution of higher learning in the U.S.A.
(Note: a General or Pass Bachelor's degree in the United States requires four years of study. A Dalhousie General B.A., B.Sc., or B.Com. 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 and Mathematics are 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 PROCEDURES

a. Applications from the U.S.A. must be received by the Registrar's Office by August 15.
b. 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 Registrar's Office by August 21; otherwise the May 1 deadline must apply.)

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. The form will be sent to you on request by the Registrar's Office.
3. Official academic transcripts (or certified copies) relating to examinations or tests referred to in the Admission Requirements, (above).
4. Records of College Entrance Examination Board (CEEB) scores, if available. (For information about the CEEB tests see p. 40).

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.

## Degrees and Courses

## Bachelor of Arts

## Bachelor of Science

## Social Work

## Subject Grouping for Degree Courses

In the curriculum, subjects offered as essential parts of the degree programmes are grouped as follows:
A Languages B1 Humanities B2

| French | Classics | Music <br> German |
| :--- | :--- | :--- |
| Greek | English | Theatre |
| Hebrew | History |  |
| Latin | Philosophy |  |
| Russian |  |  |
| Spanish |  |  |
| C Social Sciences | D Sciences |  |
| Economics | Biochemistry | Biology |
| Political Science | Chemistry |  |
| Psychology | Geology |  |
| Sociology | 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 101, 102, 103; Education 101, 102; Religious Studies 100.

Classes within the groups may also be taken as electives.

## 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 the subject. year) classes, $300+$ third level and $400+$ level (selevel. Classes numbered in the $500+$ and $600+$ fourth level. Classes numbered as graduate classes; however, series are norme open to senior undergraduates. Classes some numbered in the $250+, 350+$ and $450+$ series are open numbere 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 second 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.

Half-credit classes must be taken in pairs, normally during the same session. Students in a general degree programme may not count for credit more than one pair of half-credit classes.

Classes with numbers below 100 do not carry credits in the new degree programmes but may be prerequisites for entry to credit classes for students whose matriculation backgrounds are deficient; some of these classes are credits under the old regulations which apply to students registered in 1965 or earlier years.
$\qquad$

Degrees and Courses General Bachelor of Arts General Bachelor of $\mathbf{A r t s}^{1}$

The General Bachelor of Arts degree requires fifteen classes.

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

Every student planning to take a B.A. degree will in his first year take five classes as follows: one class in each of groups $\mathrm{A}, \mathrm{B}, \mathrm{C}$ and D , together with one class chosen from any group. (But, see $3(\mathrm{~b})$ and $3(\mathrm{~d})$ below).

## 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 ${ }^{2}$ area of concentration and the other as his minor;
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 ${ }^{3}$. The subjects may be selected from Groups A, B, C and D above or from Art History, Education 101 or 102, Commerce 100 Religious Studies in so far as the overall requirements permit.

## 3. Overall requirements

The fifteen classes making up the overall course for the General B.A. must include:
a) one class in Group A; students making progress in a

1. For honours courses see Programmes of Study where each department gives the contents of its honours programmes.
2. The designation of a major is intended to bring students into closer contact with the departments concerned and with one another, and to assist departments in giving such students guidance in designing their programmes.
3. 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 th
language begun for the first time at the University are languag advised to take a second class in the same language strongly to consolidate what they have learned:
in order to cone class from each of three subjects in Group b) at one of the classes must be in English and must be taken $B$; one first or second year of study ${ }^{1}$; only one subject from Group B2 may be counted to satisfy the Group B requirement; 2) at least one class from each of two subjects in Group C; d) if a science class was not passed in Senior Matriculation, d) class from physics, chemistry, geology or biology must on included among the fifteen taken at the University. If a science was passed as part of the Senior Matriculation course the Group D requirement stated for the first year may be waived.
For details of classes in various departments see 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 arion should similarly consult the head of the Department of Music.

## Degrees and Courses General Bachelor of Science

General Bachelor of Science ${ }^{2}$

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 classes in Group D, one class in Group B or Group C, together with one class chosen from any group.

1. Students who have obtained a grade of $80 \%$ or better in Senior Matriculation English are offered the option of taking a special examination in which the grading will be of the same standard as for end-of-year performance in the basic university class in English Application for this examination should be made to the Registrar
not later than 1 September in the year intended admission. If the student obtains a grade of $65 \%$ or better in this examination, he may elect to substitute some other class for this basic class in English. The class substituted may be in any subject listed in groups A, B, C and D (including English)
Education 101 or 102, Religious Studies.
2. For honours courses see Programmes of Study where each department gives the contents of its honours programmes

## 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;
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 ${ }^{1}$. The subjects may be chosen from Groups A, B, C and D above, or from Art History, Music, Hebrew, Education 101 or 102, in so far as the overall requirements permit.

## 3. Overall Requirements

Any B.Sc. programme must include at least one class in mathematics, one in English ${ }^{2}$ and one in another language.

## Honours Courses

Students of ability and ambition are urged to take a course leading to the bachelor's degree with honours. The course entails a concentration in selected studies, a number of advanced classes and a higher quality of work than that for the general bachelor's degree. Although the regulations for the first year of study are the same for the general and honours courses, it is desirable that the student should embark upon the particular programme best suited to the honours course he wishes to follow. Students considering an honours course are advised to consult as soon as possible with the departments in which they may wish to do their major work, preferably before their first registration.

1. 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).
2. See footnote 1, page 49.

General rules relating to honours courses

1. A student may obtain honours in four years from Matriculation.
2. Honours students must be accepted by the department concerned. Their whole plan of study must be under the supervision of that department. (Formal application for admission of a student by the Faculty to an honours course must be made by the head of the department concerned, in musticate, on forms that are available in the Registrar's Office).
3. The various honours programmes are set out in the section of the Calendar headed Programmes of Study. 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.
4. Twenty classes are needed for the B.A., B.Sc. degree with honours. A student must pass a comprehensive examination covering his honours work at the end of his course and he must make an average of not less than $65 \%$ in the required classes of his major and minor field.
5. In order to obtain First Class Honours, a student must pass the classes in his major and minor field (including any comprehensive examination) with an average of at least $80 \%$.

Major Honours Programmes and Combined Honours Programmes

1. First year requirements

The regulations for the first year of study are the same as for the General B.A. or General B.Sc degree.
2. Requirements for the second, third and fourth years
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;
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 $2 b(i)$.

## 3. Overall Requirements

The Overall Requirements are the same as those for the General B.A. and General B.Sc. degrees respectively.

The details of specific honours programmes will be found under departmental listings of programmes of study on page 63 et seq. in this Calendar. 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.

DEGREES and COURSES

## Social Work

Students looking forward to professional training at the Maritime School of Social Work should include in their undergraduate 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.

## Appendix

## Old Regulations

Students registered before September 1966 under Old Regulations should refer to the General Calendar 1968-69 for details of the regulations on the transfer from the old to the new curriculum and of the requirements for degrees and courses under the old regulations.

For University regulations applicable to all students of all Faculties, see General University Regulations.

## General Faculty Regulations

Changes of regulations become effective when designated by Senate; usually this will be upon publication in the Calendar of the Faculty of Arts and Science. Students are subject to changes in regulations and courses made after their first egistration unless specifically excused by the Faculty. All enquiries about the regulations hereunder should be made at the Office of the Dean. 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. Details of the regulations governing credits earned in these ways are given below.
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.

## 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 ${ }^{1}$.
3. 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.

## 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 necessary 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 concerned, and conform to the following requirements:
a) he must attend the classes of his prescribed course rea) hularly 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 8. Whetendance 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 perscribed 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. At the beginning of January the Committee on Studies will review the results obtained by each student. Any student who has not shown reasonable proficiency in the Christmas examinations may be required to withdraw from the University for the remainder of the session or to reduce the number of classes he is taking.


28. 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).
29. A student wishing to take, at a university other than King's-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 head of the department concerned at Dalhousie University and submit to that department the class description of the class he wishes to take (alternatives should be indicated where possible).

When a decision has been reached, the department will pass the application to the Registrar's Office and the student will be notified directly by that office of the department's decision. If the decision is favourable, the receiving university will be so advised by the Registrar's Office.

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

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

## Transfer Credits

30. No student will be granted credit for more than ten classes taken elsewhere beyond the Senior Matriculation level (unless he is enrolling in an engineering course when up to twelve credits may be allowed).
31. A student must undertake all or most of the advanced work of his course at King's-Dalhousie. 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 King's-Dalhousie as a full-time student in his final two years unless the Committee on Studies gives special permission for this requirment to be waived.

## Degrees

Minimum Standing for a General Degree
32. In order to qualify for the award of a general degree candidates must have obtained a minimum of ten points on the fifteen classes required ${ }^{1}$.
Points are awarded for each class as follows:

| Division | Grade | Class Marks | Points |
| :---: | :---: | :---: | :---: |
| $-\frac{1}{I}$ | A | $(80-100 \%)$ | 3 |
| II | B | $(65-79 \%)$ | 2 |
| III | C | $(56-64 \%)$ | 1 |
|  | 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 value; e.g. for an A grade $11 / 2$ points will be awarded.
33. Students receiving credit for classes taken at another institution are not awarded points for those classes. In such cases, the minimum number of points required for a general degree is in proportion to the number of King'sDalhousie classes actually taken. The minimum number of points required is calcuated by multiplying the number of classes passed at King's-Dalhousie by the fraction two-thirds, and rounding the product upwards to the nearest whole number ${ }^{2}$.

1. This regulation does not apply to students registered under old regulations in 1965 or earlier.
2. For example, if you have credit for three classes taken at another institution and have passed 12 classes at King's-Dalhousie, the minimum points you will require for your general degree will be minimum points you
$2 / 3 \times 12=8$ points.
3. A general degree will be awarded "With Distinction" to a student who has achieved an aggregate of 40 points in the 15 classes taken for his degree (or a proportional figure if he has taken more than 15 classes).

## Minimum Standing for an Honours Degree

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

36. A student who already holds one undergraduate degree (B.A., B.Sc.) 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.

## Withdrawal

## Changing a Course or Class

37. A student desiring to change a course or class for which he has registered should do so within one week of the first day of classes in September. No changes may be made after October 14. The student must complete the appropriate application form and have it approved by the instructor of the class which he wishes to enter. After the first week, the student must pay a fee for each change and must obtain the approval of the instructors both of the class which he wishes to drop and of the class which he wishes to enter. Forms bearing the approval of the instructors must be sent to the Registrar's Office.

## Withdrawing from a Class

38. If a student wishes to withdraw from a class he must notify the Office of the Registrar in writing not later than

January 30. Classes in which he remains registered after this date will be counted in applying the regulation set forth in paragraph 14 above.
Changing from Full-time to Part-time status or Withdrawing from the University
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 Dean explaining his carcumstances. 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 Affairs. (For conditions relating to refund of fees see under section on Fees).

## Programmes of Study <br> Art History

Special Lecturers
D C. MacKay
G. N. Kennedy

## Classes Offered

101 Introduction to the History of Art
Lecture 2 hours
D. C. MacKay

This class gives an illustrated survey of the development of art with particular emphasis on the main period in the history of Western art and the relationship of these to artistic, social and scientific environments.

Texts: H. W. Janson, History of Art
102 The Art of the Renaissance (not offered in 1969-70)
This class studies European painting, sculpture and architecture through the major artistic personalities of the period.

103 The Art of the 19th and 20th Century
Lecture 2 hours
G. N. Kennedy

This class offers a study of the 19th and 20th century movements in European and North American art with particular stress on developments after Cubism. Visual support for this class is provided by slides, films and the art gallery

## Biochemistry

## Professors

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

Associate Professor
D. W. Russell

Assistant Professors
A. H. Blair
F. I. Maclean
C. Mezei
F. B. Palmer
L. A. Verpoort

## Lecturers

R. Ayenga
J. Scott
M. S. DeWolfe
E. S. MacFarlane

Post-Doctoral Fellows
V. Saini
J. Prchal

Biochemistry, the study of the structure and behaviour of the molecules f living things, is a new science: most of what we know has been of liver since 1945 , so that even elementary textbooks are changed discovered 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 part 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 measure ment of their physical properties requires special methods. Old method 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 large structures. Biochemists have provided most of our knowledge of this complex and important series of reactions, largely by tracing the sequence of changes in chemicals labelled with radioactive isotopes Biochemical genetics (the biochemistry of heredity) is concerned with the mechanism by which a cell specifies the structures not only of its own molecules but also those of its daughter cells. A recent major break through was the elucidation of the structures of DNA and RNA this, together with even more recent knowledge of the action of viruses, has resulted in our present understanding of the chemistry underlying heredity
Biochemists are also concerned with the study of enzymes: most of the chemical reactions in living things would proceed very slowly, or not at all, if these specific catalysts were lacking. Studies now in progress are investigating the properties of enzymes and the ways
in which they function in the many varied types of organic material. The results of biochemical research are applicable in almost every aspect of life. The biochemist relates the structure of soil and the functioning of its micro-organisms to the needs of agriculture and of animals, and helps to design pesticides and fertilizers additives and substitutes. The drug, fermentation and food-processing industry, 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 action 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 or denidly 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 minors 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 propertie 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.
. class, or andivalent one is a prerequisite to more advanced This class, or in biochemistry. Enrolment is limited to about 40 .
Prerequisite: A class in organic chemistry; it will be assumed that Prerequs are familiar with the structures and reactions of the major students of organic compounds. A basic class in physical chemistry classes desirable. The prospective student will be much better is very for this class if he has some prior knowledge of chemical prepuilibrium, 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 microorganisms. 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 Mechanism (offered in 1969-70 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 properties and mechanisms of gene expression, the mechanism
protein synthesis and regulatory processes, including selected aspects protein synthesis and regu
Prerequisite: Biochemistry 302 or on equivalent class in basic bio chemistry.

## 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 normaily 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 equipbecoming acquainted with the principles and operation of the equipment they use in their work. This includes spectrophotometers,
ultracentrifuges, liquid and crystal scintillation counters, gas chroultracentriuges, liquid and crystal scintillation counters, gas chro-
matographs, spectropolarimeters, flame spectrometers, and column matographs, spectropolarimeters, flame spectrometers, and column consult with the staff regarding a project suited to their individual consult

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

## 407 Physical Biochemistry

Lecture 2 hours
R. Ayengar, A. H. Blair, J. A. Verpoorte

Selected aspects of the chemistry of biological macro-molecules, mainly proteins, are discussed.
Topics include: physical methods for studying polymers; enzyme kinetics, including the behaviour of enzymes involved in control of kinetics, including the behaviour of enzymes involved in control of and the relationship between structure and biological activity.
Prerequisite: Biochemistry 302 or an equivalent class in basic biochemistry, and a basic class in physical chemistry
Text: Dawes, Quantitative Problems in Biochemistry and references to current biochemical literature

408/508 Structure and Function of Nucleic Acids (offered in 1970-71)
Lecture 2 hours
C. W. Helleiner

This class is intended to complement Biochemistry 404/504 and This class The structures of nucleic acids are examined from the ${ }^{405} / \mathrm{Jic}$ chemical and physical points of view; the experimental basis organic currently accepted concepts of these structures is emphasized. The for currentry of the class deals with the enzymes catalyzing the second, part and transcription of nucleic acids, and with the chemica repplication ar 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 The Pharmacy. Descriptions of these classes will be found in the relevant Faculty calendars.

## Graduate Studies

Graduate studies leading to the degree of M.Sc. and Ph.D. are offered by the department. Interested students should consult the Dalhousie Calendar of the Faculty of Graduate Studies.

## Biology

## Professors

M. L. Cameron (Acting Chairman)
E. S. Deevey (Killam Professor)
K. E. von Maltzahn (Chairman, on leave 1968-69)
A. C. Neish
J. C. Ritchie

Professor (Oceanography)
G. A. Riley

## Associate Professors

L. M. Dickie
E. T. Garside
M. J. Harvey
0. P. Kamra
K. H. Mann
I. A. McLaren
L. C. Vining

## Associate Professors (Oceanography)

C. M. Boyd (on leave 1968-69)
E. L. Mills

## Assistant Professors

E. W. Angelopoulos
R. G. Brown
J. Farley
B. K. Hall
L. A. Hanic
W. C. Kimmins
M. D. Ross
A. H. Wehrmaker

## Assistant Professor (Oceanography)

W. D. Watt

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 cellis 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 elimates; 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.


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 o our actions, so as to understand and predict their effects on other iving 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 much unintelligent land use practices have failed to provide the extra food to prevent starvation. There is no doubt that very soon the food togist 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, and 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.

Arts students with no senior matriculation in sciences may satisfy their science requirements by taking Biology 100 .
Science students will take Biology 101. Science students who have an exceptionally good background in high school biology are invited to see the Chairman of the Department; if their preparation has been sufficently good they may be allowed to proceed to Biology 200 in their first year. They will not receive University credit for matriculation biology, but will have the advantage of one year and one class over the non-matriculant (see regulation 6, page 54).
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 Major 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 Major 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 (page 47) 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. One class in a foreign language
4. One class in English or other humanities class
5. One class in a social science.

## Year II

6. Biology 200
7. One of Biology 203-205
8. English (if not taken in Year I), otherwise another class from the humanities or social science groups.
9. One other humanities class.
10. One class in a social science.

## Year III

11-12. Normally two remaining classes of Biology 203-205, (or one 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. English 100

## Year II

6. Biology 200
7. One of Biology 203-205
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. A second class in the foreign las.
the humanities or social sciences.

## Year III

11-13. Normally, two remaining classes of Biology 203-205 and one Biology 300- level class.
14. One class in mathematics or science beyond the 100 -level
14. One class from groups A, B, or C (see page 46 ).

