ROYAL MILITARY COLLEGE

of Canada

99; RMC Roswell

1997 to 1999

Undergraduate Programmes of Study

NOTICES

1. The course listings and academic programmes described in this Calendar represent Senate-approved requirements and electives for complerion of degree requirements. Circumstances beyond the control of the College, such as severe budget shortfalls, may resulr in restrictions in the number and range of course and programme choices available to students as compared with rhose listed herein or in other College publications. The College reserves the right to limit access to courses or programmes, and, at its discretion, to withdraw particular programmes, options, or courses alrogether. In such circumstances the College undertakes ro the best of its ability ro enable srudents registered in affecred programmes ro complete their degree requiremenrs in a satisfactory manner. Prospective students or new registrants are advised to consult the most current information available from the College and its various Faculries in prinred or electronic form, as well as academic advisors for the programmes concerned, before making registration decisions or course/programme choices. The Senare and the Board of Governors of rhe Royal Military College of Canada reserve the right to invoke changes in this Calendar, in either its prinred or electronic forms, ar any rime without prior notice.

2. Officer Cadets at the Royal Military College of Canada must select a course of studies which is compatible with their element of the Canadian Forces and with the Military Officer Occuparion selecred. The Canadian Forces reserve the right to limit enrolment in any given course of studies.

3. Both males and females may apply for admission ro the Royal Military College of Canada.

4. Applications are processed through Canadian Forces Recruiring Cenrres (1-800-856-8488). Applications for admission should be submitted as early as possible in rhe final year of high school. Transcripts of final marks are not required ro initiate an application.

5. A copy of rhe current RMC calendar may be viewed on the Interner ar: hrrp://www.rmc.ca

6. Information may be found on the Internet at: http://www. recruiting.dnd.ca

ACADEMIC CALENDAR 1997-98

FALL TERM 1997

2 Sept	Classes start
11 Oct - 13 Ocr	Thanksgiving (no classes)
22 Oct - 28 Oct	Mid-rerm tests
11 Nov	Remembrance Day
5 Dec	End of classes
8 Dec - 18 Dec	Examinations
20 Dec	Christmas Holiday begins

WINTER TERM 1998

5 Jan	Classes starr
18 Feb - 25 Feb	Mid-term rests
28 Feb - 8 Mar	Spring Break
10 Apr - 13 Apr	Easter
17 Apr	Classes end
20 Apr - 30 Apr	Examinations
15 May	Convocation
16 May	Graduation Parade
19 May - 22 May	Supplemental Examinations

ACADEMIC CALENDAR 1998-99

The academic calendar for 1998-99 will be patterned upon the 1997-98 calendar, and event dates will be similar.

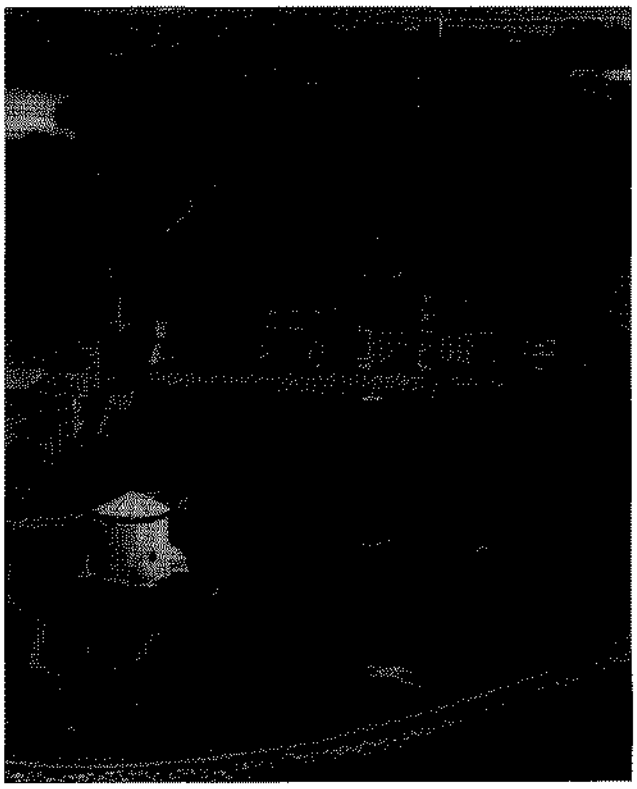
TABLE OF CONTENTS

COURSE OUTLINES

TABLES

DEPARTMENTAL COURSE DESCRIPTIONS

CANADIAN FORCES MILITARY COLLEGE



GENERAL INFORMATION

ROLE

The role of the Royal Military College of Canada is to educate and train officer cadets and commissioned officers for careers of effective service in the Canadian Forces.

OBJECTIVES

The objectives of the Royal Military College of Canada are:

a. to prepare and motivate officer cadets for effective service as commissioned officers in the Canadian Forces by -

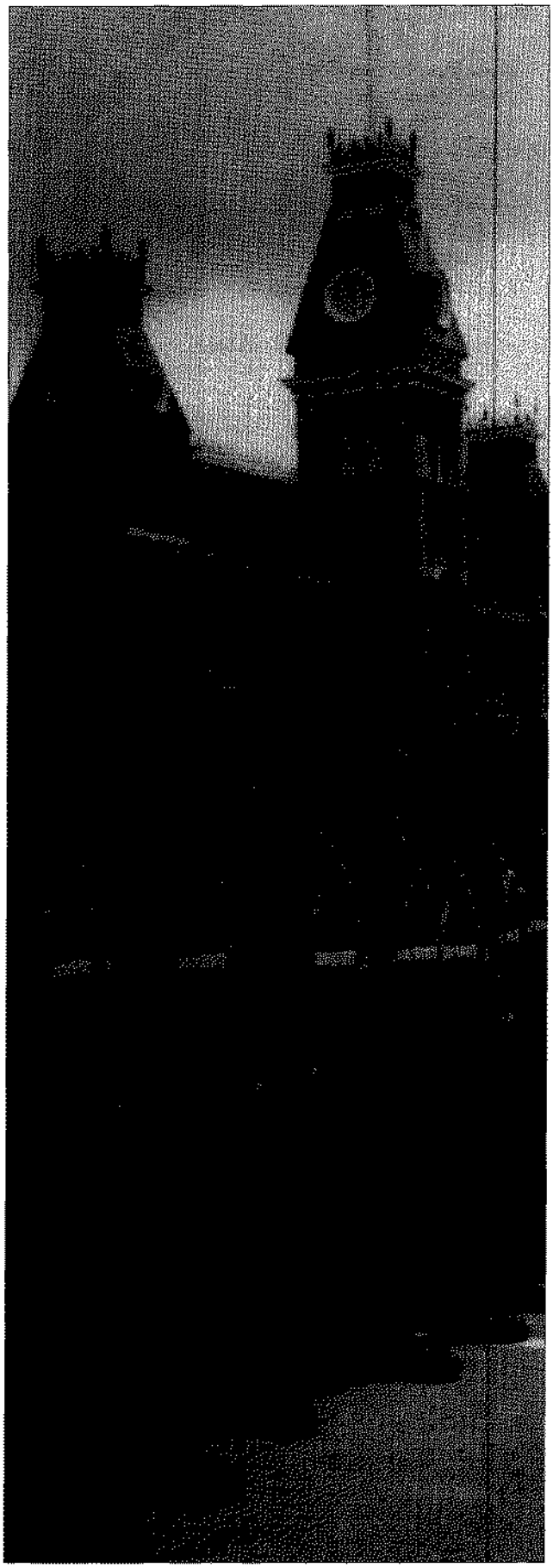
(1) providing university education in both official languages in appropriate disciplines designed on a broad base to meet the unique needs of the Forces,
(2) developing qualities of leadership,
(3) developing the ability to communicate in both official languages and an understanding of the principles of biculturalism,
(4) developing a high standard of personal physical fitness, and
(5) stimulating an awareness of the ethic of the military profession;

b. to improve in appropriate fields the educational background of students who are commissioned officers in the Canadian Forces by providing undergraduate and post-graduate courses in both official languages; and

c. to foster and encourage faculty participation in research in order to sustain academic excellence. Research with a defence focus is encouraged.

GENERAL COMMENTS

The courses of instruction provide a sound and balanced liberal, scientific and military education. Cadet wing organization and military training seek to develop a high degree of physical fitness in the officer cadets and to imbue them with a sense of responsibility, of self-discipline, of fair play, and of fellowship. An officer cadet in many ways, in the classroom, on parade, at games and in other extracurricular activities, is given an opportunity to command, to learn the art of personnel management, and to experience the value of good team work. The co-mingling of English-speaking and French-speaking cadets, of cadets from all provinces, of cadets enroled in all components of the Canadian Forces is designed to break down differences, to create common bonds of comradeship, and inculcate a spirit of tolerance and understanding. Officer cadets are given a basic knowledge of all elements while training in their chosen military occupations and obtain a good understanding of the problems of national defence.



HISTORICAL SKETCH

ROYAL MILITARY COLLEGE OF CANADA

In 1874, the Canadian Parliament passed an Act providing for the establishment of an institution "for the purpose of imparting a complete education in all branches of military tactics, fortification, engineering, and general scientific knowledge in subjects connected with and necessary to a thorough knowledge of the military profession, to be known as the Military College, and to be located in some one of the garrison towns of Canada". Kingston, with its historical, military, and naval associations, was selected as the site of the proposed college. On 1 June 1876, the Military College of Canada opened its doors to a class of eighteen gentlemen cadets, "The Old Eighteen". Two years later, in 1878, Her Majesty, Queen Victoria, granted the College the right to use the prefix "Royal".