## Year IV

16-19 Four classes from Biology 300 and 400 group of which one should normally be biology 490.
20. One class in the minor field
20. One class Honours students must pass a comprehensive examination at the Honours students 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" on page 46.
Biology 101 and 200 are pre-or co-requisite for all other Biology 200 classes. Biology 203-205 are normally pre-or co-requisite for all 300 and 400 classes. Consideration will be given to those students wanting to advance to 300 classes with only two of 203-205 as pre-or co-requisites. Honours students must complete all three of 203-205 by the end of their fourth year.

## 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 appears, 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, par ticularly as it impinges on human affairs, compels us to come to grip with this new vocabulary

The central problems of ecology and evolution are as stimulating and essential to a social scientist, or indeed any curious, informed person as they are to a professional biologist. The class examines the unify source and fate eof energstem, after some background discussion of the The language and notions at the interface of earth and atmosphere. explain many ecological relationships. The dynamics at this point to the nature of selection and the mech. The dynamics of populations, sideration of the question the mechanics of evolution lead to a conis concluded with a summary of the basic facts andion of life. Ecology essential for our understanding of such facts and concepts which are centred ecosystems as urbanization, industrializa problems of manresource and population control.
which class goes on to look more carefully at the diversity of plants on producers ecosystem depends so closely, both the green primary of life is explored, stressing repro-disposers. Finally, the animal mode behaviour. The history of plant and animal aptation, evolution and at briefly.

The class dips briefly into chemistry and physics for some elementary considerations of the concepts of energy, radioisor some elementary draws on geology for an examination of the origins of life ions. It sociology and related fields for study of the ramifications of mancentred ecosystems.

## 101 Principles of General Biology

Lecture 3 hours; laboratory 3 hours.
M. L. Cameron

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 preor to equisite. 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 hiology, chemistry and physics in high school should the study of load on the student in the first term of Biology 101.
The purpose of the class is twofold: to acquaint the student with the The purpos and methods of formal, experimental science, and to prepare the student for classes at a higher level in biology and in related the stud. To achieve these aims, the class is presented from the expubjectsental level, and an attempt is made to give the experimental peridence on which are based all the theories and hypotheses discussed. The cell is taken as a 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 earth; the implications of these theories for the organisms presently on 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
M. J. Harvey, I. A. McLaren

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 fascination always be evident for the temperamentally unreceptive.
The class is put early in the biology programme because all the 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 studen 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 instruction 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 the student will carry away an appreciation of the value of preserving this great biological diversity in an increasingly man-dominated world.

Prerequisite: Biology 101.
203 Cell Chemistry and Function
Lecture 2 hours; laboratory 3 hours
W. C. Kimmins

This class deals with the chemistry and function of the cell. Initially there is a discussion of the contributions from the fields of physics and chemistry to our understanding of the behaviour of macromolecules
in an aqueous environment. The relationship between available forces and structure/function is stressed. This is developed and applied to problems of the environment, bioenergetics, acquisition of material, intermediary metabolism, maintenance of the steady state and ageing.
The laboratory periods introduce students to a few of the basic experimental techniques that are presently used to investigate problems in his area of biology. Emphasis is placed on the analysis and presenta tion of results. During the latter part of the Spring term, experimental work can be replaced, if the student chooses, by participation in tutorials. These tutorials are of the syntheses-review-type.
A good background in organic and physical chemistry is essential.
Prerequisite: Biology 101; Biology 200.
Text: The Cell by Trombore. In addition, there are a number of texts made available which elaborate on some of the topics dealt with during lectures.

## 204 Part I Cellular Biology

Lecture 2 hours; laboratory 3 hours (first term only)
E. W. Angelopoulos

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.
Correct use of microscopes (light and phase) is stressed in practice and theory. Important laboratory methods and research techniques are included in lectures, laboratories or as demonstrations.
Prerequisite: Biology 101; Biology 200.

## 204 Part II Developmental Biology

Lecture 2 hours; laboratory 3 hours (second term only)
A. H. Wehrmaker

A continuous change in form and structure which is called "development" (e.g. from the "simple" egg cell to the "complex" adult) is typical of organisms. Developmental biology (or embryology in the typical of organisms. Developmental biology (or embryology in the
broadest sense) studies these changes descriptively as well as experibroadest sense studies these changes descriptively as well as experi-
mentally. An introduction to its main phenomena and problems is given. The laboratory part of the class illustrates them by a study of chick development.
Prerequisites: Biology 101, Biology 200.

## 205 Genetics and Evolutionary Biology

Lecture 2 hours; laboratory 3 hours
O. P. Kamra, I. A. McLaren, M.D. Ross

The class consists of two parts: namely, the study of inheritance and variation (i.e. genetics) and the study of evolutionary theory. The two topics are connected by a study of the behaviour of genes in populations (population genetics). Some background in chemistry, biology and algebra is desirable.

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. Finally, modern evol utionary thought is considered with special reference to genetics and ecology.
In the first term 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 cycle, linkage and chromosome mapping. A study is made of sex determination in many organ isms from bacteria to man, and the cytological proofs for crossing over are followed by a more chemical approach. The evidence identify ing DNA as the genetic material 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.
In the second term 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. These changes in gene frequencies are the very process of evolution, and the mechanism of evolution is then studied from an ecological point of view.
Prerequisite: Biology 101, Biology 200

## General Ecology

Lecture 2 hours; laboratory 3 hours
E. T. Garside, M. J. Harvey

One of the main challenges of the present is the problem posed by burgeoning world population, an increasing inadequacy of renewable resources, and widespread deterioration in the quality of man's envirenment. Ecology is that branch of biology which addresses itself to ronment. the theoretical and practical aspects of these problems, to the interrelationships of plants and animals, including their environment. This class provides an introduction to the central concepts and This class provides an introduction to the central concepts and
methodology of ecology, including consideration of its social pertinence.

In the first term the class combines extensive readings, lectures on selected topics, and a field laboratory analysis of the ecosystems of the region surrounding Halifax. Each student completes a project by Christmas, in which he explores, quite individualistically and independently, the ecosystem concept and relates aspects of it to his analysis of local ecosystems.

Attention in the early part of the second term is drawn to fundamental relations between various structurally and physiologically defined groups of animals on one hand and the variable conditions of the physiochemical environments on the other. This approach provides the basis for more integrated considerations of some aspects of factors which regulate animal populations, animal communities and ecosystems. The major levels of social interaction among animals are also considered. This phase of the programme is supported by assignments and demonstrations.

It is useful for students to have a working knowledge of the main groups of animals and plants, in addition to a grasp of the elements of modern biology. However, students with backgrounds in social or earth sciences, for whom ecology has central relevance, adapt readily to the class.

Ecology provides an exposure to the holistic view of the living and Ecology provides an exposure and integrated multidisciplinary viewpoint encompassing aspects of the integrated, multidisciplinary viewpoint, encompassing aspects of the natural and social sciences. Within biology, it provides an appropriate entry into advanced level classes in ecology. It bears directly on the prolessional fiels of aphed manement of land.

Prerequisites: Normally, Biology 203, 204 and 205.

## 311 Bacteriology, Virology and Mycology

Lecture 2 hours; laboratory 3 hours
R. G. Brown

The object of Biology 311 is to acquaint students with the "microbial world". In so doing, the following three questions are considered.

What are microorganisms? In deciding what microbes are, one must compare them with other living organisms and with each other Consequently, a comparative study of microorganisms based on morph ological, physiological, developmental and chemical considerations is made in the first term. The object is to delimit the "microbial world".
Where are microorganisms 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 microorganisms are present? To illustrate the diversity of microbial action, selected metabolic ac tivities of microorganisms 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 203, 204 and 205.

## 312A 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. evolutiontionary 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-tomaintain" forms. Basic techniques in collecting, preserving, sectioning, mounting and identifying algae will be explored briefly. Two or more field trips (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.

Prerequisite: Normally, Biology 203, 204 and 205.

## 312B Lichenology, Bryology

Lecture 2 hours; laboratory 3 hours

## L. A. Hanic

This class studies lichens, liverworts and mosses emphasizing their iology, morpholocical diversity ecology and evolutionary relationship ith the with ine to make a collection of local forms for study in the laboratory required to malivation 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 chromatography an blems on current areas of research in these groups for subsequent presentation and class discussion.

Prerequisites: Normally, Biology 203, 204 and 205.

## 313 Vascular Plants

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

## 321 Invertebrates I

## Lecture 2 hours; laboratory 3 hours

## J. Farley, 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 hysion physiology, etc. fulfilling the normal biology prerequisites.

## 322A Invertebrates II (Entomology)

## Lecture 2 hours; laboratory 3 hours

A. H. Wehrmaker

This class gives a survey of the insects and related arthropods. Their natural history, classification, evolutionary history and functional behaviours are discussed.

## 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 and transmission of parasites are stressed. Different hypotheses of
the origin of parasitism and recent trends in evolution are considered

The laboratory work follows the lectures. Living material is used The laboratory work follows the lectures. Living material is used
when available, otherwise slides and preserved material are studied. Prerequisite: Normally, Biology 203, 204 and 205.
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 formations of the superficial crust of the earth from an unparalleled and unequivocal exposition of organic evolution, the gradual, natural development, through the long expanse 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 which have survived the stresses imposed by the restless environment
from a series of stages or steps, each characterized by several profrom a series of stages or steps, each characterized by several pro-
nounced alterations in various organ-systems and in the general form nounced alterations in various organ-systems and in the general form
of the body. Approximately three-quarters of the programme is given 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 An appates is essential to considerations of the development and ertand their functional capacities of each other. While man is not given any special surroundings and with each other. Whice mant the opportunity exists position in this strictly zoological treatment, personal philosophy in nevertheless for the student to evaluate his personal in this respect the light of our knowledge of vertebrate evolution. sciences, theology, the class should be of value to those entering the sociacies of government teaching and the health professions. Various agencies of government employ personnel to research and management: the content of this class for
Prerequisites: Normally Biology 203, 204 and 205

## 401A Biometrics

## Lecture 2 hours

## P. J. Wangersky

This class studies the applications 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

Lecture 3 hours
J. Farley and others

The first part of the class deals with the development of science from the beginnings of civilization to the Scientific Revolution of the 16 th and 17 th 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.

Students majoring in history are eligible for this class without any formal prerequisites in biology, although Biology 100 or its equivalent would be an asset.

## 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 substances, Pleistocene paleocology 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 or social science.
See the Calendar of the Faculty of Graduate Studies for descriptions of the following classes:

404/504 Advanced Ecology
I. A. McLaren, K. H. Mann

406B/506B Plant Ecology and Quaternary History
M. J. Harvey

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

408/508 Biological Oceanography
G. A. Riley and members of staff

410A/510A Marine Algology (offered in 1969-70 and alternate years)
Lecture 2 hours; laboratory 3 hours plus additional field trips
L. A. Hanic

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 312A or its equivalent.

410B/510B Freshwater Algology (offered in 1969-70 and alternate years)
Lecture 2 hours, laboratory 3 hours, plus additional field trips L. A. Hanic

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 techniques and exper 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 dialgal culture where possible and, finally, present the results in a formal write-up.

Prerequisite: Biology 312A or its equivalent.
See the Calendar of the Faculty of Graduate Studies for descriptions of the following classes:

412/512 Physiology of Marine Plants
J. S. Craigie

415/515 Biochemistry of Plants and Microorganisms
L. C. Vining

419/519 Advanced Topics in Microbiology
R. G. Brown, L. C. Vining

421A/521A Biological Effects of Radiation
0. P. Kamra

423A/523A Genetics of Breeding Systems
M. D. Ross

423B/523B Cytogenetics
O. P. Kamra

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

431A/531A Plant Physiology
W. C. Kimmins

## 431B/531B General Virology

R. G. Brown, W. C. Kimmins

433B/533B Plant Morphogenesis
K. E. von Maltzahn

435/535 Animal Physiology
M. L. Cameron

437/537 Theoretical and Experimental Embryology
Lecture 2 hours; laboratory 3 hours
B. K. Hall

Background: The class as given in the 1968-69 session assumes that the student has not previously completed an embryology class. However, the student should understand the following concepts to cope adequately with the class in first term:
a) The process of mitosis and the way in which the genes are segregated into dividing cells.
b) The specialization of cells for particular functions, and the recog. nition of such cells in the various tissues of the adult.
c) A knowledge of the structure and function of the various organ systems of the adult vertebrate and of the origin of these organs from three embryonic germ layers.
First Term: The work of the first term (both lectures and labs) covers the following topics:
a) The formation of the gametes, the process of fertilization and the way in which fertilization sets the stage for further development.
b) The division of the zygote into a many celled cup (the process of cleavage), the organization within the cleaved zygote of areas which will form the various organ systems of the embryo and the transforma tion of the zygote into an embryo. These processes will be discussed in various invertebrates and vertebrates.

By this stage the student should have an understanding of the anatomica characteristics of each stage in the development of the animals studied characteristics of each stage in the development see that the organization of all the vertebrate embryos and should see that the or
is based on a similar plan.

Using these descriptive studies as a basis, the mechanism of develop ment will be analyzed by posing the following questions:
c) What is the origin of the germ cells which will produce the gametes of the next generation,
d) How do differences arise within the zygote so that for example one area produces brain tissue and another the alimentary canal:
e) Can the "brain-forming area" ever be induced to form a different e) Can the If so, how is the correct relationship of the organ tissue type? If so, how is the
f) Is there any organizing centre witthin the embryo which controls the development of the various parts or does each area develop independently of its neighbours?
By the end of the first term, students should understand not only the structure of the embryo but also how this organized structure arises and is maintained. These concepts form the basis for the second term's work which poses the following questions:
Second Term:
g) What is the mechanism which allows some organisms to replace a lost part?
h) What is the mechanism which controls the metamorphosis of animals which have two structural forms in life cycle?
i) What factors control the growth of the tissue and cells isolated from the body and cultivated in an artificial environment?
j) Is there any unifying theory which will explain all aspects of development?
The laboratory sessions will illustrate the descriptive stages in the development of various invertebrates and vertebrates and provide development of various invertebrates and vertebrates and provide

Summary: By the end of the year, the student should be able not only to recognize the developmental stages of various animals, but also to recognize the developmental stages of various animals, but also
to understand the mechanisms which govern normal embryonic dev to understand the mechanisms which govern normal embryonic dev-
elopment and the growth and replacement of parts and be able to relate this information to a general theory of development.

See the Calendar of the Faculty of Graduate Studies for descriptions of the following classes:

438/538A Parasitism
J. Farley

439B/539B Ichthyology
E. T. Garside

440/540 Human Physiology
B. Issekutz

447/547 Influence of Chemical Agents on Living Organisms
J. G. Aldous

480/580 Special Topics in Biology
Members of Staff
490 Honours Research and Thesis

## Graduate Studies

Graduate studies leading to both the M.Sc. and Ph.D degrees are offered by the department. Graduate students may specialize in the following areas of biology:
a) genetics and cytology
b) cellular physiology and chemical biology
c) Comparative physiology and behaviour
d) systematics and evolution
e) developmental biology
f) Ecology

Candidates for graduate degrees must satisfy the general requirements he Dalhousie of Graduate Studies. Interested students are referred to Dalhousie Calendar of the Faculty of Graduate Studies.

## Chemistry

## Professors

W. J. Chute (Chairman)
D. E. Ryan

Associate Professors
K. E. Hayes
O. Knop
K. T. Leffek
J. W. S. Jamieson

Associate Professor (Oceanography)
P. J. Wangersky

Assistant Professors
G. A. Dauphinee
D. H. Davies
T. P. Forrest
W. E. Jones
R. W. Frei
D. L. Hooper
J. S. Grossert

Chemistry is one of the physical sciences and the language of physical Chemise is mathematics. No student should contemplate embarking science honours programme in chemistry who does not enjoy matheon atics. We say honours programme advisedly, for the honours B.Sc. matics. minimum professional requirement for a chemist - the general is the mith a major in chemistry has no professional standing. Most b. Cc. With an honours degree in chemistry will undertake further tudies in the subject, working towards the degree of M.Sc. and Ph.D. A post-graduate degree is essential for those who wish to engage in post-gradent original research or in university teaching.

The first class in chemistry is an introduction to the discipline. Nonscience 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 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 ess 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 of compounds containing carbon. Analytical chemistry is concerned
with the determination of the composition of substances, and with the 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 is primarily devoted to the study of the nature of chemical reactions
and is undoubtedly the most purely mathematical area of chemistry. 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 post-graduate 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 hè 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. English 100
4. A foreign language at 100 level
5. One of Biology 101, Geology 100 or Physics 110

## Year 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 any of Physics 110, English 100 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 student. For example: those planning further study in physical chemistry should take additional mathe-
matics and physics classes; those planning future study in organic matistry 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.

## Classes Offered

100 General Chemistry
Lecture 3 hours; laboratory 3 hours
101 G. A. Dauphinee
102 D. H. Davies
103 J. W. S. Jamieson
104 D. L. Hooper
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, liquid, solids, solutions, acids and bases, stoichiometry, chemical equilibrium, thermodynamics, oxidationreduction 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.
At present, concurrent enrolment in Mathematics 100 is required only for those in Chemistry 102 which is intended for engineering only for those in Chemistry 102 which is intended for engineering students and makes more use of the calculus than the other sections.
It should be noted, however, that Mathematics 100 is prerequisite It should be noted, however, that M
to enrolment in Chemistry 210 or 230 .

## 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. Lab oratory 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 chemica 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 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 work (volumetric and gravimetric analysis) a The preparation of ate
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. H should have a basic knowledge of equilibria dealing with slightly soluble compounds, coord equilibra, 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: A. F. Clifford, Inorganic Chemistry of Qualitative analysis, Prentice Hall, 1964; E. Cartmell and G. W. A. Fowles, Valency and Molecular Structure, Butterworths, 3rd edition, 1966.

## 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.

Prerequisite: Chemistry 100; Mathematics 100.

## 241 Introductory Organic Chemistry

Lecture 2 hours; laboratory 3 hours

## K. T. Leffek

This class will normally include students from nursing and 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.
Prerequisite: 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 other elements of the periodic chart; valence; convalent 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; chemica equilibrium; velocities of eactions; oxidation-reduction; acids and bases.

## 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 ow these properties and the way in which reactions take place may解 e explained in ter of the electron distribution within the molecules. Concurrently, the laborary secion of class is designed to give instruction in then followed upounds. the lecture reome topics presented in the lecture room. The content of the class should provide a

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; of gases, iquids and solids; 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.
Suggested reading: G. E. Ryschkewitsch, Chemical Bonding and the Geometry of Molecules, Rheinhold, New. York, 1963 or P. F. Lynch,

Orbitals and Chemical Bonding. Longmans, London, 1966, may be used to supplement the freshman text.

Prerequisite: Chemistry 100 or equivalent
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 method 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 (electro-analytical and optical) methods are used.

Consideration is given to rational methods of approoach to the mathematical aspects of analytical chemistry. An intelligent appraisa of the factors necessary for obtaining meaningful results require considerable chemical knowledge and it is with this knowledge that we are concerned.

Prerequisite: Chemistry 210. Essential to the class is the ability to handle stoichiometric problems; familiarity with electrons, atoms, bond and molecules, solution equilibria, acid-base and oxidation-reduction reactions is assumed.

Texts: D. A. Skoog and D. M. West, Fundamentals of Analytical Chemistry, Holt, Rinehart and Winston, 1966

## 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.

Prerequisites: Mathematics 100 and 200; first and second year chemistry, particularly Chemistry 230.

## 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 understainding 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 pre diction 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 familia with the functional group classification of organic compounds and the basic reactions of the functional groups, and with the basi concepts of kinetics and thermodynamics as applied to chemical reactions.

Prerequisites: Chemistry 100 and 242 or equivalents.
400 Theoretical Inorganic 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.
Text: D. J. Royer, Bonding Theory, McGraw-Hill, 1968.
References: Murrell, Kettle and Teddar, Valence Theory, Wiley, 1965 S. Glasstone, Theoretical Chemistry, van Nostrand, 1944; L. Pauling and E. B. Wilson Jr., Introduction to Quantum Mechanics ; W. Heitler, 1935; C. A. Coulson, Valence 2nd edition, Oxford, 1961 ;
Elementary Wave Mechanics 2nd edition, Oxford, 1956.

## 410 Advanced Inorganic Chemistry

Lecture 2 hours; laboratory 3 hours
O. Knop

All chemical elements and compounds can exist as crystalline solids, and most of them normally do. The arrangements of atoms and molecules in such solids, known as crystal structures, closely reflect the bonding properties of the constituent elements. They can onl be studied by methods that do not destroy or modify the crysta 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.
Prerequisite: Chemistry 320 and 330 (or equivalents) or consent of instructor.
Text: To be announced.

## 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 maly, Chin 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 resononce, 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 of particular techniques will pa
available for problem discussion.

Prerequisite: Chemistry 320.

## 430 Physical Chemistry III

Lecture 2 hours; laboratory 3 hours
K. E. Hayes, J. W. S. Jamieson, 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.

## 440 Advanced Organic Chemistry

Lecture 2 hours; laboratory 3 hoursamat
T. P. Forrest, K. T. Leffek, D. L. Hooper, J. S. Grosseift, 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 rearrange ments, sterochemistry 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.

## 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 Dalhousie Calendar of the Faculty of Graduate Studies.

## Classics

## Professor

J. A. Doull (Chairman)

## Associate Professors

## R. D. Crouse

B. W. W. Dombrowski
M. A. Usmiani

Assistant Professor

## J. P. Atherton

## Lecturer

R. Friedrich

Classics is the study of our origins - how the Christian-European Classics is the thition we belong arose out of the ancient civilizations of tradition to which we belong arose out of the ancient civilizations of
the Mediterranean area. The fundamental ideas and beliefs 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 ind oriental cultures in ancient times. To understand meeting of Greek and Oriental cultures in ancient times. To understand
fully our own contemporary culture, we must study its historical origins. fully our own contemporary culture, we must study its historical origns. 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 in struction 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 of social structures or courses are offered which concentrate on any philosophy. Honours courses
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 undertanding of the common assumptions and beliefs of our society. This knowledge has aways 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, dassics is the most relevant preparation.
Clasical 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 $100^{1}$.
2. Classics 100 .
3. History 100 or Philosophy 100 or English 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. Greek 100 or Latin $100^{1}$ 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.

This course may still be completed within four years if neither Greek nor Latin has been taken in the first year.
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 histcry class or Philosophy 240 same as Classics 240).

## B.A. with Honours in Classics (Ancient Philosophy)

## Year I

1. Greek 100 or Latin $100^{1}$.
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. This course may still be completed within four years if neither Greek nor Latin has been taken in the first year.
10. English 100 or, if already taken, a remaining class from History 100, Philosophy 100
11. A second social science class.
12. 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 $100^{1}$.
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.

1. This course may still be completed within four years if neither Greek nor Latin has been taken in the first year.
2. Latin 100 or, if already taken, Latin 201.
3. 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 ${ }^{1}$.
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 $100^{2}$.
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.

1. At the descretion of the department, a class in another ancient language may take the place of one of the Greek classes
. A student who does not take Latin (or Greek) 100 in his first year In that case a Latin (or Greek) class beyond Latin his second year. 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.

## 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 ${ }^{1}$.

## 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. Freidrich

This is the beginner's class in the Greek language, and no previous knowledge is required. The aim of this class is to teach the student to read, not simply translate, a Greek text. After he has become accustomed to the new alphabet-which does not take long-the study of grammar is introduced along with reading and translation of texts from original Greek literature: in the first term chapters I-VI of the Gospel of St. John; in the second, the first book of Xenophon's Anabasis.

1. The second ancient language may be taken in the second or third year if convenient, and, at the descretion of the department, a furthe class in the second language may take the place of one Ancient History class.

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, the student will be introduced to the language of the 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 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 (Greek Drama) (offered in 1970-71) Lecture 2 hours

## R. Friedrich

This class studies Greek drama and its development from Aeschylus to Euripides. Three plays will be read and studied in Greek: Aeschylus'

Choephoroe, Euripides' Orestes and Aristophanes' Frogs. Three other plays, Aeschylus' Agamemnon and Eumenides and Sophocles' Electra, prill be discussed and should be read in translation by the students in ${ }^{\text {addence. These tragedies have been chosen so that the authors' differ- }}$ advance. treatment of the same or similar subject matter can be studied. Aristophanes' comedy confronts the two tragedians as dramatic charAristophanes judgements he passes on them have very much influenced literary criticism up to this century.

Although this class emphasizes mainly the reading of the plays in the original language and their interpretation as individual literary works of art, they will also be discussed as stages in the development of Greek drama. Other aspects will be dealt with, such as the place of the drama. theirs and their authors in the history of Greek literature and the inplays and their aug of Greece, and their historical and social background. tellectual will be discussed.

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.

Since this is an advanced class in Greek literature, the instructor assumes that students possess a sound knowledge of Greek grammar and the history of Greek literature. They ought to have read at least the History of Greek Literature by Moses Hadas or C. M. Bowra or H. J. Rose. The student is advised to read, or to have read at the outset of the class, H. D. K. Kitto, Greek Tragedy.
At least one 300 -level class in Greek must be taken by all students who have chosen Greek as their first or second language and by those who intend to take honours in classics.

## 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 Greek Philosophers

Lecture 2 hours

## R. Friedrich

The topic of this class is "Plato and Aristotle on art and literature". Books I and X and a number of other passages of Plato's Republic and all of Aristotle's Poetics will be read and studied in Greek; in addition, passages of Aristotle's Rhetorics and Politics will be consulted. The two philosophers' theory of art and literature will be discussed in the context of their philosophy. Furthermore, two modern theoreticians of dramatic art will be dealt with: B. Brecht, who-in his own words-developed an "anti-Aristotelian" theory of drama, and A. Artaud.
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 familar 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 theHistory 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.
At least one 300 -level class in Greek must be taken by all students who have chosen Greek as their first or second language and by those who intend to take honours in classics.

## Prerequisite: Greek 200

Texts: The Republic by Plato; The Poetics by Aristotle.

## Latin

## 099Introductory Latin

## Lecture 3 hours

Special (non-credit) classes will be provided upon request for studeñts 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 The pure through the reading of some basic works of prose and poetry, liter 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 Torace 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

## 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 1969-70 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.

Prerequisie: Latin 100.

## 300 The History of Roman Satire (offered in 1970-71)

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 themselves and to follow the lectures which are informal and are combined with discussions of problems that arise from the texts. There are also occasional seminars on special topics and problems in the Roman satire.

Additional reading is suggested as an aid and is left to the discretion of the individual student.

## 301 A Study of Vergil

## Lecture 2 hours

## M. A. Usmiani

The purpose of this class is to study the development and importance f 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 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 politica, 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.

## Near Eastern Languages

The classes in Hebrew, Coptic, Syriac, Arabic and Akkadian are available as electives at the descretion 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

100 Introduction to the Coptic (Sahidic) language and literature
E. Segelberg

200 Reading of selections from other Coptic dialects E. Segelberg

300 Reading of Coptic texts, mainly from the recently discovered Nag Hammadi papyri
E. Segelberg

## Syriac

100 Introduction to the Syriac language and literature E. Segelberg

Arabic
100 Introductory grammar and reading of texts (not offered in 1969-70)
200 Intermediate Arabic (not offered in 1969-70)

## Akkadian

100 Introductory grammar and reading of texts (as required) B. 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.

## 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.

## Classic 100 Classical Civilization

Lecture 3 hours
J. A. Doull, J. P. Atherton, B. W. W. Dombrowski, 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 expressed in these works. 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 through 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 (offered in 1971-72)
Lecture 3 hours
B. W. W. Dombrowski

The 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.
Prerequisite: History 100 or Classics 100 .
Classics 251/551 Seminar on Problems of Ancient Near Eastern History

## Seminar 2 hours

E. Segelberg

This class is primarily for honours and graduate students. Others may be admitted at the descretion of the instructor. In 1969-70 the class will deal with the development of the ministry and certain other functions of the Church in the light of their background in both Jewish traditions and the Hellenistic world. The doctrine of the Twelve Apostles (Didache) and the Apostolic tradition of Hippolytus Twelve Apostles (Didache)
will be used as sources.
Prerequisite: History 100 or Classics 100.

## Classics 222 Greek History (offered in 1970-71)

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 (offered in 1970-71)
Seminar 2 hours
B. W. W. Dombrowski

Characteristics of the Hellenistic Age will be studied in detail as warranted. The class is intended for honours, graduate and theology students only.

Prerequisite: History 100 or Classics 100 .

## Classics 223 Roman History

Lecture 3 hours

## B. W. W. Dombrowski, J. P. Atherton

This class will give a survey of the origin and development of Roman political organization and culture, emphasizing special aspects as may be determined from time to time. During the first term, the course of lectures will centre on the establishment of Republican institutions and their distintegration 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 stabilizing and dissolving forces expected to read extensively.

Prerequisite: History 100 or Classics 100.
Classics 253/553 Seminar on the Roman Empire and the Rise of Christianity

## Seminar 2 hours

## J. P. Atherton

Selected topics from the transition from classical to Christian culture will be studied. Particular attention will be paid to the connection between religious innovation and change in political and social life and the effect of the new beliefs on literature, art and philosophy. (The class is intended primarily for honours and graduate students. Others may be admitted at the discretion of the instructor.)
Prerequisite: Classics 100 or History 100.

## Classics 224 The Bible in Relation to Classical Culture

## 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: Classic 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
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, esperially 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) offered in 1970-71)

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
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. The method is philosophical rather than philological. Some previous study of ancient philosophy and the ability to read Greek or Latin are assumed. The subject for 1969-70 will be Aristotle's Metaphysics, with ancient and medieval commentaries.

## Classics 463/563 History of the Interpretation of Aristotle (offered in 1970-71)

Seminar 2 hours
J. A. Doull

Certain of the chief interpretations of Aristole from the Neoplatonists to Hegel are studied.

## Classics 464/564 Seminar on the Philosophy of the Church Fathers (offered in 1970-71)

R. D. Crouse

The particular subject of the seminar will vary from year to year, oncentrating on works of one or more Greek or Latin authors, or concene development of a particular doctrine. The approach will be on the developmal rather than philological, and some preparatory work in ancient philosophy as well as some competence in the appropriate in ancuage or languages will be expected. Members of the seminar language asked to present papers frequently, and to prepare one major will in the course of the year.

## 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 Dalhousie Calendar of the Faculty of Graduate Studies.

## Economics

## Professors

J. F. Graham (Chairman of the Department)
J. G. Head (Senior Killam Fellow)
Z. A. Konczacki
N. H. Morse (Director of the Fisheries Research Project)

## Associate Professors

R. L. Comeau
A. M. Sinclair
C. Steinberg

## Assistant Professors

J. M. Beauroy
F. M. Bradfield
P. B. Huber
E. Klein
C. T. Marfels
C. M. Ouellette
U. L. G. Rao

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 economics 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
parts. Training in this theory is essential to any study of conomics. Over time, economic theory has been refined by applying economica. 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 the statistics helpful.

Economis 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 descipline 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 post-graduate 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 courses listed here.

General B.A. with Major in Economics (Recommended Programme)

## Year I

1. Economics 100 .
2. Political Science 100 or Sociology 100 .
3. History 100 or Philosophy 100 .
4. Mathematics 100 .
5. Modern language.

## Year II

6-8 Economics 200, 202 and 300.
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.
12. 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. Economics 200 and 300 are basic classes. It is highly desirable that students take them in Year II, in preparation for taking higher level classes in Year III.
4. Students must satisfy the overall requirements for the General B.A. degree.

## B.A. with Honours in Economics

Year I
l. Economics 100
2. Mathematics 110 or 100 .
3. A 100 -level class in a modern language.
4. History 100 or Philosophy 100.
5. Sociology, Anthropology 100 or Political Science 100.

## Year II

6. Economics 200.
7. Economics 202
8. English 100.
9. Economics 302 or other economic history class.
10. Sociology, Antropology 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. History 100 or Philosophy 100 , whichever was not taken in Year I. 12.17 Six economics classes including 300,303 and either 301 or 307 .

18-19 Two classes in minor field.
20. An elective.

## 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

l. 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 may be required to attend honours seminars in their third and fourth years.
8. Students must be careful in arranging their courses to ensure that they satisfy the overall requirements for the General B.A. degree.

## Classes Offered

## 100 Principles of Economics

Lecture 2 hours; discussion 1 hour

## M. Bradfield, R. Comeau, C. Steinberg

Economics 100 is an introductory class which requires no previous formal training in economics on the part of the student. Because it provides an introduction and foundation for the study of the various branches of economics, Economics 100 is a prerequisite for most of the other classes offered by the Department of Economics.

The class attempts to introduce the student to the nature of economics as a science and the role of the economist in guiding policy decisions by business and government. Topics covered include an introduction to the meaning and nature of economics, micro-economics (i.e. the way in which the market system determines prices and quantities of goods bought and sold), macro-economics (i.e. the way in which the nation's total output and employment are measured and determined), public finance, money and banking, international trade and economic development and growth. Students are expected to read from materials assigned in addition to the textbook in order to acquire a wide knowledge of the problems and issues involved in economics.

At present, three sections of Economics 100 are offered. Two sections are offered during the day, and consist of two hours of lectures per week plus an additional hour for discussion. The regular lecturer gives the two one-hour lectures and the classes break into smaller groups which meet with other members of the Department of Economics during the additional hour. The groups are designed to give the students closer contact with instructors, and to encourage greater participation and freer discussion both of economic problems and of the students problems with economics. The evening section will meet twice a week for one and one-half hour lectures. It is designed meet twice a week for one and one-hal hour lectures. It is designed
to serve the needs of students from outside the regular university to serve the needs of students from outside the regular university
community who may not be able to attend during the day, but it is also open to any students who may find the evening hours convenient.

## 200 <br> Money, Banking and International Finance

## Lecture 3 hours

A. M. Sinclair

This is not a class in "how to run a bank". Rather the subject of This is not a class in the analyze the impact that the financial system as a whole the class is to analyze the impact particular, the impact that it has on has on the economy and, in particular, the impact that it has on such aspects of the economy as the level or employmer prines of the of inflation and the balance of payments. The panstions) are touched operations of banks (and of other financial institutions) are ton their upon, but emphasis is placed detailed modes of operation.
In outline the class consists of three parts: theory, institutions, and In outline the class consists of three parts: A theoretical framework is essential for the interpretation of the policy. A theoretical framework is essential or a a theoretical framework facts and experience in the rean, interest rates, exchange rates, which can hand so on. The institutional framework consists of an employment, and so on. The institutional finameial world - i.e. banks, analysis of the contemporary Canadian ond other financial institutions. trust companies, insurance companis porld of policy is described and here emphasis is placed Finally, the world monetary policy from 1945 to the present; this will upon Canadian monetary policy fing of the relevance of contemporary give the student some understanding facing the Canadian economy.
history to the present situation facing the Chas economic Essential knowledge and technical skill: An awareness of basic economic concepts, such as one obtains from Economics 100, economic a knowledge of basic algebra and gemoetry is essential explained. A knowledge of the level of proficiency required is not for much of the class, but the landard.

Prerequisite: Economics 100.
202 Economic Statistics
R. E. George

See Commerce 304, (Dalhousie Calendar).

## 300 Micro-economic Theory

## Lecture 3 hour

## 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 the other side of firm and the theory of cost. The 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. The last part of the class discusses the problems which occur in the allocation of resources and in welfare economics.

Prerequisite: Economics 100 which may not be taken concurrently.