The College is located on Point Frederick, a small peninsula immediately east of the City of Kingston and a site of considerable historic interest. In 1789 a naval depot was established on the Point and during the War of 1812 this depot was expanded into the most important military and naval base in Upper Canada. The first College buildings included some of those which had been erected in the old naval dockyard on Point Frederick. Among them was one known as the "Stone Frigate", which had been built to store naval masts, spars, sails and cordage from warships laid up following the War of 1812. Affectionately known as Stone Boat by the current generation of cadets, this venerable structure has been in continuous use as a dormitory since the College was opened. The first academic facility was completed in 1878 and is named the Mackenzie Building, in honour of Canada's Prime Minister of the day, Alexander Mackenzie. Today it continues in use as the administrative hub of the institution, accommodating the offices of the Commandant, the Principal and the Director of Cadets. Modern buildings now complement those of the earlier period, housing students, faculty, libraries, classrooms, and laboratories.

Since 1880, when the first class of cadets graduated, ex-cadets of the Royal Military College of Canada have distinguished themselves in many areas of the British Commonwealth. As early as 1879 the British Government undertook to grant a limited number of commissions in the British Regular Army to cadets of the Royal Military College. The first ex-cadet to be killed in action fell at Tambi in West Africa in 1892. Ex-cadets have seen service in the North-West Rebellion, in the South African War, on the North-West Frontier of India, in the First World War, in the Second World War, and in Korea. More recently, graduates of the College have participated prominently in Canada's peace-keeping commitments worldwide - serving in the Navy, Army or Air Force in the Middle East, Asia, Central America, Africa and Eastern and Central Europe.

"The Royal Military College of Canada Degrees Act, 1959," passed by the 25th Ontario Legislature and given Royal Assent on 26 March 1959, empowers the College to confer degrees and honorary degrees in Arts, Science and Engineering. RMC became institutionally bilingual in the mid - 1970's and began at this time to offer many of its courses and programmes in both English and French. Co-educational status was achieved in 1980 with the admission of the first cadet class comprised of young men and young women.

Between 1948 and 1995 RMC shared with Royal Roads Military College and later with Collège militaire royal de Saint-Jean the responsibility of educating officer cadets. In 1995 sister colleges Collège militaire royal de Saint-Jean and Royal Roads Military College were closed, leaving RMC as the only Canadian military college. The curriculum was restructured to integrate programmes affected by the closings, and all RMC options in Arts, Science and Engineering became available in both the French and English languages.

MUSEUM

The RMC Museum, which was created in its present form in 1962, is housed in the Fort Frederick Martello Tower on the College grounds. Displays are also located throughout the College buildings. The Tower is one of four constructed between 1846 and 1848 to augment the Kingston defences. The Museum's holdings include artifacts and records relating to the history of the College and of its graduates as well as to the naval dockyard which once occupied Point Frederick, the peninsula upon which the College stands. Amongst the Museum's most treasured possessions is the superb Douglas Arms Collection.

The Museum is open daily to the public in July and August and during the remainder of the year to school and other group visits by special arrangement.

ADMISSION REQUIREMENTS

GENERAL QUALIFICATIONS

For admission, a candidate must:

a. be a Canadian citizen;

b. meet the minimum medical standards required for enrolment;

c. obtain a passing standing in pre-enrolment tests;

d. preferably have reached the sixteenth birthday by 1 January of the year of admission;

e. obtain a passing standard in the Basic Officer Training Course which is normally completed prior to the commencement of the academic year; and

f. possess the necessary academic qualifications, outlined below.

Note concerning marital/family status:
Married applicants and those with dependants are not precluded from making application. However, the RMC programme is designed to demand a 24 hour-a-day commitment from every cadet and this fact must be clearly understood.

ACADEMIC QUALIFICATIONS

Two programme options are offered to successful applicants in the First Year at the Royal Military College of Canada:

1. the ARTS option - a degree in ARTS may be obtained through admission to the Arts option, and

2. the GENERAL COURSE option - a degree in ARTS, SCIENCE or in ENGINEERING may be obtained through admission to the General Course option.

An applicant for admission to either option must be completing or have completed high school (Grade 12) at a pre-university level satisfactory to the College, with credits acceptable and sufficient for regular admission to a university in the province in which the student is completing secondary education. Quebec students enroled in a Quebec College of General and Vocational Education (CEGEP) must be completing or have completed the first year of a two-year pre-university programme, and will normally be expected to offer fourteen credit courses.

Candidates should be aware that all programmes are of four years' duration, and are broadly based; Engineering and Science programmes are weighted in the humanities, while students in Arts undertake university level courses in mathematics and the sciences.

REQUIRED ACADEMIC SUBJECTS

NEWFOUNDLAND

ARTS

English 3101
English 3201 or 3202
Mathematics 3201

GENERAL (SCIENCE/ENGINEERING)

English - level 3 course
Mathematics 3201
Chemistry 3202
Physics 3204

NOVA SCOTIA

ARTS

English 441 or 541
Mathematics 441 or 541

GENERAL (SCIENCE/ENGINEERING)

English 441 or 541
Mathematics 441 or 541
Chemistry 441 or 541
Physics 441 or 541

PRINCE EDWARD ISLAND

ARTS

English 611 or 621
Mathematics 611 or 621

GENERAL (SCIENCE/ENGINEERING)

English 611 or 621
Mathematics 611 or 621
Chemistry 611 or 621
Physics 611 or 621

NEW BRUNSWICK (Anglophone Sector)

ARTS

English 121 or 122
Mathematics 121 or 122

GENERAL (SCIENCE/ENGINEERING)

English 121 or 122
Mathematics 121 or 122 (121 preferred)
Chemistry 121 or 122
Physics 121 or 122

NEW BRUNSWICK (Francophone Sector)

ARTS

French 1041
Mathematics 3041

GENERAL (SCIENCE/ENGINEERING)

French 1041
Mathematics 3041
Chemistry 5221
Physics 5121

QUEBEC (CEGEP1)

ARTS

English: two core courses
Mathematics: 101, 103, or 105

GENERAL (SCIENCE/ENGINEERING)

English: two core courses
Mathematics: two of 101, 103, 105, 203
Physics 101
Chemistry 101

QUEBEC (Grade 12)

ARTS

One course in each of English and Mathematics

GENERAL (SCIENCE/ENGINEERING)

One course in English, two courses in Mathematics and one course in each of Chemistry and Physics

ONTARIO

ARTS

English OAC 1
OAC Algebra/Geometry or OAC Calculus
(Calculus is preferred. Finite Mathematics may be considered if good standing has also been obtained in Grade 12 Mathematics)

GENERAL (SCIENCE/ENGINEERING)

English OAC 1
OAC Algebra/Geometry
OAC Calculus
OAC Chemistry
OAC Physics

MANITOBA

ARTS

English 40
Mathematics 40

GENERAL (SCIENCE/ENGINEERING)

English 40
Mathematics 40
Physics 40
Chemistry 40
Calculus 45 (desirable)

SASKATCHEWAN

ARTS

English A 30
English B 30
Algebra 30
Geometry/Trigonometry 30

GENERAL (SCIENCE/ENGINEERING)

English A 30
English B 30
Algebra 30
Geometry/Trigonometry 30
Physics 30
Chemistry 30

ALBERTA/NWT

ARTS

English 30
Mathematics 30
Mathematics 31 (desirable)

GENERAL (SCIENCE/ENGINEERING)

English 30
Mathematics 30
Physics 30
Chemistry 30
Mathematics 31

B.C./YUKON

ARTS

English 12
Algebra 12 or Mathematics 12

GENERAL (SCIENCE/ENGINEERING)

English 12
Algebra 12 (enriched recommended)
Physics 12
Chemistry 12

Note:

1. Applicants intending to pursue their studies in French should offer secondary school courses in French equivalent to and in lieu of the courses in English required above.

2. Applicants who have been unable to satisfy the prerequisite course requirements but have high academic standing may be considered for admission.

3. Electives studied to complete a secondary school programme should be chosen carefully to strengthen academic preparation.

4. In addition to specific course requirements, applicants for an Arts programme must present at least two other senior level academic courses.

5. Applicants who have completed secondary school outside of Canada must offer as a minimum a secondary school mathematics course that is a prerequisite for the study of calculus.

TRANSFER CREDIT AND ADVANCED STANDING

Advanced Standing to the Second Year may be granted upon admission to students whose prior academic work has been of a high standard and has been deemed to have met the prerequisite requirements for Second Year admission.

Transfer Credit may be granted for university courses which have been assessed as duplicating RMC courses, providing marks of C or higher have been earned and an overall satisfactory academic record has been maintained.
Definitions for Advanced Standing and Transfer Credits are found in the Academic Regulations.

PHYSICAL REQUIREMENTS

Candidates are required to meet the normal enrolment standards of the Canadian Forces, and should be prepared to participate in a vigorous, progressive, physical training programme.

The fundamental medical requirement is a sound, healthy body with normal mental and muscular coordination. Particular attention is given to the cardiovascular system, the respiratory system, central nervous system, visual acuity, colour vision, eye muscle balance, organs of speech, and sense of hearing. Any condition which, as it exists, or which, due to possible regression, may limit the candidate's career as a member of the Canadian Forces will be cause for rejection.