## 301 Macro-economic Theory

Lecture 2 hours
A. M. Sinclair

This is a class for students who wish to major or take honours in economics. It is intended to provide an extensive treatment of macroeconomics. The class is not mathematical in its treatment of the material. Topics covered include; national income accounting; the theory of employment, interest and money; and the theory of economic growth. Both "open" and "closed" economies are considered, and some recent innovations on the effectiveness of monetary and fiscal policies under conditions of capital mobility are studied. While major emphasis is placed on the development of the theoretical ideas, some emphasis is placed on the development of the theoretical ideas, some
attention is given to the financial and fiscal institutional arrangements in Canada and to contemporary questions of economic policy.
Prerequisite: Economics 100. Students should be familiar with the broad outlines of macro-economics as set forth in, for example, Samuelson's or Lipsey and Steiner's introductory textbooks. A knowledge of basic algebra and geometry is required to the level of a Grade XI standard

## 302 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 he 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, institution, 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.

## 303 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 writer and schools and of various contemporary writers and current topics depends in part on the interest of students. It is recognized that the tremendous expansion of the literature and 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 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.

## 304 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 microeconomic 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 readings should have included The Making of Economic Society by R. L. Heilbroner and Soviet Economic Power by R. W. Campbell.

## Prerequisite: Economics 100.

## 305 Labour Economics

## Lecture 3 hours

C. Sterling

This class is organized around the theme, "What are the most influential factors affecting wages and salaries, employment, and conditions of labour in modern industrial society with special reference to Canadian labour markets?" About 12 million Canadians are directly dependent upon wages and salaries for a living. Their income constitutes about $65 \%$ of the National Income. Over 1.5 million of these workers are powerfully organized in trade unions in critical sectors of our economy. Consequently, at the outset of the first term, we review in a formal way: the emergence of labour problem, the development and structure of the labour market, the growth, structure and character of trade unions, and the historical and legal foundations of labour relations, especially in Canada. In the latter part of the first term, we are able to begin an extensive economic analysis of the supply and demand for labour, opening with a review of classical wage theory.

Having thus set the theoretical framework for our opening question before mid-second term, we then examine the theory and practice of collective bargaining, exploring the interaction and relative strengths of market (economic) forces, and the institutional (government-trade union-employer) forces. The results of our inquiry now emerge in a study of labour's share of the national income. The last quarter
of the second term is spent on an analysis of the determinants of employment and the measurement of unemployment in general, on a study of manpower resources and resource allocation, concluding with a review of public policy in respect to labour. An effort is made throughout to relate striking current events to the theoretical framework.

Prerequisite: Economics 100. It is also helpful of the student has some experience and interest in dealing with the materials of one or more of the social sciences especially with the way data are gathered and used.

306 Economic Development of Western Civilization
R. S. Cumming

See Commerce 303 (Dalhousie Calendar).
307 Theory of the Business Cycle
R. E. George

See Commerce 453 (Dalhousie Calendar).

## 308 Theory and Problems of Economic Development

## Lecture 3 hours

## Z. A. Konczack

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 process, 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 labourintensive methods, and allocation among sectors; development planning,
which considers the process and the typology of planning, plan strategy, planning models, problems of implementation, and some case studies.

Prerequisite: Economics 100
Text: The Economics of Development by Everett E. Hagen (Irwin Dorsey Ltd.) and The Theory of Economic Growth by W. Arthur Lewis (Allen \& Unwin Ltd.). Additional reading matter will be recommended in the course of lectures.

## 312 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 with 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 100. Students may be admitted by permission of the instructor.

## 400 Public Finance

Lecture 2 hours; tutorial 1 hour
J. G. Head

Economics 400 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 presen papers on topics related to the lectures. The purpose of the tutorials pill 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 100.

## 401/511 International Trade: Theory and Policy

Lecture 2 hours
P. B. Huber

This class considers the causes of international exchange of goods and services and analyzes the effects of participation in the international economy on the income, growth, and monetary arrangements of in dividual countries. The theory and practice of commercial policy and other restrictions on trade are considered after the pure theory of international trade and its implications tave been explored. In of international trade and its implications tave been explored. In
the second term, international monetary analysis is taken up and the causes and remedies of external imbalance of national economies are considered. Then the reorganization of the international monetary system is discussed. Depending on class interest, some of the following topics may be treated in detail: issues of international development finance, the theory and practice of economic integration, East-bloc rade, Canadian commercial policy, the international economy in historical perspective, and instability and growth in the international economy

Prerequisite: Economics 200. In special cases this may be waived by the instructor. The entering student must have a reasonably good grasp of macro-economic theory and of the operations of the banking system; of macro-economic theory and of the operations of the banking system; he must also be able to hande the basic micro-economic tools of on high school mathematics is essential since a considerable part of the exposition of the class makes use of elgebraic and geometric techniques.

## 403/513 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 and urban 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 200. 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.

## 405 Economic History of Great Britain and the British Commonwealth

R. S. Cumming

See Commerce 456 (Dalhousie Calendar).
406 The Economic History of North and South America
R. S. Cumming

See Commerce 455 (Dalhousie Calendar).

## 407/507 Philosophy, Politics and Economics

D. Braybrooke

See Philosophy 340 and Political Science 349 .

## 408/508 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 nore 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 These the number and size distribution of firms in general and to refers to concentration in particular; in market conduct the pricing economic conscussed; market performance concerns the problem of process is degree of optimality of allocation of resources. The latter part the degree of discussion about whether a reallocation of resources is includes a and this involves looking at the basic elements of public necessary, and this involves business.
policies directed towards business
Prerequisite: Economics 300 which may be taken concurrently

## 409 Applied Economics

## R. E. George

Commerce 454 (Dalhousie Calendar

## 412/512 Economic History of Pre-Industrial Europe

Lecture 2 hours

## J. M. Beauroy

Economics $412 / 512$ is chronologically divided in two parts: first, the medieval period, and secondly the early modern period of 1750 . The class is concerned with the urban setting of economic life and activity of European medieval and early modern societies. It will examine factors and aspects of the development of trade, industry, the exarchant classes and the urban working groups in different European . The aricultural basis of the economy will be examined in relation to urban history.
The two-hour weekly seminar will include a presentation of guidelines and definition of problems by the instructor and papers presented by the students on topics decided with the instructor. A comprehensive reading list is distributed. An attempt will be made to acquaint students with primary sources
Prerequisite: Students may be admitted with the permission of the instructor.

## 431 Intermediate Statistics

Lecture 3 hours
G. Rao

The student who is familiar with the basic statistical theory can appreciate econometric techniques 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. The class is concerned with the theory of probability, building from an axiometic point of view, mathematical expectation, moment generating function, and statistical inference. The econometrics included in this class concentrates on the general linear model. A review is made of various problems that arise in applied economics and of atempted solution for them. The student is expected to have a good background in mathematics.

## 450 Senior Seminar on Economic Policy

Various members of the department
The Senior Seminar is confined to students in the last year of the undergraduate programme who are either majoring or taking honours in economics. This means that the class will always be small and will be made up of those who have a strong interest in economics and have sufficent preparation in the subject to participate in discussions of economic problems at an advanced level.

The Senior Seminar is a departmental responsibility, which means that discussion will be directed by that member of the department who has the greatest expertise in the policy issue under consideration. Since it is a seminar, students are expected to participate actively and to prepare papers for discussion.

## Graduate Studies

The Department offers a graduate programme leading to the M.A. and Ph.D. degree. Details of these programmes, including a list of graduate courses, are given in the Dalhousie Calendar of the Faculty of Graduate Studies. Senior undergraduates may be admitted to graduate classes at the discretion of the instructor concerned.

## English Language and Literature

## Professors

A. R. Bevan (Chairman of Department)
C. L. Bennet
M. G. Parks
M. M. Ross
S. E. Sprott

Visiting Professor
A. L. Wheeler

## Associate Professors

R. MacG. Dawson
J. Fraser
A. J. Hartley
S. Mendel
D. P. Varma
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

Visiting Fellow
H. David Scott

Killam Senior Fellows
A. J. Sambrook
J. M. S. Tompkins

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 author's 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 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 the 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 unitversity. But reading and writing, like mathematics, are performed on 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 pos
ibilities that there are in words. The study of English literature and sibilities that there are in words. The study of engish literature and
language is therefore a practical study, indeed a practical necessity for the highest development of verbal skill.

At Dalhousie-King's 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".
At present, eleven of these classes are offered in such subjects as American literature, Canadian literature, Shakespeare, the English novel, twentieth-century fiction, and modern poetry.
3. The honours course in English consists of nine classes beyond English 100. It is a comprehensive study of English literature at the under graduate 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 schoo 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 the 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 454 (recommended for fourth year)
Section C. English 253; English 351 (recomrnended for second year) Section D. English 251; English 352.
Section E. English 254; English 353
Section F. English 451; English 354 (recommended for second year). Section G. English 453; English 455.
The student may choose his two remaining classes from those not already chosen in Section C to G , or from Section H.
Section H. English 201; English 206; English 452.
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 page 46).

## B.A. with Combined Honours

There are several combined honours programmes:
English and History
English and French
English and Philosophy
English and German
English and Spanish
Students interested in any of the above 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

## 001 Composition and Literature

Lecture 3 hours
Mrs. E. B. Sutherland
English 001 is a class designed for those students who do not have the qualifications for entrance into English 100 . Composition is an integral part of this class, and one hour a week is given to that study, through various textbooks, chief among which are the Prentice-Hall Handbool
for Writers and Edgar N. Roberts' Writing Themes About Literature. The rest of the class in intended to introduce students to the particular pleasure to be found in different types of literature
Texts: The Rinehart Book of Short Stories; Sound and Sense; An Introduction to Poetry by Laurence Perrine; three plays: Othello by Shakespeare, Candida by G. B. Shaw, and The Playboy of the Western World, by J. M. Synge; three novels: Sons and Lovers by D. H. Laurence, Portrait of the Artist as a Young Man by James Joyce, and Who Has Seen the Wind by the Canadian writer W. D. Mitchell.

## 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 hour

## 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. are held once a week for op
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 ofYoungW erther (Signet) ; Constant, Adolphe (Signet) ; Stendhal, Scarlet and Black (Penguin); Turgenev, Fathers and Sons (Signet); Flaubert, Madame Bovary (Norton); Dostoyevsky, 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, worville, Whitman, Dickinson, Twain, Crane and Dreiser. The aim of Enclish 206 is to to introduce students to major American writers from 1800-1900. 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, MobyHawthorne, The Scarlet Letter (Houghton Mifflin); Melville, Moby-
Dick(Bobbs-Merrill) ; Twain, Adventures of Huckleberry Finn(Hough-Dick(Bobbs-Merrill) ; Twain, Adventures of Huckleberry Finn(Hough-
ton Mifflin); Crane, The Red Badge of Courage and Four Great Stories ton 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 iiterature with emphasis on poetry and fiction from the 1920's to the present. Some knowledge of nineteenth-century British literature, though not essential, is very useful to the student of Canadian literature. A few representative writers of the nineteenth century (Howe, Haliburton, Susanna Moodie, 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, lst Series; Susanna Moodie, Roughing It in the Bush; Leacock, Sunshine Sketches of a Little Town and Arcadian Adventures with the Idle Rich; Grove, Fruits of the Earth; Ringuet, Thirty Acres; MacLennan, Barometer Rising and Two Solitudes; Gabrielle Roy, The Tin Flute; Robertson Davies, Leaven of Malice; Callaghan, Such is My Beloved; Buckler, The Mountain and the Valley; Sheila Watson, The Double Hook. The text for poetry is Klinck and Watters, Canadian Anthology.

## 208 The English Novel to 1900

## Lecture 2 hours

Instructor to be announced
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

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. Scot Fitzgerald, Great Gatsby; Ernest Hemingway, Farewell to Arms; William Faulkner, Light in August; Hemingway, Farewell to Arms; William Faulkner, Light in August;
Henry Roth, Call it Sleep; Nathaniel West, Miss Lonelyhearts; Joyce 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 Carnibal; 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 Modern Poetry

Lecture 2 hours
S. E. Sprott

An introduction to modern poetry written in English is centered on a study of Yeats, Pound and Eliot and a less detailed reading of writers uch as Hopkins, Graves, Auden, Dylan Thomas, Stevens, and W. such Williams, with some reference to others in England, the United States and Canada. Critical reading of poems leads to a consideration of outstanding interests, characteristics, developments, and achievements in poetry in English from about 1890 to about 1950. The class is arranged to give time for reading in depth in selected areas and requires class discussion, papers, an essay in each term, and a final examination.

An entering student should be able to read a poem and write intelligently about it in good English and in standard critical terms; he will be assumed to have some acquaintance with well-known poems in the English tradition from Shakespeare to Browning and to have done English tradition from shating in Yeats, Pound and Eliot.
some preliminary reading in Peats, Pound
Prerequisite: A clear pass in English 100.
Texts: To be announced

## 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 Hemingway, Faulkner, Frost, Anderson, Fitzgerald, Salinger, W. C. Williams, Eliot, O'Neil, Tennessee Williams, Arthur Miller.

Prerequisite: English 100.
Texts: To be announced.

## 214 Shakespeare

Instructor to be announced
This is a new class designed for general students who wish to study selected works of Shakespeare. Those plays to be studied had not been determined at the time of writing.

## 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 English students (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 principally lyri
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 Fairie Queene, Vol. I(Everyman); Rollins and Baker, The Rollins and Baker, The Renaissance in England.

## 252 Shakespeare 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 Marlow 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 Antelligently 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 (700-1100A.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 archeology. 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 Early Eighteenth-Century Literature

## Lecture 2 hours

## A. R. Bevan

This class, conducted as a mixture of lectures and discussions, deals with an eighty-year period of English literature, 1660-1740. The emphasis will be placed upon three great satirical authors (Dryden, Pope and Swift) and upon a study of Restoration Comedy and Tragedy. 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, and philosophical points of view: Hobbes, Halifax, Pepys,
Butler, Addison and Steele, Manderville 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 hoursS. 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).

## 353 Eighteenth-Century Literature from 1740 to 1800

Lecture 2 hours

## H. D. Sproule

This class investigates the major trends in eighteenth-century thought between the neo-classical and romantic movements, illustrated by study of selections from Gray, Thomson, the Wartons, Cawper, Collins, Crabbe, Shenstone, Burns, Blake, Boswell and Johnson, Goldsmith, Sheridan, Fielding, and Richardson. Since the class commences with a discussion of background material, the student is advised to review for himself, beforehand, some of the major developments made by for himself, beforehand, some of the major developments made by
Locke, Newton, and various members of the Royal Society. A review Locke, Newton, and various members of the Royal Society. A review
of Swift and Pope is also recommended, although it is not a fixed requisite. A summer reading list will be available, and the student is urged to undertake at least a modest sampling of its items.

The class attempts to relate the quality and texture of intellectual experience of the period in a manner as vital and attractive as posexple A reson of interest, ordinary literary competence, sible. A reasonable to read occasionally beyond what is specifically and a willingness to read occasionally beyond what is specifically work in this area
Prerequisite: English 100.
Texts: To be announced.

## 354 The Nineteenth-Century English Novel

Instructor and texts to be announced.
This is a new class, designed to give the student the opportunity of studying the novels of the period from Scott and Austen to Hardy. Although details had not been decided upon at the time of writing, the Brontes, Dickens, Eliot, Thackeray and Iames will probably be among the authors studied.

## 451 Nineteenth-Century Poetry

Lecture 3 hours
A. J. Hartley, M. M. Ross

In the first term, this class will study the Romantic period, Wordsworth, Coleridge, Byron, Shelley and Keats. In the second term, the Victorian poets will be studied. The main emphasis will be put on Tennyson, poets will be studied. The main emphasis will be put on 1ennyson, Rossette and Swinburne.
The class undertakes a study of selected poems of each of these poets in order to appreciate their aesthetic awareness of the expanding consciousness, not only of the perfectibility of man and society, but also of the human struggle inherent in this aspiration.
The class is conducted as a combination of lectures and discussions. Detailed reading lists are provided. Students are required to write one essay each term.
Texts: Riverside editions.

## 452 Nineteenth-Century Thought

## Lecture 2 hours

C. J. Myers

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. Ansivering 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 these 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.
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
R. J. Smith

English 453 is a seminar class for senior honours students and graduate students in their qualifying year. The class is not designed to offer a historical survey of the literature of the period, but to introduce students to central works, authors, and critical problems of twentieth-century English literature. There will be little emphasis on work published after the Second World War. Among the texts to be discussed will be works by Conrad, Eliot, Forster, Joyce, Lawrence, Pound, Woolf and Yeats. Each student will be expected to present at least two papers for discussion in class, and there will be a final examination. Summer reading is recommended.

## 454/513 Literary Criticism

## A. L. Wheeler

This class is intended for senior honours and graduate 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 time of writing.

## 0ther Classes

The department expects to be able to offer other new classes in 1969-70. Students should consult with the department or the Registrar for changes and additions.

## 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 Dalhousie Calendar of the Faculty of Graduate Students.

## Geology

## Professors

M. J. Keen (Chairman of Department)
H. B. S. Cooke
C. G. I. Friedlaender
G. C. Milligan

## Associate Professors

R. A. Gees,
P. E. Schenk

## Assistant Professor

## F. Medioli

Visiting Professors

## F. Barbieri

A. von Volborth
C. E. Wegmann

## Special Lecturers

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 predisted? 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
are 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, former shore-lines, are found now far above present sea-level around Hudson Bay and in Newfoundland. Can a geologist sea-levibe conditions at the surface of the earth at any time in the past?
descien Or the temperature inside the earth at these same times? Or even Or? How do mountains form? Perhaps the Himalayas rose when India and Russia collided. Perhaps the Rocky Mountains are the India the Pacific Ocean. Our means of subsistence, food, raw-materials, and energy required for a growing population must be obtained from the outer-most 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 aspects 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 in 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 demands. 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 advide. 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

Suggested programmes are outlined below for General B.Sc. with Major in Geology, a B.Sc. with Honours in Geology and for a B.Sc. with Honours in Geology combined with Honours in Physics or Chemistry or Biology. Honours students may be required to submit a short thesis by the end of their last year. They will also be required to obtain field experience satisfactory to the department.