PREPARATORY YEAR

An optional year of pre-university studies for the degree programmes offered at the Royal Military College of Canada (RMC) is available for students not yet academically ready to enter RMC. Any candidate who has completed secondary V in Quebec, or has completed the equivalent high school programme elsewhere, is eligible to apply. This academic year is equivalent to the first year of collegiate studies (CEGEP 1) in Quebec. Studies are available in Arts and in Science/Engineering. All courses are available in either French or English. Successful applicants will be enrolled in the Canadian Forces and will need to complete successfully a seven-week Basic Officer's Training Course, held in July and August, before beginning their studies.

During the Preparatory Year, students will be in residence at Canadian Forces Garrison in Saint-Jean-sur-Richelieu, Quebec, located some 40 km south of Montreal. They will spend most of their day in the nearby non-military academic environment of Fort Saint-Jean, a joint campus of the CEGEP and the University of Sherbrooke. Students will be offered some basic military training throughout the year and will have access to a varied Sports programme. Further information can be obtained by contacting the nearest Canadian Forces Recruiting Centre at 1-800-856-8488.

ADMISSION PLANS

REGULAR OFFICER TRAINING PLAN (ROTP)

The Regular Officer Training Plan (ROTP) gives young Canadians the opportunity to obtain both a commission as an officer in the Canadian Forces and a university education. Applicants who have been accepted for entry at the Royal Military College of Canada, or other Canadian universities, enrol as officer cadets in a regular component of the Canadian Forces.

Under the Plan, the costs of tuition, uniforms, books, instruments, and other essential fees for the duration of the course of studies are borne by the Department of National Defence, and in addition an officer cadet is paid a monrhly salary, less deductions for income tax, pension plan, supplementary death benefit, room, and board. Free medical and dental care are provided through the entire training period which includes the Summer Training periods. Annual leave with full pay is granted according to regulations.

An officer cadet is obliged to maintain a satisfactory academic and military standard throughout the entire programme. Officer cadets who fail a year may be permitted to attend one repeat year at their own expense and, if successful, be reinstated to full pay and allowances.

Upon successful completion of the programme, officer cadets are awarded a degree and granted commissions as officers in the Canadian Forces. Graduates of the ROTP are obliged to serve five years in a regular component of the Canadian Forces.

An officer cadet who is enroled under the ROTP may apply for release without obligation after the first of November and prior to the commencement of rhe second academic year. Thereafter, an ROTP officer cadet who seeks release shall undertake to reimburse the Crown for all expenses incurred by reason of attendance at the Royal Military College of Canada or another university.

Further information on the Plan may be obtained on application to any Canadian Forces Recruiting Centre.

RESERVE ENTRY TRAINING PLAN (RETP)

The purpose of the Reserve Entry Training Plan (RETP) is to provide a limited number of vacancies at the Royal Military College of Canada for those who would like to undertake military training along with their education, but who are not prepared ro commit rhemselves to a full-rime Service career at rhe rime of entry. Up to 15 students may be accepted each year as "Reserve Entry" cadets. Reserve Entry cadets receive the same education and training as ROTP cadets but they are required to pay fees to defray part of the costs of the academic year. Reserve Entry cadets, unless they have joined an Active Component during their course, are committed to serve in a component of the Primary Reserve Forces upon graduation and commissioning. Reserve Entry cadets are required to take summer training with the assigned classification for which they receive pay and allowances at the same rate as a Second Lieutenant on Class B service (refer to any Canadian Forces Recruiting Centre for the current rate).

The admission requirements for RETP cadets are the same as those for cadets who enter under the ROTP.

Further information about the Reserve Entry Training Plan (RETP) may be obtained from any Canadian Forces Recruiting Centre.

Fees (Reserve Entry Cadets)

Officer cadets attending the Royal Military College of Canada in

a Reserve status will encounter the fees indicated below. These are estimates for the 1997/98 academic year, and may be increased or lowered without notice:

b. an annual College Fee of $1524;

c. a charge for room and board of approximately $2400 for the nine months of the academic year; and

d. an annual Recreation Club Fee of $107.

Payment of fees and costs can be arranged in two instalments, the first upon registration, and the second by rhe following 31 January.

UNIVERSITY TRAINING PLAN - NON-COMMISSIONED MEMBERS (UTPNCM)

The University Training Plan - Non-commissioned Members (UTPNCM) is a DND-sponsored subsidization plan open to certain other-ranks in the Canadian Forces who meet the academic requirements for admission to the Royal Military College of Canada or other Canadian university as candidates for a baccalaureare degree. Depending on rheir level of academic standing, UTPNCM candidates may enter either at the First Year level or with Advanced Standing. Except for certain allowances made for age, service experience, and marital status these officer cadets must meet substantially the same academic and military-training requirements as those in the ROTP. On graduation, both groups of officer cadets are commissioned and promoted.

UNIVERSITY TRAINING PLAN - OFFICERS (UTPO)

The University Training Plan - Officers (UTPO) is a DND-sponsored subsidization plan open to commissioned officers serving in the Canadian Forces who are within two years of meeting course requirements for a baccalaureate degree at the Royal Military College of Canada or other Canadian university. Thus all students admitted under this plan must enter as candidates with Advanced Standing.

Note: For further information on UTPNCM and UTPO, refer to the Canadian Forces Military College section in this Calendar.

ADMISSION PROCEDURE

APPLICATION

All applicants to the College must apply in person to a Canadian Forces Recruiting Centre. As part of the application process, applicants must complete an application form for the Regular Officer Training Plan (ROTP) or the Reserve Entry Training Plan (RETP). Information concerning application may be obtained from the Registrar or from the Commanding Officer of any Canadian Forces Recruiting Centre (CFRC) at 1-800-856-8488.

Application for admission under the ROTP or RETP must be made by 13 March of the academic year prior to entry.

A birth certificate and a report of a candidate's academic achievement will be required at the initiation of an application.

Applications should be made as early as possible, and all forms should be submitted without necessarily waiting for the results of the first set of examinations in the final year of high school. However, the CFRC will require the applicant's co-operation in furnishing transcripts of high school marks to date and in arranging the earliest possible receipt of final marks for the present school year.

Application for the ROTP or RETP is also an application for residence and for scholarship consideration.

It is strongly recommended that all applicants submit applications to several universities in addition to their application to the College so that they are not denied the opportunity of continuing to university in the event that they are not selected for the Royal Military College of Canada.

CAREER OPPORTUNITIES IN THE CANADIAN FORCES

Candidates for the ROTP or RETP will need to consider carefully the occupational area in which they intend to pursue their career. The Career Counsellor at the CFRC will be able to provide detailed information about these occupational areas. The following points should be kept in mind:

a. First, second, and third choices of officer occupation must be made with the application.

b. Certain military officer occupations may require a complementary degree course pattern. For example, nearly all Engineering military occupations require completion of an Engineering degree. For most Operational military occupations, any degree pattern may be followed, including for example, Engineering. The Career Counsellor will be able to provide more information regarding the various alternatives.

c. Applicants for Air Operations (Pilot, Air Navigator) will be expected to undergo additional selection procedures to determine suitability for this group. The results of these selection procedures should be available prior to the last date at which a decision to accept a place at the College has to be made. Details of these procedures will be worked out to mutual benefit by the CFRC.

d. The offer of a place under ROTP or RETP will also include the offer of a place in training for an officer occupation. This may not necessarily be the first or second choice made by the candidate. Since application to transfer to another occupation is not likely to be successful, careful consideration of the offer of officer occupation should be made before accepting the offer.

SELECTION

Eligible applicants for the ROTP and the RETP will be required to appear, by appointment, at a Canadian Forces Recruiting Centre for a medical examination, testing and interview. Within Canada, applicants not resident in a city in which a CFRC is located will normally be provided with return transportation and reasonable travelling expenses from their place of residence to the CFRC, and living expenses while at the CFRC. Incidental expenses must be substantiated by a receipt before reimbursement will be considered. The visit to the CFRC will be arranged at a convenient time soon after the application is received. The length of time for the selection process will be kept to a minimum, and adjustments to appointment times will be made whenever possible if conflicts arise with other activities.

Candidates will be advised shortly after their interview as to the status of their application. Final selection is based on academic standing, leadership potential, and on the recommendations of the Interview and Medical Boards as to the personal and physical suitability of the candidate.

Successful candidates will be offered a place in the ROTP or RETP at the Royal Military College of Canada or other academic

institution. They will be notified of the requirement to attend a seven week pre-academic Basic Officer Training Course commencing shortly after the end of the high school year. Upon successful completion of the Basic Officer Training Course, candidates will proceed to their academic institutions to commence their programmes.

JOINING INSTRUCTIONS

Successful applicants will be informed by the CFRC of the date of joining, of the procedure to be followed, and of the clothing and equipment they should bring with them. They will also be given instructions about transportation and travelling allowances.

ADMISSIONS RESTRICTION

The Royal Military College reserves the right to reject applicants on the basis of their overall academic record, even where entrance requirements have technically been met. Normally a candidate who has been required to withdraw from another university or college for academic reasons will not be considered for admission until a full academic year has elapsed.

THE MILITARY STRUCTURE OF THE COLLEGE

SERVICE QUALIFICATIONS

All who enter the Royal Military College are enroled as officer cadets either in the Regular Force (under the ROTP or the UTPNCM) or in the Reserve Component (under the RETP).

All officer cadets are enroled in the Canadian Forces and are consequently subject to a code of behaviour consistent with service regulations. Their life is regulated through orders and instructions which they are expected to interpret intelligently and to observe through a sense of self-discipline. Each cadet has access to a copy of the instructions which outline the policy and the procedures governing Cadet Wing activities.

MILITARY WING

The Director of Cadets (DCdts) is the Commanding Officer of the Military Wing and is responsible to the Commandant for the overall conduct, supervision, discipline, and the performance of the Cadet Wing. This responsibility is discharged by the various officers and senior non-commissioned officers of the Military Wing. The Division Commanders and Squadron Commanders of the Military Wing advise, guide, counsel, and evaluate all cadets. The Military Wing staff are responsible for military training programmes for all officer cadets including physical training, drill, and officer development. They are also available to answer cadet enquiries and give advice on military matters.

CADET ORGANIZATION

Within the Military Wing, the cadets are organized into a Cadet Wing composed of a headquarters and a number of divisions and squadrons, which in turn are subdivided into flights and sections. A separate squadron is comprised solely of students enroled under the University Training Plan - Non-commissioned Members (UTPNCM). Under the guidance of Regular Force officers (the Squadron Commanders), this organization controls cadet life at the College within limits laid down by the Commandant.

Senior officer cadets hold staff and command appointments in the Cader Wing and receive practical training in leadership by being responsible for the discipline, progress, and efficiency of their wing, squadron or flight. Cadets also organize and run the full intramural sports programme and carry out typical service duties such as duty officer and fire picket commander.

Every committee at the College handling cadet affairs has strong cadet representation. This gives the representatives insight into the problems of organizing and administering sports and entertainment, including the budgeting of funds.

CADET LIFE AT RMC

The life of an officer cadet during the vigorous years at the College is dominated by a programme made up of four interlocking pillars of achievement: academics, military training, physical education and second language training.

Academics, the most demanding part of this programme, are discussed further on in the calendar.

CADET MILITARY TRAINING

The College is fully residential, the cadets (other than UTPNCM) living together in a military environment. Cadets are responsible for the administration of many of the activities in their life at RMC. This situation gives all cadets the chance to observe the leadership of others and helps them to learn this art by accepting such responsibilities themselves.

All cadets are required to take part in a demanding routine designed to raise them to a sound standard in physical training, drill, and deportment and to develop in them a ready sense of duty, self-discipline, self- confidence and integrity. They are also required to meet the demands for cooperation and team work with their fellow cadets.

The Cadet Officers play an important part in this training, they themselves learning much by the experience. Although physically and mentally demanding, this training does not involve personal indignity, illegal punishment, harassment, or "hazing" in any form.

Each cadet entering the college, with the exception of UTPNCM, must pass a number of milestones before being accepted as a full-fledged member of the Cadet Wing. The most significant one, the Recruit Obstacle Race, which is normally run about the end of September, is designed to prove to the First Year cadet that obstacles which seem insurmountable may, in fact, be overcome through cooperation with others, combined with individual stamina and determination.

DRILL

The Royal Military College of Canada is renowned for the quality and diversity of its ceremonial. The attainment of these high standards is gained through the hard work and dedication of each cadet.

Each cadet participates in one period of drill per week. Cadets are expected to reach and maintain a high standard of personal drill with the service rifle, colours, and the sword. A practical test is administered each term to verify that the standard has been maintained.

At many times during the year, the Royal Military College of Canada is called upon to provide formations of cadets for ceremonial occasions. Time is found to prepare for these taskings usually during the after duty hours.

DAILY ROUTINE

Once classes start, the typical daily routine is as follows:

6:30 am	Reveille
6:30 - 8:00 am	Wash, Dress
	Defaulters Parade
	Morning activities
	Breakfast
8:00 - 11:40 am	Classes
11:50 - 12:35 pm	Lunch 1
12:45 - 1:30 pm	Lunch 2
1:40 - 4:15 pm	Classes
4:25 - 7:00 pm	Sports (Tue-Wed-Thu-Fri)
	Tutorials (Mon)
5:00 - 7:00 pm	Dinner
8:00 - 11:00 pm	Study Period/Cadet Time
11:00 pm	Lights Out for Recruits

The hours 8:00 to 11:00 pm of each evening, Sunday through Thursday, are always available for study for all students in all years. Only with special permission may College activities be scheduled in this time, and quiet must be maintained in the dormitories.

LEAVE

Weekend leaves and evening passes to which an ROTP/RETP officer cadet is entitled may be restricted depending on performance and the demands of training and other duties. New recruits normally are not permitted leave until Thanksgiving Weekend in October.

Christmas leave for periods of up to two weeks is granted each year.

RESIDENCE

Single rooms are normally provided for senior cadets and others on a space available basis. In the First Year it is usually found beneficial to place two cadets in a room. All residences are co-educational. On-campus dining is provided. Full recreational facilities, including an indoor swimming pool, are available in close proximity to the residences. Cadets of the UTPNCM programme do not live in residence; all others are required to do so.

RMC CADET MESS

The RMC Cadet Mess provides facilities for the training of the Cadet Wing in the customs and practices of a Service Mess, and has facilities for social and recreational activities which are an integral part of College life.

The general administration is carried out by a Cadet Mess Committee with cadet representation from all years assisted by a staff advisor from the Military Wing. The Mess is conducted in the form of a Service Officers Mess with cadets filling the responsible positions. The RMC Cadet Mess has its own constitution and by-laws where the responsibilities and privileges of its cadet members are explained.

DRY CANTEEN

The Canteen has a snack bar for cadets and staff, open at stated hours, and a small store for personal articles and souvenirs.

CHAPLAIN SERVICES

The Chaplains - Protestant and Roman Catholic - conduct regular Sunday Services of Divine Worship. Officer Cadets are encouraged to attend regularly.

Officer Cadets will find in the discussion groups, dialogue dinners, and padre's hours opportunities for valuable interchange with the Chaplains on ethical, moral, and religious issues. The Chaplains are always available for individual counselling.

RMC RECREATION CLUB

The RMC Recreation Club is responsible to the Commandant, through its Executive, for the planning, control, supervision, and financial support of all officially organized recreational activities of the staff and cadets, except for those activities specifically excluded from its jurisdiction by the Commandant. All cadets are required to pay a fee for membership. Coordinating authority is vested in the Athletic Director.

REPRESENTATIVE ACTIVITIES

a. Varsity Sports

The College is a member of the Ontario Universities Athletic Association (OUAA) and the Ontario Women's Intercollegiate Athletic Association (OWIAA). The OUAA and the OWIAA are two of the six intercollegiate associations which make up the Canadian Intercollegiate Athletic Union (CIAU). The College currently competes in the following university sports: cross country running (men and women), curling, fencing (men and women), hockey, rugby, swimming and track and field. RMC also competes in the Ontario Colleges Athletic Association (OCAA) in the following sports: basketball, badminton (men and women), soccer indoor and outdoot (men and women) and volleyball (men and women). The OCAA colleges are members of the Canadian Colleges Athletic Association at the national level. RMC teams also take part in a number of invitational competitions including the traditional international hockey game with the United States Military Academy.

b. Representative Sports

The following additional activities provide cadets with opportunities to participate on a team basis and reptesent the College in competitions: biathlon, broomball, gymnastics display, judo, karate, pistol, rifle, squash, and taekwondo.

OTHER CLUBS AND ACTIVITIES
(subjects to change depending on interest)

a. Sports Clubs

Aikido, broomball, equestrian, mountain biking, mountaineering, scuba, and yacht club.

b. Military Clubs/Activities

Army club, combat simulations, highland dance

c.Recreation Clubs

Astronomy, christian fellowship, DJ club, stage band, video, choir and paint ball.

ROYAL MILITARY COLLEGE BANDS

The Royal Military College Band provides a recreational outlet for cadets with musical interests. The Band performs at parades at the College and at Squadron Mess Dinners. The Band also participates in a wide range of events such as the Kitchener-Waterloo Oktoberfest Parade, International Highland Games, the Toronto's St. Patrick's Day Parade, the Celtic festival, high school tours, military tattoos, the Spring Concert in Scarlet and numerous other local parades and concerts. The RMC Band is composed of five sections: the Pipes, the Drums, the Brass and Reed, the Highland Dancers and the Choir.

PIPES AND DRUMS

The Pipes and Drums is comprised of about 35 pipers and 35 drummers. Basic instruction on bagpipes and drums is provided by two professional Canadian Forces musicians.

BRASS AND REED

The Brass and Reed Band has a membership of about 50 musicians. Instruments are supplied and include flute, clarinet, saxophone, trumpet, trombone, french horn, euphonium, tuba keyboard and percussion. Rehearsals are directed by a professional Canadian Forces musician.

HIGHLAND DANCERS

The Highland Dance section performs with the Pipe and Drum Band at Mess Dinners, high school tours and othet College functions. Previous expetience, although welcome, is not necessary, as novice instruction is available. There are approximately 20 dancers in the section.

CHOIR

The RMC Choir also performs with the Band at Mess Dinners and other College functions including the famous Concert in Scarlet. Instruction is provided for all 40 singers.

ROCK BANDS

Each year, several groups of cadets form their own rock bands. They perform for their peers throughout the year at a variety of functions such as the talent show "Plein Feux".

PHYSICAL EDUCATION AND ATHLETICS

INTRODUCTION

The RMC Physical Education and Athletics programme provides opportunities for officer cadets to participate in activities that are physically and mentally stimulating and socially sound. Cadets develop their athletic skills through practice and learn self-control by following the written and implied rules of sportsmanship. As a vehicle to build and exercise the qualities of leadership conducive to officers of the Canadian Forces, the programme includes learning the organizational tasks and duties of officials for selected activities.