## General B.Sc. with Major in Geology

## Year I

1. Geology 100.
2. Language 100
3. English 100 (or elective).
4. Mathematics 100.
5. Physics 110 or Biology 100 or Chemistry 101.

## Year II

6. Geology 201.
7. Geology 202.
8. Elective (or English 100 if not already taken).
9. Physics 110 or Biology 100 or Chemistry 101 or Mathematics 200. 10. Physics 200 or Biology 201 or Chemistry 210.

## Year III (alternate 1)

11-13. Geology 301, 302 and 303.
14. Physics 220 or Biology 201 or Chemistry 210.
15. Elective.

## Year III (alternate 2)

11-13. Geology 301, 302 and 304
14. Engineering 200.
15. Elective.

## B.Sc. with Honours in Geology

Year I

1. Geology 100.
2. Language 100
3. English 100 (or elective).
4. Mathematics 100 .

Economic Geology
5. Physics 110

Geophysics
5. Physics 110.

Geochemistry
5. Chemistry 101.

Biological and Stratigraphic Geology
5. Biology 100.

## Year II

6.7. Geology 201 and 202.
8. Elective (or English 100 if not already taken).

Economic Geology
Chemistry 101.
10. Mathematics 200.

Geophysics
9. Physics 220.
10. Mathematics 200.

Geochemistry
9. Chemistry 210
10. Physics 110 or Biology 100

Biological and Stratigraphic Geology
. Biology 201
10. Chemistry 101 or Physics 110 or Mathematics 200.

## Year III

11-12. Geology 301 and 302.
13. Elective.

Economic Geology
14. Geology 304.
15. Engineering 200.

## Geophysics

14. Geology 405.
15. Physics 230 or Mathematics 200 or 227 or 206.

Geochemistry
14. Geology 305.
15. Chemistry 230.

Biological and Stratigraphic Geology
14. Geology 303.
15. Biology 321.

## Year IV

Economic Geology
16. Geology 401 or 406.

17-18. Geology 403 and 404.
19. Engineering 210 and 211.
20. Chemistry 210.

## Geophysics

16-18. Geology 303, 304 and 452.
19. Geology 451 or 401.
20. Mathematics 200 or 227 or 206 or Physics 230.

Geochemistry
Geochemistry
$16-19$. Geology 303, 304, 401 and 454.
20. Physics 220 or Biology 201.

Biological and Stratigraphic Geology
16-18. Geology 304, 401 and 455.
19. Geology 457 or 506.
20. Chemistry 210 or Physics 220 or Mathematics 200 or 227 or 206.
B.Sc. with Honours in Geology combined with Honours in Physics, Chemistry or Biology

## Year I

1. Mathematics 100 .
2. Language 100 .
3. English 100 or elective.
4. Geology 100.
W. Geology

With Physics
5. Physics 110.
With Chemistry

With Chemistry
5. Chemistry 101.
With Biology
5. Biology 100.

## Year II

6-7. Geology 201 and 202
8. Elective (or English 100 if not already taken). With Physics
9. Physics 220
10. Mathematics 200 or 220 or 228.

With Chemistry
9. Chemistry 210.
10. Mathematics 200 or 220 or 228 .

With Biology
9. Biology 201
10. Chemistry 101 or Physics 110 or Mathematics 200.

## Year III

11. Geology 301
12. Elective

With Physics
13. Physics 230.
14. Physics 330 or 335.
15. Geology 303.

With Chemistry
13-14. Chemistry 230 and 320.
15. Geology 304.

With Biology
With Biology 321 and 323
13. 14. Biology
15. Geology 302.

## Year IV

With Physics
16. Physics 310.
17. Mathematics 200 or 227 or 206.
18. Geology 305.
19. Geology 401 or 405.
20. Geology elective.

With Chemistry
16. Chemistry 410
16. Chemistry 410 . 17. Physics 110 or Biology 100
17. Physics 110 or Biology 100
18 - 19. Geology 454 and 305 .
20. Geology elective.

With Biology
16. Biology elective.
17. Chemistry 220 or Physics 220 or Mathematics 200 or 227 or 206.

18-19. Geology 401 and 455.
20. Geology elective.

## Classes Offered

## 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
deas 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, 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 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 class is an introductory class for students intending to take a degree 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 him or her groundwork for further classes. A text will be prescribed, and texts and reference books in the library will be recommended at appropriate times in the class. Laboratory work is conducted in the field during the fall and meets at 2 p.m. in the fall term because of the 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; demonstration periods
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. No reg. ular laboratory is specified at pill be prescribed, and reference made periods and reference material in the library at appropriate times.

## 201 Elements of Optical Mineralogy and Petrography

Lectures 2 hours; laboratory 3 hours
C. G. I. Friedlaender

In 1966, it was tentatively decided to change the scope and presentation of the class on elementary mineralogy. More stress is laid now on selected aspects considered to be of immediate practical application in the determination of minerals with the microscope. However, this prethe detes that the student is already familiar with the principles of supposes crystlography. For this, it is not attempted to give a correlated guidcrystallographe: the student will be expected to make use of textbooks.
According to the interest and range of the students, additional material of crystal morphology and crystal physics will be included.
The student will have an opportunity to make observations and determinations himself. The laboratory is an essential part of the class which is conducted as a seminar class. Term papers are given on a range of topics.

## 202 Introduction to Invertebrate Palaeontology

## F. Medioli

This class studies the major groups of fossil invertebrate organisms of particular geological interest, their ecology and stratigraphic distribution.

## 301 Petrology of Igneous, Sedimentary and Metamorphic Rocks

Lecture 2 hours; laboratory 3 hours
C. G. I. Friedlaender, P. E. Schenk

In the first term general questions and selected aspects of the petrography of plutonic rocks will be considered. This class does not give a cover to cover treatment of descriptive petrography. Selected problems and rock associations will be treated.
In the second term, sedimentary petrology will be studied with the purpose of interpreting from microscopic features the environments of both deposition and diagenesis of sediments.
Texts: (used in second term) Sedimentary Rocks by Pettijohn (for the lectures) and Sedimentary Petrology by Folk (for the laboratory).

## 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 a historical account of the development of stratigraphy The second division deals with the materials of stratigraphy, durin which topics are covered such as classification, textures and structure of sedimentary rock, paleoecology, and sedimentary tectonics. The third division considers stratigraphic bodies and relations such as stratification and the vertical sequence, uncomformities, 'stratigraphic classification, and nomenclature, lateral variation and facies, and problems of correlation. The final division deals with a real 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 week-end 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 ill. ustrations, 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 the 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, approximately equivalent to the course previously offered by the Engineering Department. This trains the student to visualize the threedimensional 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, Strictural Geology and other texts are useful, and students are also referred ural Geolechnical journals.

304 Introduction to Ore Deposits (offered in 1969-70)
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 simultancously. Exceptions are made to meet specific programmes, but the student should consult the instructor and obtain permission.

## 305 Crystallography

Lecture 2 hours; laboratory 3 hours
C. G. I. Friedlaender

The class gives an introduction to geometrical and physical crystallography.

## 401 Sedimentation and Sedimentary Petrology

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\text { Lecture } 2 \text { hours; laboratory } 3 \text { hours }
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R. A. Gees

This class consists of a two-hour lecture period and a three-hour laboratory period. During the lecture period the following topics are discussed: the origin of sediments, sedimentary fextures and structures, the composition of sediments, their classification and nomenclature, the petrography of the gravels, sandstones, shales, limestones, and nonelastic 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 or 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 1969-70)

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 (offered in 1970-71) 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.

## 405 Introduction to Earth Physics

Lecture 3 hours; laboratory 3 hours
M. J. Keen, R. D. Hyndman

This class considers the application of physics to a study of the earth; the formation and age of the earth; ocean-flonr spreading and continental drift; the formation of continents, mountain ranges, and deep ocean trenches; earthquakes and seismology; the earth's gravity field, isostasy, earth tides; the earth's magnetism and palaeomagnetism; electrical conductivity in the earth; the ages of rock; temperature and heat flow in the earth.
The class is oriented towards the physical aspects of the whole earth, rather than the aspects immediately of concern in mineral or oil exploration. But the ideas and techniques are the same-an array of seismometers spread over tens of kilometers for the detection of earthquakes and nuclear explosions is no different in principle from an array of 100 meters long used, say, in seismis prospecting for oil.

Two term papers are required, and one class seminar from each student. Two term and participation by students is an essential part of the class.
Discussion and

## 406 Examination of Mining Properties

D. Johnston

This is a lecture and laboratory class on the evaluation of mineral Teposits and on the use of the physical and chemical properties of depositserals, in the recovery of metal from ore. The class 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 the successive stages of development from initial exploration to proits successmphasis will be placed upon the design planning of various duction. Emphasis the operation by the students. No texts are prescribed but facets of the operation by the students. No texts are prescribed but
extensive use will be made of technical literature from the library files.

422/522 Introduction to Vertebrate Palaeontology (offered in 1969-70)
Hours to be arranged
H. B. S. Cooke

The major features of vertebrate evolution and the geologic history of vertebrate groups, particularly the mammals, are discussed.

## 451/501 Advanced Petrology

Hours to be arranged
C. G. I. Friedlaender

This class studies universal stage methods, petrofabrics, and modal analysis.

## 452/502 Advanced Earth Physics

Hours to be arranged

## R. D. Hyndman, M. J. Keen, R. Ravindra

The class studies the application of physics to particular problems in the study of the earth.

## 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), digital modelling and selected assignments of a seminar type.

## 454/504 Geochemistry

Hours to be arranged
A. von Volborth

The abundance and distribution of elements in the lithosphere are studied and the preponderant elements and their nuclides are discussed.

455/505 Advanced Historical Geology (offered in 1970-71)
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. This class has dealt with the evolution of the continental perimeter of North America, beginning here 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 various margins have been tied together by considering the midcontinent, the remainder of the class deals with the Precambrian. Approximately 50 per cent of the classes are seminars. A weekend field trip to the famous Arisaig section is scheduled for each fall and is intégrated into the class material. A report is required after this trip. Other trips may be planned. Emphasis will be given to specific areas of Europe. Africa and Australia.

Prerequisites: Geology 301, 302 and 303.

## 456/506 Introduction to Microneontology

## F. Medioli

Major groups of recent marine micro-organisms of particular geological interest are studied.

## 457/507 Principles of Pleistocene Geology

Seminars 2-3 hours weekly
H. B. S. Cooke

Consideration is given to the nature of snow cand ice: movement in glaciers and ice caps; glacial erosion and deposition; glacial stratigraphy, correlation and dating methods; sea level fluctuations; climate changes evidenced in non-glaciated regions; theories of ice ages.

## 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. The origin and history of these elements are discussed in detail.
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 (offered in 1969-70)
A. von 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 compration of this class may enable the student to meet the requirements of pletion of this class may enable the student to meet the requirements of
the Atomic Energy of Canada concerning scientists involved in the the Atomic Energy of Canada co
operation of particle accelerators.

## Geology Seminar

Papers are presented by guest speakers, memibers 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.

## Graduate Studies

Graduate studies leading to the degree of M.Sc. and Ph.D. can be taken in different fields of geology. These include: Appalachian geology and geophysics, economic and hydrogeology, geocheniistry and mineralogy, geophysics, instrumentation development, marine geology, Quaternary geophysics, instrumentation development, marine geology, Quaternary
and Pleistocene studies, and sedimentology. For information, see the entries under Geology, Physics, and Oceanography in the Dalhousie Calendar of the Faculty of Graduate Studies, or write to the Chairman, Calendar of the Faculty
Department of Geology.

## German

## Associate Professor

Detlev Steffen

## Assistant Professors

Klaus Fricke
Friedrich Gaede
Auguste Roulston

## Lecturers

## 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 ofered 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. Germwo classes from Classics 100, History 100, Philosophy 100.
3. 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 302, 351, 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.

## Classes Offered

## Introductory classes

Introductory classes do not require previous knowledge of German

## 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 pronounciation 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, Ubungsbuch, Harper and Row.

## 150 Intensified German

Lecture 5 hours; laboratory 2 hours
K. Fricke

This class combines the objectives of both German 100 and 200; no previous knowledge of German is required. German 150 carries two credits, equivalent to those of German 100 and 200; it is thus designed credits, equy for those students who wish to take German as their first partictive. Students who wish to acquire firm command of a year elective. Students who wish to acquire firm command of a foreign language mey to advanced language or literary classes will planning to proceed to advanced lidnguage 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 thate). Students will acquire a vocabulary of about 500 words. In seond stage, instruction will concentrate on systematic grammatithe second 10 aills, while speaking 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

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 passice voice, use of prepositions, declensions of adjectives, syntax - main clauses, dependent clauses, questions, imadjectives, syntax - main clauses, dependent clauses, questions, im-
peratives, direct speech. The knowledge required can be found in peratives, direct speech. The knowledge required can be found in
books of German 100 or Grade X, XI, XII German, and in German books of Germa
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 cral 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 instructional 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. Pefeffer, 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 rhiefly the analysis of typical sentence construction found in the reading selections, vocabulary building and sight translations. Reading material is assigned from many building and sight translations. Reading material is assigned from many
sources in the major scientific fields. Students are encouraged to sources in the major scientific fields. Students are encouraged to
bring in additional reading material of their own interest to discuss 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 Text 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 German Civilization

## Lecture 2 hours

This class gives a survey of the development of German as part of European civilization, outlining important events of German history as reflected in literature, philosophy and art. The lectures are based on literary documents or slides showing important examples of architecture and painting. One textbook serves as a guide to study of any particular topic.

## Advanced Classes

Advanced classes are based on German 200 or arı equivalent knowledge.

## 300 Introduction to German literature

Lecture 2 hours
D. Steffen, K. Fricke, R. Zeeb.

A study is made of selected texts representing major periods of German literature since the beginning of modern times in the 16th century. The class also serves as an introduction to literary criticism.
In the first term, classes will concentrate on the study of poetry. Considerable time will be spent discussing the relations between forms and motifs of poetry and the general course of history. In the second term the class will turn to a more detailed study of two periods
of German literature. For this purpose, prose and dramatic writinos by Lessing, Goethe, Kleist, Kafka and Brecht will be examined. These texts will also provide the material for discussion of various literary forms of both narrative prose and drama.
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 emblematas 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 hoursK. 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 German were influenced by classical Greek, and Latin literature, French and German Baroque writing, Cervantes, Shakespeare and 18th century English literature. There is hardly any other period in German literature that displays such a vivid awareness of the literary productions of other European nations, whether it was to free itself from their dominance or to draw inspiration from them.
The class will examine the nature and extent of these influences as this is essential if the original achievements of the period are to be evaluated. Knowledge of one of these literary fields would enable students to make considerable contributions to the progress of class work. The class includes the study of imporant 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
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 (offered in 1970-71)
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.

## 351 Composition in German

## Lecture 2 hours

## R. Zeeb

The aim of the class is to develop in students the ability to express themselves freely and correctly in different styles within the vocabulary of the present day German social, political, cultural and scientific life. The class will study the various uses of synonyms,homonyms, antonyms, idioms, different meanings of similar words and of words within changing contexts and vocabulary within selected word-patterns. Students will be required to do translations and exercises in syntax, to practise the literary styles used for personal letters and official letters and reports, and to write essays on various topics.
Prerequisite: German 200; or equivalent.

352 German Philosophy: Aesthetic Theories (offered in 1970-71)

## 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, Holderlin, 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 interpetation 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 Holderlin

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 Holderlin will be investigated. The class will examine the evolution of the main themes, motifs, and the various uses of poetical genres, structures and forms in the stages of development of a single poet, and will thus illustrate the special problems experienced by the poet.

Prerequisite: German 200 or equivalent.
400 The Period of Transition: Goethe and his Time (II) Lecture 2 hours
D. Steffen

The writings of the later Goethe and of Romanticism are studied.
The time from about 1800 to 1830 was marked by the Napoleonic era, the forces of restoration, and a society that became increasingly conscious of the discrepancy between reality and the ideals inherited from the revolution. Romantic literature and thought are both an expression of and a reflection on these changes. In this class an attempt will be made to trace the various positions of Romanticism. Romantic conceptions of poesy and reality also played a part in the writings of the later Goethe. The study of Goethe will specially consider the reasons for his departure from Classicism, his views on Romanticism, and his relation to the dominant school of German

Idealism. An examination of works by Holderlin 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 (offered in 1970-71)

## Seminar 2 hours

K. Fricke

Between 1930 and 1880, due to the industrial revolution, Germany experienced profound social and political changes. Literature of this experiencedmarily characterized as "realistic", reflects the impact of puch social forces on literary traditions and theories.
The following works representing the most important tendencies of the era will be examined: Buchner, Dantons Tod; Hebbel, Maria Magdalena; poems by Heine and Morike; 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. Zebb

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 (offered in 1970-71)

## 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 an Stress, Idealism, Romanticism. Faust does not lend itself to a one-sided method of interpretation; its complexity demands a variety of approache Its dramatical structure, the body of its ideas, its language and it symbols deserve equal attention

Discussions will concentrate on the final form of the drama. Variou 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 im portant 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 Dalhousie Calendar of the Facutly of Graduate Studies.

## History

Professors

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J. E. Flint (Chairman)
J. E. Waite
G. R. MacLean
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G. S. Granter

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

Assistant Professors
J. Fingard
D. A. Muise
P. D. Pillay
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 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 extended 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, wellchosen personal library from the large number of excellent books published in the 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 four more history classes at the 200 or 300 level.
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. history B.A. with honours in history affords considerable flexibility and The B.A. choosing a programme for study and yet provide for conscontration.
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 America: 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, African 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 101, a language, English 100, Political Science 100, together with Economics 100, if the Group D requirement has been met.