PHYSICAL EDUCATION

The four-year physical education programme is a participatory one in which officer cadets are required to take part in a myriad of activities designed to achieve and maintain a high level of fitness and to learn the basic fundamentals in a wide variety of team and individual carry-over sports. The fitness test, administered three times annually, consists of five test protocol items that examine endurance, speed, power, agility and strength. All cadets must attain the minimum physical fitness requirements. Moreover, they must achieve the Canadian Forces Military Swim Standard prior to graduation.

ATHLETICS

The Athletics programme is pursued on two levels: representative activities (varsity and representative teams) and intramural sports.

REPRESENTATIVE ACTIVITIES

Representative activities are designed for those with greater abilities. Suitability for continued involvement by cadets is predicated upon academic performance. Cadets who do not maintain satisfactory academic and/or military progress may be restricted from regular participation in varsity and/or representative teams.

First party athletic awards are not offered by RMC to prospective students, nor are benefits or allowances offered as partial or full subsidization for participation as members of intercollegiate teams. As a member in good standing of the CIAU, OUAA, OWIAA, CCAA and OCAA, RMC is committed to fielding intercollegiate teams to meet the needs of the student body, the college, and the Canadian Forces.

INTRAMURAL SPORTS

The RMC intramural programme plays an important supportive role to both the physical education and intercollegiate athletic programmes. It offers an opportunity for participation in sport competitions in a wide variety of activities, some of which are not available at the intercollegiate level. Intramural participation is normally compulsory for those cadets who are not part of a representative or varsity team.

CONCLUSION

The main interdependent segments of the total RMC programme are academics, military training, physical education and second language learning. Academics have always been and will continue to be the most important component of each cadet's education, a process which, at RMC, is built on a foundation of self-discipline and integrity, the basis for the College motto - Truth, Duty, Valour.

SECOND LANGUAGE TRAINING

An objective of the Royal Military College is to develop in its cadets the ability to communicate in the second official language. Consequently, second language training is mandatory for all students who do not already possess a high level of competence in their second language, Francophones receive training in English and Anglophones receive training in French.

Upon entry to RMC, students are tested in order to place them in a class appropriate for their level and ability. Students who demonstrate a high level of proficiency in their second language (SL) will be scheduled to take the Public Service Commission (PSC) Second Language Exam (SLE). The SLE measures the following SL abilities on an ascending scale of A,B, C, E(=career exemption):

The reading comprehension test is called the "A" test.
The writing ability test is called the "B" test.
The oral interaction test is called the "C" test.

Students who have achieved a level B in all three tests are exempted from second language training while at RMC and have fulfilled the requirement for graduation.

Students who are exempted are strongly encouraged, in the interest of maintaining and improving their language acquisition, to engage in further formal training in their second language.

Students who are not exempted from formal second language training are required to demonstrate regular and adequate progress in their second language at the end of each phase of their Course.

Small, homogeneous classes, usually composed of an average of eight (8) students, are established to give students the opportunity to progress according to their abilities. Five (5) periods of instruction are given every week during normal class hours. First year students who

do not achieve the exemption level on the SLE by the end of the academic year take an intensive summer course of about two hundred (200) hours.

To increase exposure to the second language and to underline the bilingual nature of RMC, many activities at the College are conducted in both official languages. There are, for example, English weeks and French weeks during which students have the opportunity and are encouraged to work in their second language. As well students are expected to spend a reasonable amount of time studying outside classroom hours. A student will normally register in academic courses offered in the student's first official language. Students who have reached the exemption level in their second official language may apply to register in courses in their second language.

The student body at RMC is approximately 70 per cent anglophone and 30 per cent francophone. The opportunities for everyday practice in the second language are therefore numerous. To encourage practice to the extent permitted, First Year anglophone students and First Year francophone students share rooms.

SUMMER TRAINING

GENERAL

A major part of an RMC cadet's military development takes place during the summer. Every summer, all officer cadets participate in up to eleven weeks of military training designed to prepare them to assume specific duties as officers of the Canadian Forces after graduation from the College. While summer training is not the responsibility of the College, the results are closely monitored and form part of a cadet's College training record.

LEAVE

Annual leave of at least 14 working days is normally granted during the summer months before or after the summer training period.

PAY

During this summer period all caders (ROTP, RETP and UTPNCM,) receive pay and allowances as prescribed.

PHASE I (OR BASIC OFFICER TRAINING COURSE)

Phase I training is common for all cadets and is taken in two parts. The first part is done during a seven-week period just prior to the commencement of the First Year academic term. The second part includes some further military training done during the academic year. The aim of the Basic Officer Training Course (BOTC) is to develop in the officer cadets essential officer-like qualities and to provide an introduction to those common military subjects essential to the employment of all officers in the Forces. During BOTC training, cadets receive instruction in weapons, map using, leadership theory and exercise, first aid, general service knowledge, military writing and second language training. An immersion course in the cadet's second language occurs during the summer following First Year.

PHASES II, III AND IV

During summers following the Second, Third, and Fourth Years, officer cadets receive further formal military training. The training undertaken in Phase II, III, and IV summers is designed to prepare the cadet for a specialized military occupation.

COMPUTING FACILITIES

A number of up-to-date micro computer and work station laborarories managed by Computing Services support scheduled teaching activity and individual study. These laboratories are integrated into local area networks. Access to various network services, including information services available through the Internet, is granted through a system of accounts. Services provided by the Library computer are accessible via the local area networks. Users of the various computing systems are subject to the guidelines established by Faculty Council in the Code of Ethics.

A student may be required ro purchase and maintain a personal computer, associated peripherals, and software which satisfy the specifications established for the programme in which the student is enroled.

Several departments provide micro computer laboratories dedicated to their own programmes of study.

SLOWPOKE-2 NUCLEAR REACTOR AND FACILITY

The SLOWPOKE-2 nuclear reactor and facility is located in Module 5 of the Sawyer Building. Installed in 1985, this research reactor is operated by the Department of Chemistry and Chemical Engineering for the Department of National Defence. The reactor and the associated laboratory equipment are used for the education of undergraduate and postgraduate students, for research and analytical applications, and for training and support of DND personnel. Specific capabilities include neutron activation analysis, neutron radiography, liquid scintillation counting, and low-level and transportable gamma spectrometry.

LIBRARIES

There are two libraries to serve the need for information services and to support the research work of students and staff - Massey Library (Humanities and Social Sciences), and the Science/Engineering Library located in the Sawyer Building.

The Massey Library houses a substantial collection of books, government documents, journals, microforms, video/audio cassettes and special collections. The special collections consist of monographs, prints, photographs and archival material. Of particular significance is the Military Studies Collection which includes an extensive collection of Canadian, British, French and German military history. The bookstacks are open to the public but borrowing privileges are restricted to authorized users.
The Science/Engineering Library contains a substantial collection of books, journals and technical reports covering chemistry, physics, mathematics, computer science, ocean and space sciences and five engineering fields.

Study areas, microform readers/printers, photocopiers, reference and interlibrary loan services and on-line searching in the major databases are provided in each library.

The RMC libraries, being constituent members of a bilingual institution, are committed to collect and to offer all library services in both official languages.

SCHOLARSHIPS, PRIZES & AWARDS

REGULAR OFFICER TRAINING PLAN (ROTP)

Officer cadets who are members of the Regular Officer Training Plan have their fees for the entire course paid by the Department of National Defence and, in addition, are entitled to pay and allowances prescribed by the Department. For more detail, see the section on Admission Plans.

Scholarships awarded in recognition of academic merit may be retained under the Regular Officer Training Plan.

RESERVE ENTRY TRAINING PLAN (RETP)

Officer cadets who are members of the Reserve Entry Training Plan are required to pay fees to defray part of the costs of the academic year. See the section on Admission Plans. Applicants under the Reserve Entry Training Plan may be eligible to apply for some scholarships and bursaries that are available to students at Canadian universities.

PROVINCIAL STUDENT AWARDS PROGRAMMES

Awards may be available under the terms of the above Programmes to those under the Reserve Entry Training Plan and, in some particular circumstances, under the Regular Officer Training Plan.

Information may be obtained from the Registrar's office.

SCHOLARSHIPS AND BURSARIES

General Scholarship Fund

Administered by Faculty Council, the General Scholarship Fund permits the introduction of new scholarships, bursaries and prizes, or the augmentation of existing awards. The Fund is made possible through contributions in memory of Ex-Cadets No. 5804 S.G. Esdaile and No. 5522 T.A. Spruston; gift of the late Mrs. Lilian Grier in memory of Ex-Cadet No. 599 Colonel Leroy Fraser Grant; and also through the kind generosity of the Bull HN Information Systems Ltd.; Pyrolysis Systems Incorporated; and of Emeritus Professor of Mechanical Engineering, the late Lieutenant-Colonel P.C. King.

Royal Military College Club of Canada Foundation Scholarship

A number of scholarships annually are open to competition among all Reserve Entry applicants for admission to the Royal Military College of Canada. Each scholarship has a value of $4000 providing the holder maintains a satisfactory standard. An applicant, to be awarded a scholarship, must be accepted as a Reserve Entry candidate. Applications must be submitted by June 1st of the year of entry. Further information may be obtained from the Executive Director, RMC Club of Canada, Royal Military College of Canada, P.O. Box 17000 Stn Forces, Kingston, Ontario K7K 7B4.

The Leonard Foundation

Through the Leonard Foundation created by the late Lieutenant-Colonel Reuben Wells Leonard, RMC No. 87, financial awards are made available on the basis of need to provide assistance to students enroled in undergraduate programmes. Preference in the selection of students for financial assistance is given to the sons and daughters of clergy, military personnel, school teachers, graduates of the Royal Military College of Canada, members of the Engineering Institute of Canada and members of the Mining and Metallurgical Institute of Canada. The amounts of the awards will vary depending on the applicant's financial situation, but on average will be $1250 and may be renewed on re-application.

Dominion Cadetships

A Dominion Cadetship may be granted by the Minister of National Defence to a cadet who, being a member of the Reserve Force, enters the initial year at the Royal Military College of Canada.

a. The value of a Dominion Cadetship encompasses:

(1) the annual college fee for the First Year;
(2) the cost of single quarters and rations for the First and subsequent years; and
(3) the annual Recreation Club fee for the First and subsequent years.

b. Not more than fifteen Dominion Cadetships may be granted in a college year.

c. A candidate, to be eligible for a Dominion Cadetship, must meet the enrolment and academic standards for admission and be the child of a person who was killed, has died, or is severely incapacitated as a result of service in -

(1) the Canadian Forces, or
(2) the Canadian Merchant Marine, during hostilities.

d. Application for a Dominion Cadetship shall be made in writing, giving full particulars of the candidate's eligibility under subparagraph c., and shall normally be forwarded by the first day of March to a Canadian Forces Recruiting Centre or Detachment.

e. The final board of selection shall submit to the Minister of National Defence for approval a list of candidates recommended for Dominion Cadetships, in order of merit.

f. A Dominion Cadetship is forfeited on failure of an academic year.

Association of Professional Engineers of Ontario Scholarships

a. Entrance Scholarship

The Ontario of Professional Engineers Foundation for Education provides two entrance awards of $1200 each to OAC graduates entering an accredited RMC engineering programme. Based upon high OAC standing, one of the awards is made to an eligible female student and one to an eligible male student.

b. Undergraduate Scholarship

The Ontario Professional Engineers Foundation for Education provides two awards of $600 each to undergraduate students in either, Second or Third Year of an engineering programme;

one to the student who obtained the highest academic standing;

and

one to the student who exhibited exceptional role model qualities through participation in non-academic activities while maintaining above average marks.

The Dr. P.E. Fisher Memorial Trophy and Scholarship

This scholarship is awarded to the Third Year ROTP/RETP cadet considered most deserving by reason of academic standing, qualities of leadership and sportsmanship.

The Duncan Sayre MacInnes Memorial Scholarship

This scholarship is awarded to the Fourth Year cadet who is considered the most deserving of those who accept a regular commission in the military occupations of Air Navigator, Air Traffic Control, Air Weapons Control, or Pilot by reason of academic standing, character, and proficiency in summer training.

The C. Raymond Grandy Memorial Scholarship

This scholarship is awarded to the best cadet entering Second Year at RMC as determined by academic standing, leadership potential, and overall performance in the First Year.

RCAF Women's Division Scholarships

The RCAF Women's Division Scholarships are awarded to cadets entering the Third Year of a four-year degree programme on the basis of high scholastic achievement and outstanding personal qualifications. One or more awards may be made annually.

Army, Navy and Air Force Veterans in Canada - United States Unit Scholarship

The ANAVICUS Scholarship is awarded to the best cadet of Third Year on the basis of personal qualities, academic performance and leadership potential.

The W.M. Carleton Monk Memorial Scholarship

This scholarship is awarded to the Reserve Entry applicant in the Fourth Year who obtains the highest marks in academic subjects in the graduating year, provided attendance at a Canadian university follows graduation.

Jack C. Sargant Memorial Scholarship

No. 3091 Jack C. Sargant played intercollegiate hockey for the RMC Redmen throughout his four years at the College. In his memory a scholarship valued at $1000 is awarded annually to a varsity athlete who demonstrates combined proficiency in academic standing, sportsmanship, leadership and athletic ability.

PRIZES AND AWARDS

Awards in which studies, academic standing, or academic proficiency is a qualification normally require that the year must have been clearly passed at the first attempt without conditions and with at least Second Class standing. The following annual awards may be won by students who meet the requirements as specified by the donors or as determined by the Faculty Council and approved by the Commandant.

Definitions: For the purposes of Prizes and Awards, a cadet is defined as a student enroled under either the Regular Officer Training Plan (ROTP), the Reserve Entry Training Plan (RETP) or under the University Training Plan, Non Commissioned Member (UTPNCM). "Student" includes "cadet" and officers enroled under the University Training Plan, Officers (UTPO).

THE SWORD OF HONOUR

The Sword of Honour is awarded to the ROTP/RETP cadet of the Graduating Class who best combines high standards of proficiency in each of the academic, military, and sports aspects of training.

MEDALS

The Governor General's Silver Medal is awarded to the cadet with the highest overall average in the Fourth Year of study at RMC, on completion of an Honours or Engineering degree programme with First Class Honours, provided that a four-year programme of study has been completed and that an overall average of Second Class honours has been recorded in Third Year.

The Lieutenant-Governor of Ontario's Silver Medal is awarded to the cadet who obtains the highest academic standing in the Third Year Engineering course.

The J.W. Brown Memorial Medal is awarded to the cadet who obtains the highest academic standing in the Third Year of an Arts programme. The medal is presented in memory of No. 7268 J.W. (Jim) Brown, a 1967 graduate in Commerce and President of the RMC Club of Canada in 1985/86.

Programme Medals - Fourth Year. A medal is awarded annually in each academic programme, and in each Humanities major, to the cadet standing highest in the programme in the Fourth Year providing an overall average of A- or better has been earned by the recipient. Recipients must have maintained a minimum overall average of B- or better without failures or conditions in the Third Year of study.

AWARDS, PRIZES, AND TROPHIES

FOURTH YEAR

The Victor Van der Smissen-Ridout Memorial Award is awarded to the best all-round ROTP/RETP cadet morally, intellectually, and physically who graduates at the Royal Military College of Canada.

The Department of National Defence Award of Merit is awarded to the graduating ROTP/RETP cadet attaining highest standards of proficiency in the academic, military, and sports aspects of training. The winner of the Sword of Honour is excluded from consideration for this award.

The Toronto Branch RMC Club Prize is awarded to the Fourth Year ROTP/RETP cadet who obtains the highest combined marks in Drill and Physical Education during the entire course.

The Harris-Bigelow Trophy is awarded to the Fourth Year cadet who has displayed the best combination of academic and athletic ability throughout the entire course.

The Society of Chemical Industry, Canadian Section, awards a plaque to the student who has the highest standing in the final year of the course in Chemical and Materials Engineering, provided that the overall average is at least A- and that the course has been completed in the normal number of years.

The Association of Professional Engineers of Ontario Gold Medal for academic achievement is awarded each year to the engineering student with the highest academic standing in the final year.

The Military Engineering Prize is awarded to the best graduating cadet enroled in the military occupations of Aerospace Engineering, Communications and Electronics Engineering, Military Engineering, Electrical or Mechanical Engineering.

The Navy League of Canada Prize is awarded to the best Sea Operations cadet (Maritime Surface and Sub-Surface or Maritime Engineering) in the graduating class.

The Royal Canadian Artillery Association Prize is awarded to the best Land Operations cadet (Armoured, Artillery, Infantry) in the graduating class.

The Air Force Association of Canada Award of Merit is awarded in alternate years to the best Air Operations cadet (Pilot, Air Navigator, Air Traffic Control, Air Weapons Control) in the graduating class.

The Air Cadet League of Canada Award of Merit is awarded in alternate years to the best Air Operations cadet (Pilot, Air Navigator, Air Traffic Control, Air Weapons Control) in the graduating class.

The Military Support Award of Merit is awarded annually to the best cadet in the graduating class from the Logistics, Security, Personnel Administration or other military occupation of the Support Group.

The Panet Cup is awarded to the graduating cadet who achieves the highest average score in all four years in the spring Physical Fitness Test.

The Armed Forces Communications and Electronics Association Education Fund of Canada Award is presented to the graduating cadet who achieves the highest academic standing in either the Computer or Electrical Engineering programmes.

THIRD YEAR

The Chemical Institute of Canada Undergraduate Prize is awarded to the student who obtains the highest standing in Third Year Chemical and Materials Engineering.

The Corps of Guides Prize is awarded to the cadet who obtains the highest marks in Surveying and Tetrain Analysis.

The Strong Challenge Shield is awarded to the cadet of the Third Yeat attaining the highest physical fitness score in the Physical Fitness Test.

SECOND YEAR

The Royal Military College of Canada Award for Academic Excellence in Second Year is awarded annually to the cadet who has obtained the highest academic standing in the Second Year.

The Class of 1942 Memorial Trophy is awarded to the best all-round ROTP/RETP cadet of the Second Yeat in academic standing, leadership, and sportsmanship.

The Grant Prize is awarded to the cadet in Second Yeat attaining the highest physical fitness score in the Physical Fitness Test.

The Military Engineers' Association of Canada Award is presented to the best Second Year Officer Cadet in Engineering.

FIRST YEAR

The Royal Military College of Canada Award for Academic Excellence in First Year is awarded annually to the cadet who has obtained the highest academic standing in the First Year.

The Queen's University Challenge Shield is awarded to the best all-round ROTP/RETP cadet of the First Year in academic standing, leadership, and sportsmanship.

The Fulton Award is awarded to the cadet in First Year attaining the highest physical fitness scote in the Physical Fitness Test.

ANY YEAR

The Edith Boulton Nordheimer Memorial Prize is awarded to the student who in an open competition submits the best essay on a Canadian or Commonwealth topic.

The Lieutenant-Colonel Leroy Fraser Grant Memorial Prize will be presented to the student of any yeat who, in open competition, submits the best essay on othet than a Canadian or Commonwealth topic.