## Classes Offered

## Study 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 101. History 101 is a class concerned with Europe and its expansion overseas from the Renaissance to the outbreak of the French Revolution. It is designed for students who plan to continue in history or closely allied subjects. Thus, History 101 is similar in approach and demand to 200 -level history classes.

## 100 European History and Civilization

Lecture 3 hours (2 sections)
D. H. Cooke, P. B. Waite

## 101 Early Modern Europe and its Expansion Overseas

 Lecture 2 hours plus tutorial sectionsT. K. Hareven

## Study at the 200 level

There are no prerequisites for entry into 200 -level history classes However, History 100 or 101 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. Stud ents 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

Two 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, pol itical 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 con cerned with the background, interpretations, and methods of historians who have written about the topics under discussion.
200 Mediaeval Europe, from the fifth century to Renaissance
Lecture 2 hours plus tutorial sections
R. M. Haines

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 reatment 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 Pericd. 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 he means by which students increase their ability for thinking and understanding.

## 220 History of Canada

Lecture 2 hours plus tutorial sections
J. Fingard, D. A. Muise

## 230 American History

Lecture 2 hours plus tutorial section
P. Burroughs, D. H. Crook, J. Fingard, T. K. Hareven

## Study 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 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

## 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 and literally oriented parties and "movements" in the second half of the nineteenth century.

## 307 History of Modern Germany

Discussion/tutorial 2 hours

## D. Dtokes

History 205 provides the appropriate background for this class. Selected topics in 19th and 20th century German history, which seek to explain topics in to what extent political, intellectual, and social developments why Germany differed from those of other western European countries, in Germanined. 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, 1485-1715 Lecture/tutorial 2 hours

## H. S. Granter

History 210 provides the appropriate background for this class which examines the two great English revolutions in church and state, the Tudor and the Puritan. The theme is how the impact of these two revolutions shaped English society and government, and gave it the characteristics which endured until the nineteenth century and which, in certain particulars, still endure.

## North American History

## 320 Church and State in Canada

Lecture/tutorial 2 hours

## J. Fingard

History 220 provides an appropriate background for this class, which considers the establishment and development of organized religions
and religious beliefs in Canada, and their influences upon Canadian institutions constitutional history, social development and educational

322 Canadian Economic History
N. H. Morse
(for details see Economics 302)
327 History of Nova Scotia
Lecture/tutorial 2 hours
D. A. Muise

History 220 provides the appropriate background for this class, which considers the evolution of Nova Scotia as a political, social, economic and cultural unit from its earliest beginnings to the present. Students will be expected to prepare and present papers using original sources.

## 331 American Society and Culture

## Lecture/tutorial 2 hours

T. K. Hareven

History 230 provides the appropriate preparation for this class, which considers major aspects of American society and thought, their relationship to economic and political developments and their expression in art, literature and religion.

## 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 con sideration of Christian and Islamic influences. The second term emphasizes the effects of contact with Europe, the slave trade, the 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 History from Canadian history. The class concentrates on the period theme the British acquisition of Cape colony, and examines the developments of relationships and tensions between the English and Afrikaans ments speaking groups, and topics considered are the rise and fall of the Zulu nation, 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. Study at the 400/500 level
Classes numbered 400/500 in history are primarily intended for grad ate 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 want 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. Arnong the topics treated are the German party system, the growth of anti-democratic thought, the political role of the army, the ideology of Nazism, the 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

## Seminar 2 hours

R. P. Bonine

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

## 412/512 Economic History of Pre-Industrial Europe

J. M. Beauroy
(see Economics 412/512)

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 "Imperialism", 1870-1914
J. E. Flint

This seminar considers the themes and problems of imperialism, its economic background, political and international aspects and its ide. ology. 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
P. D. Pillay

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.

421/521 History of Canada, 1896-1968
D. A. Muise

Some themes to be followed include: the growth of modern political parties, Canadian-American relations, Federal-Provincial affairs, social
and economic developments. Students will be expected to prepare 424/524 Canadian Constitutional Law IV. 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 colovelopment of the four Atlantic colonies. Students will be required dovelopite 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 Scotian governmental and political institutions, and with the current state of Nova Scotian politics.

## American History

431/531 The American Revolution, 1763-1787
P. Burroughs

This seminar class studies the causes of the American Revolution and the framing of the constitution

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 develop ment from the end of the post Civil War reconstruction to the begin. ning of Wilson's second term.

## 434/534 The United States, 1916 to the Present

T. K. Hareven

The seminar studies the political, social and intellectual developments in twentieth-century America. Emphasis is given to the role of the city and to reform movements. There will be discussions of major interpretations and research papers will be prepared from original sources.

## 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 varied in accordance with individual student requirements.

## Graduate Studies

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

## MATHEMATICS

## Professors

M. Edelstein
A. J. Tingley (Chairman)

Killam Research Professor
F. W. Lawvere

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

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

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 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 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 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 gave 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 ar 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: $0,1,2,3,4,5,6, \ldots$
1, $2,4,8,16,32,64, \ldots$
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" says 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 discover the $\sqrt{ } 2$ 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 of 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
sane 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 whis century the German mathematician David Hilbert investigated of properties of what we now call "Hilbert Space" which is another the proct mathematical structure. It was not for a number of years after abstract mat the physicists found that this was precisely what was needed that, describe "quantum mechanics".
Thus, mathematics is a study of abstract patterns and relationships, Thus, 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 hou wh 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: $\log , a b) \xlongequal{=} \log a+\log b$.
In university, the emphasis is on why this equation is true, what does "log" mean? It might be said that university mathematics courses fall into three types, with much overlap and fuzziness at the edges.

1. A deep analysis of a particular kind of mathematical structure. For example, a class with a title like "Real Analysis" is usually a For example, a class with a titled 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 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 mathernatics 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 mathematics, and those who register for other degrees who intend in 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 course 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

1. Mathematics 100.
2. English 100.
3. One class from Group A.
4. One class from group C.
5. One class from Group D in addition to Mathematics 100.

## Year II

6-7. Mathematics 200 and 203.
8. One class from Group B.
9. One class from Group C.
10. Elective.

## Year III and Year IV

11-17. 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.
18-20. 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 head 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 elegular 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 Is 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 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; tutorial 1 hour
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 distance travelled by a body moving in a straight line at a constant volocity v is given by the formula $\mathrm{s}=\mathrm{vt}$. 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 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

## M. J. L. Kirby

This class provides a survey of mathematical techniques which are useful in analyzing mathematical models in the social sciences. The material covered in the class is similar to that presented in Mathematics 100. However, certain topics (such as trigonometric derivatives and integrals) which are included in Mathematics 100 are not covered in Mathematics 110. In their place Mathematics 110 includes an introduction to matrix algebra, differential equations and difference equations.

This class is intended as a survey class for students who are not This to take further work in mathematics. Students who are going going take other mathematics classes should take Mathematics 100 rather to take Mathematics 110 as Mathematics 100 uses a more rigorous than Mathematical approach. Throughout the class, applications of mathemathemal techniques to social science problems, particularly economic matical problems, will be stressed.
prob
Prerequisite: High school mathematics.
200 Intermediate Calculus
Lecture 3 hours
K. V. Menon, S. Swaminathan

It is assumed that students taking this class have already acquired some knowledge of calculus. Conceptual aspects will be treated, while stress is laid on manipulative techniques which lend themselves readily to applications in physics and engineering.

Topics include: real number system, continuous functions and their fundamental properties, partial derivatives and applications, convergence and divergence of infinite series, power series, double integrals, functional determinants, geometry of euclidean vector spaces with emphasis on three dimensions, elementary differential equations.

## Prerequisite: Mathematics 100.

## 202 Basic Concepts of Mathematics

## Lecture 3 hours

## E. L. Heighton

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 algerbraic 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 concepts underlying the real number system and the fundamental notion
of analysis, the limit concept, is considered. Complex numbers are defined and some properties of elementary functions studied using complex numbers as their domain of definition.

## 203 Linear Algebra

## Lecture 3 hours

## C. Atherton

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.
The 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 (not offered in 1969-70)

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 gcometries obtained by means of absolute conic.
Prerequisite: Mathematics 100.

## 206A Probability and Mathematical Statistics

## Lecture 3 hours

## A. J. Tingley

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 perdict accurately whether or not it will ain 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, test 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.

## 260B Probability and Mathematical Statistics

## Lecture 3 hours

## A. J. Tingley

This class is more sophisticated mathematically than is 206A. Rigorous roofs are given of many of the results introduced heuristically in proors Additional topics, including linear regression, linear correlation, 201. analysis of variance are introduced. It is expected that a student and anampletes this class will be able to examine statistical literature who completes in connection with problems in statistics which arise in effectively ind that he will have a basis for further work in this field
Prerequisite: An understanding of the elemerts of differential and integral calculus to at least the level of Mathematics 100

## 220 Applied Mathematics

## Lecture 3 hour

E. Blum

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 skills 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

J. R. Baines

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 $\mathrm{x}=1$ is a solution of the equation $\mathrm{x}^{5}-\mathrm{x}=0$. However, a similar approach to a solution of the equation $1.9 x^{5}+2.6 x^{2}-9.3=0$ 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 phen omena. The prerequisite is a working knowledge of calculus. A majo 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 1969-70)
Lecture 3 hours
This class is designed to give the student the mathematical background for a good understanding of the universe and a solid foundation for possible further study or admission to the naval or air forces. It provides up-to-date information about recent achievements in stellar astronomy. The history of the development of astronomical thought from ancient times to the present will be considered in connection with the presented material.
The class starts with geometrical considerations about the sphere, spherical coordinates and some concepts of spherical trigonometry. Then the topics, celestial sphere, diurnal motion, equatorial coordinates, 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 coordinates.
Prerequisite: Mathematics 100, which, with the consent of the instructor, may be taken simultaneously.

240 Introduction to Computer Science
Lecture 3 hours
J. Lions

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

Topics discussed include: Fortran programming; algorithms; comTopics dise computer systems; a simple, hypothetical computer; prepponents of machine language programs; random numbers, statistics aration of machuber generators; computer simulation; some aspects and random number generators; computer simulation; some aspects of the COBOL prog
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 Dirkson, Graham, (PrenticeHall, 1968).

## 300 Introductory Analysis

## Lecture 3 hours

## M. Edelstein

The main object 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

K. V. Menon

The existence of parallel theories in different subjects indicates that there is an underlying unified theory. Number theory, group theory there is an underlying unified theory. Number theory, group theory and formal algebra have been connected 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: 1. N. Herstein, Topics in Algebra.

## 304 Foundations of Analysis

Lectures 2 hours

## A. C. Thompson

The purpose of this class is to try and give students some understanding and appreciation of some of the ideas which are the basis for all mathematics but, more particularly, of those which are fundamental for analysis and topology. In so doing, it is hoped that the student will gain further insight into what mathematics is about.

## Class Outline:

(a) The definitions and manipulation of set-theoretic symbols.
(b) A careful study of "relation" and in particular, of "equivalence relations", "partial orders" and (above all) "functions".
(c) A study of cardinal and ordinal numbers and their arithmetic. (d) An introduction to formal logical reasoning. This part is designed to give an adequate introduction to symbolic logic without being too technical.
(e) A discussion of the axiomatic nature of much modern mathematics
(e) A discussion of the axiomatic nature of much modern mathematics.
(f) A list of axioms for set theory with a discussion of the role of the (f) A list of axioms for set theory with a discussion
Axiom of Choice and some of its equivalent forms.

Axiom of Choice and some of its equivalent forms.
(g) Peano's axioms for the natural number system.
(h) The construction of other number systems (integers, rationals and reals).
(i) A discussion of the real number system with particular emphasis on the "completeness" axiom.
(j) The topology of the real line (compactness, connectedness) and (perhaps) of more general metric spaces.

The only requirement for the understanding of the class is a certain mathematical maturity, i.e. some facility with formal mathematical reasoning and an acquaintance with one or more abstract mathematical system, such as "group" or "vector" space. Some knowledge of the real number system is also needed. It is advisable, therefore, for the
intending student to have taken Mathematics 200 and Mathematics 203 but these prerequisites may be waived with the consent of the instructor.

305 Differential Geometry and Tensor Analysis

## Lecture 2 hours

In differential geometry the properties of curves and surfaces are investigated by means of calculus. The subject has various relations to ther fields of pure and applied mathematics: on the other hand other fifferential geometry forms an essential part of physics and geodesy difeeasurements of the earth's surface) and on the other hand it is (measurem connected with differential equations, the calculus of varivery much Its results are of a symmetric form and inspired generations, etc. ations of mathich 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, tensors, differentiation and the displacement of Levi-Civita.
The class requires knowledge of matrices, determinants, the techniques of calculus, power series, some ordinary and partial differential equations.
Prerequisite: Mathematics 200 and Mathematics 203.

## 306 Probability

## Lecture 3 hours

The class is intended to assist the student to acquire as thorough an understanding of basic concepts in probability as is compatible with his mathematical background. Statistical concepts will be developed where they arise as direct applications of the topics in probability under consideration. In this way students receive a brief introduction to tests of significance, confidence limits and major sampling distributions. Interesting topics such as "random walk" will also be studied to describe the empirical background and to illustrate the great variety of practical applications of probability.
The aim is not only to introduce probability and statistics but also to prepare the student for further studies in this area. 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 recurrent events, Markov chains, sampling from a finite population derivation of $x^{2}$, Student's t-and $f$-distributions, estimation from, samples, tests of hypotheses.
Prerequisite: Calculus to at least the level of Mathematics 200.

## 312 Differential Equations

## Lecture 3 hours

E. Blum

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 laws of universal attraction, Kirchhoff's law 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 studied 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. It contains various applications, e.g. most of the above mentioned problems, the motion of a satellite, etc. The part of the class which problems, the motion of a satellite, etc. The part of the class which
deals with ordinary differential equations includes the topics: linear deals with ordinary differential equations includes the topics. incar
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 normall skill in partial 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
H. Brunner

Topics to be discussed will include:
a) Lagrangian interpolation: interpolating polynomial, error term,
finite difference interpolation formulas, Hermite interpolation.
finite Niffereal differentiation: extrapolation to the limit, numerical b) Numerical closed and open Newton-Cotes formulas, error, orthogonal integration: Gaussian quadrature, Romberg integration.
polynomiarical integration of ordinary differential equations: Euler's c) Numeralor expansion methods, methods of Runge-Kutta type, method, extrapolation to the convergence.
error, stability and convergence. d) Functional approximation: least-squares techniques, curve fitti
d) Fun-maximum error techniques, Chebychev approximations.
minimum minimunlinear equations: elementary methods, Newton-R
e) Non polynomials, Bernoulli's method, QD-algorithm.
f) Systems of linear equations: Gaussian elimination, matrix decomposi. tion, Cho and overrelaxation.
relaxatenvalues and eigenvectors of materices: basic theorems, eigeng) Eigen symmetric matrices, Jacobi's method, Given's method, values of of symmetric matrices, triangularization of a matrix, eigenvectors of tridiagonal matrices.
Prequisites: Mathematics 200 (or equivalent class). The student has Pre equisites: 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, ctc. 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

## H. Brunner

Tovics 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 Rung-Kutta type, Lagrangian interpolation, numerical intergration 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 d) Eigenvalues and eigenvectors of matrices: basic theorems, numerical
methods for symmetric matrices, application (svstems of ordinary linear methods for symmetric matrices,
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 equation), numerical methods for linear second-order equations.
f) Fourier series and integrals: orthogonal functions.
g) Special functions from mathematical physics: B-function, function, Fresnel integrals, asymptotic expansions, Bessel functions.
Students offered Mathematics 328 will not be given credit for Mathe matics 220 or 300 .
Prerequisite: Mathematics 228 or Mathematics 200 or equivalent class.

## 330 Linear and Integer Programming with Applications

 Lecture 3 hours
## M. J. L. Kirby

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 optional 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 and 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 to novel or ingenious approach.

## 340 Data Structure

Lecture 3 hours
Y. Tsang

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 The class for data; the storage system with allocation and collection; structures techniques; list processing techniques in high level programming language; generalized data management systems. Examples of large ing language, 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 averging process. A rudimentary knowledge of modern algebra, set theory and the theory of metric spaces is presupposed. The theory of theory and the theory of metric spaces is presupposed. The theory
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 eximples 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 Complex Variable

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 dornain. 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 ${ }^{00}$ ) 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, Rie mann surfaces, Laurent series, theory of residues, meromarphic 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

## K. V. Menon

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
R. P. Gupta

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
tatistics competently in such fields as the social sciences, biological ciences and medical sciences. After this class, every branch of statistics sciences
will be open for further study.
The topics covered will include the following: point estimation, consistent, sufficient, efficient and unbiased parameters, methods of maxsistent, likelihood, method of least square, method of moments, method of minimum $x^{2}$, minimum variance unbiased estimation, interval of timation minimax and Baye's estimation, Neyman-Pearson's lemma, estimation, hypotheses, goodness of fit tests, likelihood ratio tests, critical composite cally most powerful tests, non-parametric tests.

Prerequisite: Mathematics 200 and 306.
410 Decision Theory and Theory of Games (not offered in 1969-70)
Lecture 2 hours
R. P. Gupta

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 decisionmaking 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, tmpirical 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

## S. Swaminathan

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 linea algebra, however, the notion of "distance" plays a crucial role, f example, in the function space mentioned above the distance betwee two functions $f$ and $g$ is given by sup $\{|f(x)-g(x)|:$ xe $[0,1]$ and hence the mappings which are studied in functional analysis are the continuous linear mapping.
Thus, functional analysis brings together algebra, analysis and topology and much of its interest lies in the richness of mathematical structury involved and the interplay between, for example, the algebraic and tres topological notions. Though there is a good deal of topology ind 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 "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 HahnBanach theorem.
f) The properties of continuous linear functions from one normed vector space to another, (the uniform boundedness principle and
closed graph theorem).
It should be pointed out that in (d) and (f) not only are continuous linear functions studied "individually" but the space of "all" of them is also an object of study.
g) Continuous linear functions from a normed vector space into itself are studied in detail. This is sometimes given the name ."spectral theory" and contains the theory of eigenvalues and diagonalization of matrices.
Prerequisite: The indispensable requirements for understanding this class are a thorough knowledge of linear algebra (Mathematics 203) and real analysis (Mathematics 300).

## 418 Introduction to Algebric Topology <br> Lecture 2 hours

## M. Edelstein

The topics of this class will include: classification of compact surfaces, the fundamental groups, Seifert-VanKampen theorem, covering spaces,
implicial complexes, subdivision and approximation, fundamental group simplicial cicial complex, simplicial homology theory, relative homotopy of a simplive homology groups, remarks on general homology theories.

Prerequisite: Mathematics 300.

## 419 General Topology

Lecture 2 hours
The word "topology" is derived from the Greek word meaning "place", "position" or "space", thus topology is the science of space and a "position" sub-disciple of geom in common with analysis in the area of functional tions and develops in common with analysis in the area of functional andlysis. Topology is also related to algebra in that it uses material
from linear algebra. It is, therefore, the purpose of this class to provide from linear algebra. It is, therefore, the purpose of this class to provide
an account of the essentials of topology and supply many of the prerequisites for the studies in algebra, analysis and geometry which depend on it.
Extensive use is made through the class of the notion of filters, and properties of the lattice of filters. The early part of the class is devoted to the study of properties of a single topological space: characterizations of topological spaces by operators, separation axioms, subspaces, cornpactness, connectedness and related concapts, matric spaces, the lattice of topology. Later in the class, mappings are introduced which arve to relate different topological spaces. These spaces are characterized by means of their possible embeddings and representations acterized by means of their possible embeddings and representations
as images under continuous maps. The problem of extensions is treated in great generality, thus yielding the well known types of exiensions as special cases and allowing a simple treatment of the completions of metric and uniform spaces, various compactifications, representation theorems, and a study of uniform structures is presented in this connection.
Prerequisites: A knowledge of: the theory of sets, relations, functions and the real number system; cardinal and ordinal arithmetic; the axiom of choice in its several disguises, and some degree of mathematical maturity.

421 Eigenvalue and Boundary Value Problems (not offered in 1969-70)
Lecture 2 hours

## J. R. Baines

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 the instructor

## 430 Analysis of Inventory Systems

Lecture 2 hours
M. J. L. Kirby

As in mathematics 330, this class discusses terhniques for solving a class of operations research problems. The problems considered here are concerned with making optional 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 setled 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 partic ular 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.

Prerequisite: 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 Dalhousie Calendar of the Faculty of Graduate Studies.

## MUSIC

## Associate Professo

David F. Wilson

## Assistant Professors

Vernon Ellis, (Music Education) Denis Farrell (Theory)

## Instructors

H. Philip May (Voice)

Maitland Farmer (Organ)
Eleanor Ritcey May (Piano)
Constance Hubley (Piano)
Ninette Babineau (Violin)
Adam Mueller (Cello)
John Denault (Bass)
Jenk Komst (Clarinet
Henarles Cornish (French Horn)
Charles Cornish (French Ho
Chalmers Doane (Trom
Max Ball (Percussion)
Instructors in Flute, Oboe, Bassoon and Trumpet to be appointed
Since music, like science and other areas of Jearning, has become an immense field of specialized knowledge open only to those who have had a comprehensive musical education, music making in our contemporary society demands more than a mere technical command of voice or 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 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 work. shops 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
Renaissance Singers and Consort-David Wilson, director
Chamber Ensembles-Vernon Ellis, Ninette Babineau
Recorder Groups-Vernon Ellis
These ensembles are open to all qualified students in the University.

## Art 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 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 east of Montreal. A close relationship ${ }_{l}^{\text {con been established between public schoois and the University which }}$ has will give students an opportunity to be taught by specialists who are witive in public school teaching, and to observe and teach in firmly
act active ished general music, orchestra and band classes.
etablished
By arrangement with the Nova Scotia Department of Education, studBy arrangleting this course receive a Teacher's Certificate (Class 5).
ents

## Year I

1. Music 140
2. Music 100
3. Music 210
4. English 100.
5. An Arts elective

## Year II

6. Music 240 .
7. Music 245.
8. Music 200.
9. Music 310
10. Arts elective

During the course of the year, students will be expected to observe selected classes in elementary and secondary schools in the area.

## Year III

11. Music 340.
12. Music 345
13. Music 410
14. Education 101
15. Music 330.
16. Music 335

## Year IV

17. Music 440.
18. Music 445
19. Music 445.
20. Music 420
21. Education 6.

21 Music 430.
21. Music 430.
22. Music 435.

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

## General B.A. with Major in Music

## Year I

1. Music 140
2. Music 100 .
3. English 100.
4. A class in a language.
5. A class in social sciences.

## Year II

6. Music 240
7. Music 210.
8. A class in the humanities.
9. A class in social sciences.

Students without science matriculation.
10. A class in the natural sciences.

Students with science matriculation.
10. An elective or a class in the minor subject.

## Year III

11. Music 310.

12-13. Two classes in music beyond the 100 level.
14-15. Two other arts classes beyond the 100 level.
Participation in instrumental and 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). These classes may be followed by advanced classes in music history and literature.

## B.A. with Honours in Music

## Year I

1. Music 140.
2. Music 100.
3. English 100
4. A class in a language.
5. A class in the social sciences.

## Year II

6. Music 240.
7. Music 200.
8. Music 210 .
9. History 100 .

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. Music 340.
12. Music 310.
3. A class in the social sciences
14. 15. Two classes in a language and/or the humanities.

## Year IV

16. Music 410.
17. Mus, Three additional advanced classes in music.
18. An arts elective to conform with the overall requirements for an honours degree.
Participation in instrumental and choral ensembles is required of all students.

## Classes Offered

## Music History and Literature

100 History of Music Survey
Lecture 3 hours; seminar 1 hour
D. F. Wilson

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 on Page 216).

105 History and Appreciation of Music (previous Music 101) Lecture 3 hours

## D. F. Wilson

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 collection of
records is available for listening practice. The instruments orchestra are discussed and demonstrated by members of the At the Symphony, and live demonstrations of music are incorporated intic the class whenever possible. Instruction in the rudiments of into (notation, scales, intervals, chords) is included in the class of music (or Music 100) must be taken by students minoring in class. The class not be taken by students majoring in music. 200 History of Music

## Lecture 3 hours

A detailed study of the history of music including the study an analysis of works of all periods.

Prerequisite: Music 100 or 105 and Music 205 or 210. Students may with permission, take Music 205 or 210 concurrently with Music may, Students should be familiar with the forms, composers and music 200 styles of all periods of music from 100 A.D. to the present musical harmony up to and including dominant seventh chords and modulation; they should be able to identify music aurally by style and period.

## 301 History of Opera and the Symphony

Lecture 3 hours
The development of opera from 1590 to the present and the development of the symphony from 1720 to the present. Detailed study of representative work of all periods.
Prerequisite: Music 200 or permission of the instructor. Students should have a comprehensive understanding of the history of music and of eighteenth and nineteenth-century harmony.

## 400 Music History Seminar (offered in 1970-71)

Lecture 2 hours

Advanced study of selected periods of music.
Prerequisite: Music 200.

## 402 Music in the Twentieth Century (offered in 1970-71)

 Lecture 3 hoursThe development of music from the late nineteenth century to the present, with a study of the leading composers of the twentieth century.
Prerequisite: Music 200, 310. Students should have a comprehensive understanding of the history of music and of at least eighteenth and nineteenth-century harmony.

## Music Theory

## Theory Fundamentals Programme

As from September 1969, all students enrolled in either Music 100 o As from 210 will be given an examination in the rudiments of music This examination will take place during registration week and will be This ex on the materials covered in the programmed text:Scales, Intervals, based ond Triads by John Clough, published by the W. W. Norton Co Keys and to entry into these music classes.

## 205 Materials of Music

Lecture 3 hours
A class in elementary music theory for students taking a general A class. 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

## D. M. Farrell

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 harmony, 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
D. M. Farrell

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 tone figured bass, keyboard harmony, sight-singing, dictation and training to the level achieved in Music 210

## 410 Theory of Music

Lecture 5 hours
D. M. Farrell

A study of partwriting, analysis, composition and keyboard harmony in twentieth-century techniques, Baroque and nineteenth-century counterpoint, advanced rythmic, harmonic and melodic dictation, sight-singin and theory pedagogy.

Prerequisite: Music 310. Students should be familiar with eighteenth and nineteenth-century harmony and analysis, Renaissance counterpoin keyboard harmony, sight-singing and dictation to the level achieved in Music 310.

415 Seminar in Analytical Techniques (offered in 1970-71) Seminar 2 hours

The study and analysis of representative examples of music of the Baroque, Classical, Romantic, and Modern 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.

Prerequisite: Music 200 and 310
420 Orchestration and Conducting (offered in 1970-71)

## Lecture 3 hours

The study of the properties of the individual instruments of the orchestra and methods of combining instruments in small combinations and full orchestra, together with a study of orchestral and choral conducting.
Prerequisite: Music 100 or 105: Music 205 or 210.

## Music Education

(Open only to Music Education students)

## 330 Elementary and Secondary Vocal Methods

Lecture 3 hours
V. A. Ellis

A study of classroom techniques and materials for teaching using the A study of of Music" adaptation of the Kodaly approach, the Orff Thethod and other systems currently in use at the elementary level; the method the music consultant in elementary education; professional role of thips; programme development: general music programmes relationships; programme development gevels.
. .te. Music 100, 310, and Choral Techniques I. Students Prerequisite: should 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.

## 335 Practice Teaching

75 hours of supervised teaching in the public schools.
430 Instrumental Methods (offered in 1970-71) Lecture 3 hours
A siudy 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 245, 310.

## 435 Practice Teaching (offered in 1970-71)

75 additional hours of supervised teaching in the public schools.

## Applied Music

(Open only to students majoring in music)

## 140 Instrumental or Vocal Study

Private instruction in the student's major applied music subject (instrument or singing) and class or individual instruction in secondary piano. Students offering piano or organ as their principal instrument will substitute Accompaniment and Score Reading I for Secondary Piano.
Prerequisites: The standards of performance required in each applied music subject are published by the Department of Music.

## Music 240, 340, 440 Instrumental or Vocal Study

A continuation of Music 140 with private instruction in the student's major applied music subject (instrument or singing).

## Music 245, 345, 445 Secondary Studies

A series of classes in secondary applied music subjects (instrumen or singing) for education students. The series is made up of $t$ classes listed below. The actual classes that are taken, and the orde in which they are taken, depends on the student's major applie music subject. Details may be obtained from the Department of Musi

## Secondary Piano

E. May, C. Hubley

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

## Accompaniment and Score Reading I and II

Lecture 1 hour
V. A. Ellis

A study of the art of accompaniment, and practice in reading choral and instrumental scores at the piano. For piano and organ majors.

## Choral Techniques I and II

Lecture 1 hour
H. P. May, D. F. Wilson

A basic study of vocal production and of rehearsal and vocal techniques as applied to choirs.

## String Class I, II an III

Lecture 2 hours
N. Babineau

Class instruction on stringed instruments, using the Bornoff method The three year course of study will include 50 hours of instruction 0 violin, 50 hours on cello, 25 hours on viola, and 25 hours on doublebass.

## Brass Class

Lecture 1 hour
Class instruction in the playing of brass instruments.

## Woodwind Class (offered in 1970-71)

Lecture 1 hour
Class instruction in the playing of woodwind instruments.

Pe cussion Class and Secondary Wind Ensemble (offered in
$1970-71$ )
Lecture 1 hour
The playing of secondary wind instruments in ensemble, and class The plions on percussion instruments.

Recorder Class
Lecture 1 hour
V. A. Ellis

Class instruction in the playing of recorders.

## 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 underlyind crustal structures. Career oceanographers are presently employed in Canada in a few universities and in various federal laboratories tha are engaged in both basic research and applied problems which mee national need, such as fisheries investigations, exploration for offshor a national need, such as fisheries investigations, exploration
mineral resources, and studies of ice in navigable waters.
A good background in basic science is a necessary prerequisite, followe by specialization in oceanography at the graduate level. Dalhousi is one of three Canadian universities offering M.Sc. Dathousi programmes in this subject. However, properly prepared unde graduates are permitted to take one or more of the classes as under There is an introductory class which more of the classes as elective advanced classes in each of which surveys the entire field, and chemical ocean in each of the major specialties - physical and geophysics. Further details about this programme are given in the Dalhousie Calendar of the Faculty of Graduate Studies

## 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

## 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 100. Philosophy has concerned itself in the past with a number of
traditional questions. For example, are men in any sense free, or are 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, etc.? Again, have men souls which might conceivably survive death,
or is individual life merely an emergent quality of matter doomed to 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 generalization from experience? Then there is philosophical theology. Can any reasonable proof be given of there is philosophical theology. Can any reasonable proof be given of
God's existence? Finally, there are many problems of an ethical kind. God's existence? Finally, there are many problems of an ethical kind.
For example, is there an absolute morality or all ethical standards For example, is there an absolute morality or all ethical standards
relative to the society in which they are practised, and the time when 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, whichever 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 require. ment 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 language (French or German or Latin or Greek), a social science, unless exempted, English and 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 the 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 $320^{1}$.
13. One other class in philosophy
14. A class in the minor subject.
15. Elective.
16. 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 until the fourth year, and another class in philosophy taken in its place

## Year IV

16.18. Three classes in philosophy including Philosophy $320^{1}$ if not 16.18 taken.

19-20. Two electives.
NOTE: The effect of the general regulations for the degree of B.A NOTE: The efs is to require the inclusion among the ancilliary classes with Honours 100 or History 100, and a class in a second subject in of Classics 10 . There will be a comprehensive examination at the social science. end of the final year. arranged individualy in consultations.
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. M. Campbell, R. M. Martin

Ouestions like the following have perplexed western philosophers since the time of ancient Greeks: What is the nature of the human soul? Is it immortal? Is our apparent freedom to make decisions and to choose among alternative courses of action really an illusion? Are value judgments always subjective, depending upon one's personal 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

1. 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.

## 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.

Students 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, 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 TimeTable. Of these 16 assigned hours, no more than 12 will normally be assigned to class-room work in any one week, the re-
maining 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 in the University and in the wider local community, before their personal preferences. Students vol untarily 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.

## First Year

Old Testament 501
New Testament 501
Greek New Testament 501
Dogmatics 501
Pastoralia 511
Pastoralia 522
Pastoralia 514
Pastoralia 525
Pastoralia 506
2 elective hours
Second Year
Old Testament 602
Greek New Testament 602
Church History 602
Dogmatics 602
Liturgics 602
Pastoralia 607
Pastoralia 608
Pastoralia 609
2 elective hours

## Third Year

Dogmatics 703
Church History 703
Pastoralia 703
Pastoralia 706
Pastoralia 709
5 elective hours

## RELIGOUS 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 Divinity, in their first and second years. Other students, men forward to is no fee.

Religious Knowledge 101-1 hour a week (1969-70)
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, New and Nestaments, with particular attention to the relevance the authority of the Bible for Christian faith.
(A) OLD TESTAMENT

Old Testament 501 - Two sessions a week, both terms (1970-71).
The history and literature of Israel from earliest times the Theding its religious, political and cultural development. Tests on the contents of the relevant English text of the Bible will be given in this the following English Bible courses
Old Testament 612 - Two sessions weekly, first term (1969-70). Judaism in the post-exilic period. aism in the post-exilic period.
Old Testament 723 - Two sessions weekly, second term (1969-70). literature with an introduction to Nurvey of the relevant intertestamental

Hebrew 501 - Two sessions weekly, both terms (1969-70). Elective.
Pine Hill. Grammar and Translation: Ruth
Hebrew 602 - Two sessions weekly, both terms (1969-70). Elective.
Pine Hill. Selected prose extracts.
Pine Hill. Selected prose extracts.
Hebrew 703 - Two sessions weekly, both terms (1970-71). Elective.

## (B) NEW TESTAMENT

New Testament 501 - Two sessions weekly, one 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 required of those who have taken Greek for their B.A.).
An
Greek New Testament 501 - Two double sessions weekly one term. Pine Hill for 1969-70). Introduction to Textual Criticism.
Greek New Testament 612 - Two sessions weekly, first term (1969-
70). The Fourth Gospel.

Greek New Testament 703-One hour a week. Elective, T.B.A.
Greek New Testament 704 - One hour a week. Elective, T.B.A Revelation.

## CHURCH HISTORY

The Courses listed assist the student to fill in for himself the general outlines en Church History. They concentrate on a number of theme which run throughout the centuries: the Church and its Mission, it Society, the State and Reform; the Church and its Intellectual Develop ment.

## REQUIRED COURSES

Church History 522- Two sessions weekly, second term (1969-70) English Church History from its beginning to the present day.
Church History 603 - One hour a week (1970-71) Reformation. Canadian Church History. from and including th ELECTIVE COURSES
Church History 604 - Two sessions weekly both terms. Primacy.

Church History 725 - Double session weekly second term Continental Reformation and Counter-Reformation.

## CHRISTIAN DOCTRINE

The two basic courses together (Doctrine 501 and 602) provide an in troduction to the five major departments of systematic Christian though viz., Theology, Christology, Pneumatology, Ecclesiology and Eschatology,
Patristic, Medieval and Reformation periods is outlined, leading to an Patristic,
assessment of its place in Christian thought to toyy. The doctrines of
the Church, the Ministry and the Sacraments are dealt with in the first解 of their vocation from the beginning of their course in the Faculty o Divinity.