PROGRAMME AND DEPARTMENTAL PRIZES

The MPL Departmental Prize is awarded annually to the cadet in the Fourth Yeat who obtains the highest aggregate mark ovet four years in the required courses of study in the Department of Military Psychology and Leadetship. The recipient must have a minimum mark of A- in the required Fourth Year MPL coutse.

Programme Prizes - Third Year. A ptize is awarded annually to the cadet standing highest in each academic ptogramme in the Third Year, and in each Humanities major, providing the year has been passed without condition and an overall average of A- ot above has been attained.

Departmental Prizes - First and Second Year. A departmental prize is awarded annually to the cadets in First and Second Year who have achieved the highest standing in the several courses of a department provided that the year has been passed without condition and at least A- has been obtained in one of the courses of the department concerned.

Drill and Exercises (ROTP/RETP). Prizes are awarded annually to the ROTP/RETP cadets in each of the First, Second, and Third Years who stand first in the competition for the Military Training Badge.

CANADIAN FORCES MILITARY COLLEGE MEDALS AND PRIZES

The UTPNCM Award of Merit

The UTPNCM Award of Merit is awarded to the graduating UTPNCM cadet attaining the highest standards of proficiency in the academic, military, and spotts aspects of the training.

The Class of 78 - Dr. Walter S. Avis UTPNCM Honour Shield

The UTPNCM Honour Shield is presented annually to the UTPNCM graduate who has conttibuted most to the positive development of the UTPNCM squadron. The UTPNCM Honour Shield is co-sponsored by the UTPNCM graduating class of 1978 and by Mrs. W.S. Avis in memory of Dr. Walter S. Avis who was Dean of the Canadian Forces Military College during 1974-80 and a strong supportet of the squadron.

The winnet of the UTPNCM Award of Merit is excluded from consideration for this award.

Fourth Year Medals

A medal is awarded annually in each of Honouts Arts, Honours Science, and Engineeting to the graduating student entering CFMC with Advanced Standing who, having First Class honours, stands highest among the Advanced Standing CFMC students in the course of study, provided that an overall average of Second Class honours without failures or conditions was maintained in the Third Year.

Prizes

Prizes will be awarded annually to those students entering CFMC with Advanced Standing who stand highest among the Advanced Standing CFMC students in the yeats and programmes listed below, provided that the year has been cleatly passed without condition and that an overall weighted average of A- or bettet has been obtained;

(1) Second Yeat of a three-year (Pass) programme;
(2) Third Year of thtee-yeat (Pass) ptogramme; and
(3) Third Yeat of a fout-yeat ptogramme in each of Arts, Science, and Engineering.

Drill and Physical Education Prize (UTPNCM)

Prizes are awarded:

(1) To the graduating UTPNCM who has maintained throughout the complete course the highest standard in drill and physical education among those graduating; and

(2) To the UTPNCM not in the graduating year who achieves the highest standard in drill and physical education in the year.

ACADEMIC PROGRAMMES

INTRODUCTION

The Royal Military College of Canada offers academic programmes leading to the following degrees:

Bachelor of Arts (BA):

a. Humanities (majors in English, History or French);
b. Social Science (Politics and Economics);
c. Military and Strategic Studies; and
d. Business Administration.

Notes:

1. A minor concentration in Military Psychology and Leadership, or in English, History, French or Politics and Economics may be taken. For more information, consult the section on the Department involved.

2. An Honouts degree will be granted to students who have met the prescribed requirements fot honours in the Humanities, Social Science and Militaty and Strategic Studies programmes; students in Business Administration will be granted the degree with Honours upon satisfying the tequitements specified by this ptogramme.

Bachelor of Science (BSc):

a. Honouts Science with concenttations in Chemistry, Mathematics and Computer Science, or Physics.

b.Space Science.

c.Science.

Note:
A degtee with Honours will be granted to students who have met the prescribed tequitements fot honouts in Honours Science or Space Science.

Bachelor of Engineering (BEng):

a. Chemical and Matetials Engineering;
b. Civil Engineering;
c. Computet Engineering;
d. Electtical Engineeting; and
e. Mechanical Engineeting.

Note:
A degree with Honours will be granted to students who have met the prescribed requitements for honours in the engineeting ptogramme.

The duration of the programme of studies at RMC is four years, no matter which degtee is sought. Howevet, petmission may be granted for a student to repeat not more than one failed yeat, provided performance in all other ateas is satisfactory.

All degree programmes are offered in English and in French. A student will notmally register in academic courses given in the student's first official language. Students who have reached the functional level in theit second language may register in coutses in their second language and in courses taught in a bilingual format.

The College year is divided into two tetms, the Fall Term and the Wintet Term. The academic year normally extends from late August until May.

GENERAL REQUIREMENTS

The subjects in the curriculum ate selected fot their value to potential officers of the Canadian Fotces. Science and Engineering programmes have a high proportion of time devoted to the Arts and, on the othet hand, the Arts programmes have a high proportion of time devoted to Mathematics and Science.

The Physical Education programme is divided into three areas: Intercollegiate sports, Intramural sports, and Physical Training. All cadets must take part in both the Physical Training programme and one of the sports ptogrammes.

Drill is required of all cadets in all fout yeats.

FIRST YEAR

First Year may be completed in either Arts or in the General Course.

Students who complete the Fitst Year Genetal Course may proceed in Engineering, Honours Science, or Space Science.

They may also enter Second Year Arts but will be required to make up specific Arts courses ftom First Year.

SECOND YEAR

In Second Yeat, Coutses of Study are available in Arts, Science, ot Engineeting. Details may be found in the Course Outlines section.

Arts:

The following Courses of Study in the Arts are available:

HUMANITIES, Honours and General (Majors in English, Ftench ot History)
SOCIAL SCIENCES, Honouts and General (Major in Politics and Economics)
MILITARY AND STRATEGIC STUDIES, Honouts and General
BUSINESS ADMINISTRATION, with Honouts and General.

Students in the Arts (Humanities, Social Sciences and Military and Sttategic Studies) will normally select theit Course of Study in Second Year. Students intending to study Business Administration will begin their programme in Second Year. A Coutse of Study consists of a major concenttation of courses in one programme, together with a number of Arts courses which are required of all students.

In addition to developing a Coutse of Study, students may also develop a minor concentration in one subject (History, English, French, Politics and Economics) which is not an integral part of their Course of Study. A minor concentration is also available in Military Psychology and Leadership.

Entry into Honours Atts is normally open to those students who have completed First Year Arts and have met the requirements as set down by the department ot programme in which they wish to pursue Honours.

Science:

Second Year Science students may choose from Honours Science, Space Science or Science. The Fall Tetm of Second Year is common for all Science and Engineering students; specialization begins in the Wintet Term of Second Year.

Engineering:

Except for prospective Civil Engineets, engineeting students take a common Second Year. Specialization in Civil Engineeting begins with the Wintet Tetm.

THIRD AND FOURTH YEAR ARTS

Arts students may entol in a Coutse of Study in the Humanities, Social Sciences and Military and Strategic Studies in Thitd Year. Specified course requirements from Second Year will complement the selected programme.

A course of study selected in Third Year will normally be continued in the Fourth Yeat.

In addition to requirements of Second Language Ttaining, Physical Education, and Dtill, a Course of Study in Arts at eithet the Honouts or the General levels requites the completion of five and one half full courses in each of the Third and Fourth Years. (The mandatory courses in Military Psychology and Leadership ate included in this numbet and the specific tequitements of the Department involved must also be satisfied).

The actual courses which will be taken in each of the Third and Fourth Year will be dependent upon specific degree tequitements (see course outlines section) and timetable limitations; at least two full coutses from the ptesctibed Course of Study must be taken each year.

THIRD AND FOURTH YEAR SCIENCE

Students completing Second Year Honouts Science with a combined average in Chemistry, Mathematics and Physics of B- ot hetter may entet Third Yeat Honours Science, Space Science ot Science. Students completing Second Year Space Science may enter Third Space Science or Science. Students completing Second Year Science may continue in Third Year Science.

HONOURS SCIENCE

Honouts Science is a demanding, elite ptogramme offered to students fot whom academic challenge is a ptiotity. Honouts ptogrammes are focussed on fundamental principles of science, and their applications in various fields. Concenttations are available in chemistry, mathematics and computer science, and physics.

Students wishing an Honours degree should apply to the Head of the depattment of the desired concentration.

SCIENCE

Students in Science must complete the tequired coutses in Military Psychology and Leadetship, Drill, Physical Education, and Arts and other courses in the Thitd and Fourth Years totalling a minimum of 80 Weights, with a minimum of 30 Weights in each of the Third and Fourth Yeats. At least 60 weights must be taken in an approved concentration.

Students in Science may select a concenttation in chemistty, mathematics and computer science, ot physics.

Students wishing a degree in Science should apply ro the Head of the departmenr of the desired concentration. Upon completion of registration, the approved set of courses will constiture the student's programme of study for the purposes of Academic Regulations. With the approval of the Dean of Science and on the recommendation of the Dean of Engineering, students in the Fourth Year of an Engineering programme may be admitted to Science with a concentration in the appropriate engineering discipline. The approved courses will constitute the student's programme of study for the purposes of Academic Regulations.

COURSE OF STUDY

The prescribed course of srudy for Honours Science is set out in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 9
Fourth Year	Table 18

Details of Science concentrations are set out in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 9
Fourth Year	Table 18

SPACE SCIENCE

The programme in Space Science emphasizes concepts and technologies related to the signals and communications aspects of space activities. The programme is thoroughly grounded in the natural sciences and mathematics with a series of specialized courses concentrated in the final two years. The fundamental courses develop the student's intellect by activities and studies requiring a rigorous scientific method. In the specialized courses, the student learns to apply this basic training to the development of operations in Space.