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

Doctrine 501 - 1970-71
The Church, the Ministry and the Sacraments; Man, Sin and Grace; Eschatology.

Doctrine 602 - See Pine Hill Systematic Theology III. Unity; doctrine of the Atonement.

Doctrine 503-Elective T.B.A
The Church in the Present Age. The Theology of the Church Today problems of Exumenical co-oper in a Secularized Culture.

Doctrine 604 - Elective T.B.A.
Theology in the Present Age. Contemporary theologians, with special reference to the influence of Karl Barth and Paul Tillich; critique
School.

Doctrine 705-Elective T.B.A. thought, with special reference to Christology, from Gore, Thornton

## 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 reform, into the present,-and especially, for us, in the Bookg the Reform, into 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 REQUIRED COURSES

Liturgical Theology 501 - 1970-71.
(1st term: A rapid survey of Worship, from the early Christian period, to 1544. $\qquad$ Worship 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" 1969-70). ELECTIVE COURSES

Liturgical Theology 612 - Two sessions weekly, first term
The history and analysis of Christian Worship from the The history and analysis of Christian Worship from the earliest days,
rites.

Liturgical Theology 723 - Two sessions weekly, second term. cumeology of Worship, and a survey of various rites existing in the

Liturgical Theology 704-One hour a week.
Seminar: an in depth discussion on a topic to be chosen in consultation with Professor Stone.

## PHILOSOPHY OF RELIGION

Philosophy of Religion 501-1970-71
wo hours a week. An introduction to the philosophy of religion
Philosophy of Religion $502-$ (Philosophy 225 at Dalhousie) 196970. 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 recommended.

## PASTORALIA

Pastoralia is concerned with all matters affecting the relationship between pastor and people, and questions involved in relating the eternal essential theological learning with instruction and experience in coment unicating this learning. They also seek to assist the intending pastor to work co-operatively with his peers and with colleagues in pattor
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 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 Admin stration 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 doüble sessions weekly second term.
Pastoralia 609 - Two afternoons a week one term. Supervised
Pastoral Education. al Education
THIRD YEAR
Pastoralia 703 - Two sessions weekly both terms. Conduct of
Church Service, use of the Prayer Book, and church meetings 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 setting (hospitals, community projects, parish, etc.) Each student will normally participate both terms and gain credit thereby for an elective course



## 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 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.

## SPEECH ARTS

## Lecturer:

Stella Kryszek, L.G.S.M., Gold Medalist, L.A.M.D.A., S.R.N.
Voice Production, Drama. Prose. Poetry. Choral Verse Speaking. Public Speaking. Parliamentary Procedure. Correction of Speech Defects

There are two terms of four months each. Sixteen lessons are given each term. First Term begins September, 1969; Second Term begins January, 1970

## TUITION FEES

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

## SYLLABUS

BREATHING:
Relaxation - development of intercostal diaphragmatic ntrolled breathing.

VOICE:
Development of good vocal quality. Projection of the voice. Elimination of nasal, throaty, guttural or thin tone, and voice strain.

Articulation, Enunciation and Pronunciation.

## OCAL EXPRESSIVENESS:

Training in correct use of phrasing, emphasis, pause and modulation.

## LANGUAGE:

Study of the fitness of words, and smoothness of transition.

## RHETORIC:

The construction and presentation of an address. MICROPHONE TECHNIQUE

## LECTURESHIPS

The Archbishop Hackenley Rural Lectureship
(A Diocesan Synod of Nova Scotia Foundation, with a supervisor appointed by the Synod and the Divinity Faculty and acting under the guidance of the Dean of Divinity).

This course is available to all students and priests and will consist of lectures on the Church's relation to the Rurai Community, and seminars and conferences on the rural pastoral ministry, and the supervision of students working in rural parishes. This course will be integrated with the Dioeesan Rural Training School.

## Aillantic Summer School of

 Advanced Business AdministrationJune 22nd - July 26th, 1969

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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 1969 the School will be held from June 22nd to July 26th

The purpose of the School is to provide further training at an advanced level for those who are already engaged in at an advanced level for those who are already engaged in ork in the business world. Instruction is offered, under ne tutelage of a staff drawn from the Harvard School of icy, Financial Analysis and Control, Labour Problems, Marketno Problems, and Government Policy and The Canadian Econ omy.

Admission to the School is by recommendation from the firm which employs the student and participation is invited rom all sizes and types of companies. There are no formal ducational requirements, but it is expected that sponsors intelligence, industry and interest in their jobs, experience, inteligence, industry, and interest in their jobs, will profit rom 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 $\$ 1,300,00$ for the ive 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., nd 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.

## Instifute of Pastoral Training

University of King's College Pine Hill Divinity Hall

Divinity School of Acadia University
Presbyterian College, Montreal
Medical Faculty of Dalhousie University
The organization of the Institute in collaboration with Pine Hill Divinity Hall, the Divinity School of Acadia Uni versity, 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.

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 u1) 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 pletion the courses from bona fide enquirers belonging to other professions are welcomed, and receive equal consideration.

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.

## The Maritime School of Social Work

L. T. Hancock, M.A. (Acadia), B.S.W. (McGill), A.M (School of Social Service Admin., University of Chicago) Carol Ann Probert, B.A. (Mount St. Vincent), M.S.W. (Maritime School of Social Work and Saint Mary's) Registrar.
The Maritime School of Social Work is affiliated with the University of King's College. The School provides a twoyear graduate program leading to the Master's Degree in Social Work. It was started in 1941 by a group of visionaries led by the late Dr. S. H. Prince, for many years a Professol of Sociology at King's. Seeing the rapid growth of Social Service Agencies throughout the Atlantic Region, this group recognized the need for a Centre where individuals could receive the education necessary for a career in the profession of social work.

The School began in a very modest way with four students and a faculty of volunteers. Today, it owns a large property in Halifax on Coburg Road at Oxford Street where a well qualified faculty provides modern professional education to over seventy-five students.

In early days the School had no permanent home and classes were held wherever suitable space could be found. In 1952 a home was made for the School at the University of King's College, and for five years it was housed in the Administration Building of the University. In 1957 the School purchased the property it now occupies.

Designed to serve the Atlantic Region, the School has placed emphasis on individual attention and highly qualified instructors. In 1950 Mount Allison University, St. Francis Xavier University, and Acadia University recognized the School and through an affiliation agreement awarded Master of Social Work Degrees to its graduates. In 1952 the University of King's College and St. Mary's University joined in the affiliation. Thus, a graduate of the School now receives his Master's Degree in Social Work from one of these five Universities.

Students interested in learning more about the program are referred to the current Calendar. The program, like that of other Canadian Schools of Social Work, is both practical and theoretical. The classroom courses are divided into three different groups, those concerned with the social work methods those concerned with the social services, and those concerned with understanding human behaviour and social environment. In addition, students are required to participate in a Research program and write a thesis before they can qualify for graduation. The practical part of the program takes students into nearby agencies for two and one half days a week where they practice social work under the direction of a specially qualified Field Instructor.

The demand for professional social workers at home and abroad is enormous, and opportunities are varied and challenging. Persons planning a career in the Social Welfare field should first obtain a baccalaureate degree, with special em phasis on the Social Sciences, before applying to the Maritime School of Social Work for admission. Courses in Sociology, Psychology and Political Science are particularly important. In addition, personal qualifications such as patience, understanding, tact, good judgment, emotional stability, and tolerance of religious backgrounds and beliefs that are different from one's own, are essential.

The University of King's College is proud of its long and close association with the Maritime School of Social Work. The University is pleased to offer residence and dining room facilities to students of the School. Students of the University interested in learning more about careers in Social Work are advised to seek an interview with the Registrar of the School by phoning Halifax 423-8162.

## 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 should be made to the Registrar.

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

## ARTS AND SCIENCE

## A. ENTRANCE SCHOLARSHIPS

## Dr. W. Bruce Almon Scholarship-\$1500 a year.

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

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

## Susanna Almon Scholarships- $\$ 750$ a year.

Established by the University from the legacy of Susanna Weston Arrow Almon, these scholarships are tenable for four years from Grade XII

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

King's Foundation Scholarships- $\$ 350$ a year.
Established by the Board of Governors, these scholarships 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 are expected 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, a:e 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 eithe: 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 tenabls 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.

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.

## Irr. 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 under-
graduate 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 Col lege 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 the Great wars. 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 Commonwealth offers a number of scholarships to students of other Commonwealth countries. These scholarships are mainly for graduate study and are tenable in the country making the offer. Awards are normally for two years and cover travelling, tuition fees, other university fees, and living allowance. For details of the awards offered by the various countries consult the Registrar's office or write to the Canadian Universities Foundation 75 Albert Street, Ottawa.

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


## DIVINITY

Owen Family Memorial Scholarships-Two of $\$ 250$
Established by Mr. and Mrs. D. M. Owen, in memory of the Owen Family, tenable for one year, but renewable, and open to applicants who are Nova Scotia born, and resident therein, and are or are about to become theological student at King's College, preference being given (1) to native res idents 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
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 quaredited student entering the Divinity School for the first time in September, 1969, who stands highest in a special examination to be held on September 19, 1969 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 encourag ing 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 15 th, 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.

John Clark Wilson Memorial Bursaries-\$100 each
Established in 1947 by Miss Catherine R. Kaiser, in mory of John Clark Wilson. Two bursaries of $\$ 100$ each, mable for one year. Awarded to Divinity students deemed orthy 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, 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 o: 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 1969-70).

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 and Divinity Faculty not only of scholarship, but also, of finast worthy on grounds tion 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 alterrate years for a prize in Church History. Next award 1969-70.

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 be 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 Builock 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 recognized College in the Anglican Communion, preference being given to students studying at the University of King's College. The award is made on the basis of need and may be renewed provided a certain acceptable standard is attained. The recommendations of the Rector of St. Mark's and the Dean and Divinity Faculty are necessary conditions. The bursary must be applied for annually.
The Reverend 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.

## Student Organizations

## 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 is a member of the Canadian Union of Students. 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 Com mittee, the Saturday Dance Committee; committees on the constitution, elections, finances, Dalhousie relations, awards, etc.

## THE KING'S COLLEGE AMATEUR ATHLETIC

 ASSOCIATIONThe 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 badminton
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 Depart ment of English, offers training in voice production, acting, dance, movement, make-up, costume, set design and construciton, 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. It is published weekly

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.

## AWARDS

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

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

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

## Warrena Power Award

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

## The R. L. Nixon Award

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

## The Prince Prize

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


## SOCIETIES CONNECTED WITH THE COLLEGE

## Alumni Association of King's College

This Association,
Legislature, consists of incorporated in 1847. by Act of the the furtherance of the welfare of and others whose object is 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 Sw
Halifax, N. S. S.
Vice-President: The
e-President: The Rev. Emery G. Harris, 320 Herring
Cove Road, Halifax, N. S. Treasurer: Dr. Henry Mugrah

Halifax, N. S
t Rd.,
Executive Secretary: Mrs. J. Des
King's College, Halifax, J. Desrosiers, University of

## The Alexandra Society of King's College

This Society, which has branche
Provinces, was formed in bas branches all over the Maritime Auxiliary to the College. It maintain 1902 as the Women's and bursary and has instituted aintains an annual scholarship andra Chair of Divinity.

## Patroness

Hon. Life Member Hon. Life President Hon. President
Hon. Vice-President
Officers 1969-70
Mrs. A. H. O'Neil
.H. R. H. Princess Alice
H. R. H. Princess A
Mrs. G. M. Ambrose
. Mrs. H. D. Smith
.Mrs. G. F. Arnold


## CONVOCATION, MAY 15, 1968 DEGREES CONFERRED

DOCTOR OF CIVIL LAW (honoris causa) Henry Forman Muggah
DOCTOR OF DIVINITY (honoris causa) The Reverend Professor Charles James Taylor DOCTOR OF DIVINITY (de jure dignitatis) The Right Reverend George Feversham Arnold BACHELOR OF SACRED THEOLOGY
Granchelli, The Reverend Francis Gordon. . . Falmouth, N. S. BACHELOR OF DIVINITY
Harris, The Reverend Emery Gordon. . . Spryfield, N. S.
Neish, The Reverend Donald Arthur
St. Cat

MASTER OF SOCIAL WORK

| Dolin, Martin Mathew Haylock, Susan Jane McNaughton, Helen Elizabeth Carte | . Spryfield, N. S. <br> .Halifax, N. S. <br> .Halifax, N. S. |
| :---: | :---: |
| BACHELOR OF ARTS |  |
| **Aitchison, Linda Lou ......................... Pugwash, N: S. <br> Allison, Patricia Ringen ................. East Riverside, N. B. <br> Bailey, Margaret Jennie . . . . . . . . . . . . . . Sydney Mines, N. S. <br> Berringer, Janet Elaine ...................... Rockingham, N. S. <br> Callbeck, Claudette Jardine <br> (Honours Political Science) . . . . . . . . Charlottetown, P.E.I. |  |
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|  |  |
| ${ }^{* *}$ Cann, Mary Leuise ${ }^{\text {Chard, Jean Marie (Kryszek) }}$ |  |
|  |  |
| (Honours English) .................Halifa |  |
| Coffin, Peter Robert | Oakville, Ont. |
|  |  |
|  |  |
|  |  |
| Day, John William Robert ........... ${ }^{\text {dylesford }}$ |  |
|  |  |
| DeWolfe, John Mark (Honours English) LaTuqu |  |
|  |  |
|  |  |
| Engram, Elizabeth Gertrude . . . . . . . . . . Hal |  |
| Guest, Linda Sue ${ }_{\text {Harris, }}$ Peter Wright ................ Dartmouth, N. S. |  |
|  |  |
| (First Class Honours Classics)...... Halifax, N. S. |  |
| atfield, Gregory Keith ..............Ha |  |
| Howe, Jayne Kenny . . . . . . . . . . . . . . . Ottawa, Ont |  |
| Jones, David George . . . . . . . . . . . . . . . . . Glace Bay, N. |  |
| Jones, Linda Gail |  |
| Aileen Gertrude (Boutilier) |  |

**Conferred during the session

## DIPLOMAS GRANTED

BACHELOR OF ARTS (continued)


BACHELOR OF SCIENCE
Allen, Michael John Maynard Connell, Sharon Dawn ...........
**Kelly, Edward James MacPhee, Keith Munroe Meek, Gerald Henry

> Musquodoboit Harbour, N. S. . Bridgetown, N. S. . Lachine, P. Q. Willowdale, Ont. Bedford, N.S. . Elmsdale, N. S. Kensington, P.E.I.

CLASS LIFE OFFICERS - 1968

Honorary Life President
Life President
Life Vice-President Life Treasurer

Mrs. G. S. Clark (Dean of Women) John Wisdom Mackay Beverly Ann Zannotti David George Jones
*In Absentia
**Conferred during the session
TESTAMUR
Godley, The Reverend Denis John
Dartmouth, N. S.

## ENCAENIA AWARDS

ARTS AND SCIENCE

The Governor General's Medal .......... Alumni Living Endowmen
April Fund Scholarship (Third year) President's Scholarship
Presiden (Second year
(First Year) President's Scholarship (Fip
The Stevenson Scto Scholarship. ...... The Beatrice E. Fry Memo
Dr. M. A. B. Smith Priz
Bishop Binney Prize W......................... The Almon- Mcrawley Classical Prize ......... he Zaidee Horsfall Prize in Mathematics The Lawson Prize. The Harry Crawford The Jackson Bursary . The Jasswell Bursary

## DIVINITY

The Canon W. S. H. Morris Scholarship.... The Reverend Francis
The Ott Reading Prize $\qquad$
The Canadian Bible Society Book Prize for the Reading of Holy Scripture

The McCawley Hebrew Prize
The Junior McCawley Hebrew Prize
The Junior Me Sherman Richards
The Shatford Pastoral Theology Prize
The Kenelm Eaton Memorial Scholarship The Prince Prize in Apologetics ........ The Archdeacon Forsyth Prize in Greek The Dr. C. Pennyma

Peter Wright Harris
Peter Wright Harr . Bruce Parkinson Archibald Bruce Parkinson Archib
Borden Loraine Conrad Hazel Ruth Danson Ian Edward Deakin Janet Eileen Mitchell Janet Eileen Mitchel Parricia Ann Farkinson Archibald Bruce Parkinson Archibald Susan Rosemary Haughn Donald Ewan Banks John Keith Hatcher Elizabeth Anne Hobson Glizabeth Anne Hobson Glenn Edward Taylor Lawrence Wayne Campbell
.The Reverend Frederic
Leonard Tassinari, Jr. .The Reverend Theodore Kingwell Burton Brenda Jean Pierce David Collins Reid Donald Feversham Arnold Brenda Jean Pierce Donald Feversham Arnold David Collins Reid The Canon H. Douglas Smith Pastoral
Education Award for post-graduate studies

Bruce Herbert Warren Howe
Bruce Herbert War
David Collins Reid
.The Venerable James Harold Graven

Dr. W. Bruce Almon Scholarship Alumni Living Endowment Scholarship
King's Foundation Scholarship
David Charles Blagrave Robert MacDonald Hoeg Catherine Ann Veinotte Keith Allan Hamlin Tan Douglas Johnson Georgia Louise Proctor
George Graham Sheppard George Graham Sheppard Alice Irene Taylor Jane Elinor Bailey Elizabeth Gail Brooks Barbara Lynn Leslie
Rebecca Ann Strople Barbara Lynn Leslie
Rebecca Ann Strople
Audrey Florence Olde Alumni Scholarship .........................Audrey Florence Oldershaw
Winfield Memorial Scholarship Kalting Trust Scholarship

Linda Janet Grandy Linda Janet Grandy Brenda Lou Cole