Students wishing a degree in Space Science should apply to the Head of the Physics department.

CONDITIONS OF ENTRY

Admission to Science is open to students who have successfully completed the Second Year Honours Science programme, the Second Year Space Science programme or the Second Year Engineering programme.

HONOURS DEGREE IN SPACE SCIENCE

Students in Space Science who complete a programme with at least 125 Weights in Science in Third and Fourth Year, without supplemental examinations and who maintain a Second Class average in rheir Science courses in Third and Fourth Year will be awarded an Honours degree. A degree in Space Science will not be awarded to students whose programme torals less than 105 Weights in Science in Third and Fourth Year.

COURSE OF STUDY

The prescribed course of study for Space Science is set out in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 10
Fourth Year	Table 19

GENERAL SCIENCE

Students in a General Science programme must complete the required courses in Military Psychology and Leadership, Drill, Physical Educarion, and Arts, and courses offered by the Division of Science in the Third and Fourth Years totalling a minimum of 80 Weights, with a minimum of 30 Weights in each of the Third and Fourth Years. Up to 24 Weights may be substituted from courses offered by the Division of Arts or the Division of Engineering, with the permission of the department offering the course. A student's selection of courses must be approved by a department of the Division. Upon completion of registration, the courses selected will constitute the student's programme of study for the purposes of Academic Regulations.

THIRD AND FOURTH YEAR ENGINEERING

Students completing Second Year Engineering may proceed in an engineering programme for which they have qualified; admission to Third Year requires the approval of the department concerned and is dependant upon meeting the minimum average requirements specified for the programme. A combined average of D+ or better in Mathematics, Physics and Chemistry in Second Year is normally required. The optional engineering programmes are Chemical and Materials Engineering, Civil Engineering, Computer Engineering, Electrical Engineering or Mechanical Engineering.

With the approval of the Dean of Science, exceprional students who complete Second Year Engineering may be permitted to enter Third Year Honours Science.

A student admitted to a Third Year Engineering programme will normally remain in that programme in Fourth Year.

AGREEMENT BETWEEN RMC AND QUEEN'S UNIVERSITY

Long standing co-operative ventures with Queen's have now been extended to undergraduate courses. Cadets at RMC and students at Queen's may now, subject to Departmental approval, take undergraduate courses at rhe other institution and count these courses as credits towards their degrees. Normally, the choice of courses will be limited to third-year and fourth-year courses.

COURSE OUTLINES

COURSE IDENTIFICATION CODE

Each course is identified by a six- or seven-character code.

Example: EEE341B

The first two letters indicate the Department or subject of the course; in this example it is Electrical Engineering.

The third letter indicates the language in which the course is given; either E for English, as in the above example, or F for Français (French).

The three digit course numbering indicates exactly which course in a subject area is referred to. The first digit indicates the year in which the course is normally offered. The second and third digits indicate the departmental course number.

The seventh character, if present, indicates that the course is a one-term course. The letter A indicates that it is given in the Fall Term and the letter B indicates a course given in the Winter Term. A code of only six characters represents a full-year course. Some courses have a "A/B" as the seventh and eight characters. This indicate that the course may be given in the fall or winter.

Credit for one-half of a full-year course may be granted and in such cases the course identification code will be augmented by a seventh character. Addition of the digit "1" represents completion of the Fall Term portion of the course while the addition of the digit "2" denotes completion of the Winter Term portion.

Listed below are the subject codes for courses given in English and their counterpart for courses given in French.

BAE - Business Administration
AAF - Administration des affaires
CEE - Civil Engineering
GCF - Génie civil
CME - Chemistry and Chemical Engineering
CMF - Chimie et génie chimique
CSE - Computer Science
INF - Informatique
DRE - Drill
EXF - Exercice
ECE - Economics
ECF - Economie politique
EEE - Electrical Engineering
GEF - Génie électrique
ENE - English
FRE - French*
FRF - Français*
GEE - General Engineering
IGF - Ingénierie générale
GME - German*
ALF - Allemand*
GOE - Geography
GOF - Géographie
HIE - History
HIF - Histoire
MAE - Mathematics
MAF - Mathématiques
MEE - Mechanical Engineering
GMF - Génie mécanique
NEE - Nuclear Engineering
GNF - Génie nucléaire
PEE - Physical Education
EPF - Education physique
PHE - Physics
PHF - Physique
POE - Politics
POF - Politique
PSE - Military Psychology and Leadership
PSF - Psychologie militaire et leadership
SCE - Science
SCF - Sciences
SLE - Second Language*
LSF - Langue seconde*
SPE - Spanish *
ESF - Espagnol

* In the case of these subjects, the third letter of the code indicates the primary language of the majority of students taking the course.

COURSE DESCRIPTIONS

Course descriptions are given in the departmental sections of the Calendar. Following the descriptions of each course a three digit code (3 - 1 - 6) is displayed. The first digit identifies the number of periods per week allotted to lectures, the second digit indicates the number of periods allotted to laboratory work or practical exercises and the third digit indicates the recommended number of hours to be spent on assignments or individual study in order to reach the course objectives.

The assigned weight for the course is also shown with each course description. Weights, and their uses, are explained in the Academic Regulations.

TABLE 1 – FIRST YEAR ARTS

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
ENE110: Lit and Comp	12	4	-	4	8	4	-	4	8	
HIE100: European Tradition	12	3	-	3	6	3	-	3	6	
PSE112: Intro Psych	12	3	-	3	6	3	-	3	6	
ECE102: Elmnts of Economics	12	3	-	3	6	3	-	3	6	
POE104: Intro to Govt & Pol	12	3	-	3	6	3	-	3	6	
MAE100: Elements of Calculus	12	3	1	4	6	3	1	4	6	
SCE100A: Fundmntls of Science	6	3	-	3	6	-	-	-	-	
SLEFR1:	-	-	5	5	-	-	5	5	-	
PEE101:	-	-	2	2	-	-	2	2	-	
DRE101:	-	-	2	2	-	-	1	1	-	
TOTAL	78	22	10	32	44	19	9	28	38	

TABLE 2 – FIRST YEAR GENERAL COURSE

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
ENE100: Comp and Lit	16	4	-	4	4	4	-	4	4	
PSE123A: Psych-Fundamentals	6	3	-	3	3	-	-	-	-	
MAE101: Intro. Calculus	16	3	2	5	5	3	2	5	5	
MAE109: Linear Algebra	14	3	1	4	4	2.5	1.5	4	4	
PHE105: Mechanics	12	2	0.5	2.5	2.5	2	1	3	3	
PHE107: Optics & Electricity	12	2	0.5	2.5	2.5	2	1	3	3	
Expt. Physics	-	-	2	2	2	-	2	2	2	A
CME101: Engr Chemistry I	16	3	2	5	5	3	2	5	5	
SLEFR1:	-	-	5	5	-	-	5	5	-	
PEE101:	-	-	2	2	-	-	2	2	-	
DRE101:	-	-	2	2	-	-	1	1	-	
TOTAL	92	20	17	37	28	16.5	17.5	34	26	

NOTES: A – Standing in Experimental Physics will be weighted equally into PHE105 and PHE107.

TABLE 3 – SECOND YEAR ARTS

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
ENE200: 20th Century Lit	12	3	-	3	6	3	-	3	6	
HIE202: Canada	12	3	-	3	6	3	-	3	6	
Arts Elective 1	12	3	-	3	6	3	-	3	6	A,B
Arts Elective 2	12	3	-	3	6	3	-	3	6	A,B
Science Elective 1	6	3	-	3	6	-	-	-	-	C
Science Elective 2	6	-	-	-	-	3	-	3	6	C
SLEFR2:	-	-	5	5	2	-	5	5	2	
PEE201:	-	-	2	2	-	-	2	2	-	
DRE201:	-	-	1	1	-	-	1	1	-	
TOTAL	60	15	8	23	32	15	8	23	32	

Notes: A – No more than the equivalent of two full year courses can be taken from the same department. Thus, students can elect to take only one additional full-year course in English or History.

B – Students wishing to obtain a minor should do so starting in Second Year. Minors are available in Psychology, English, French, History, Politics or Economics. Consult the Department responsible for the minor for more details.

C – Students lacking senior secondary school credit in Chemistry must take CME200A: Contemporary Chemistry; those lacking such credit in Physics must take PHE202B: Elementary Physics. MAE200A: Probability and Statistics is recommended for those planning to emphasize Economics.

TABLE 4 – SECOND YEAR ARTS – BUSINESS ADMINISTRATION

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
BAE204: Financial Accounting	12	3	-	3	6	3	-	3	6	
BAE216B: Marketing Fundamntls	6	-	-	-	-	3	-	3	6	
BAE242B: Quant. Methods I	6	3	-	3	6	-	-	-	-	
ENE200: 20th Century Lit	12	3	-	3	6	3	-	3	6	
HIE202: Canadian Mil Hist	12	3	-	3	6	3	-	3	6	
ECE306A: Macroec Part I	6	3	-	3	6	-	-	-	-	
ECE324A: Microec Part II	6	3	-	3	6	-	-	-	-	
Arts Elective	6	-	-	-	-	3	-	3	6	
MAE220B: Introductory Logic	6	-	-	-	-	3	-	3	6	
SLEFR2	-	-	5	5	2	-	5	5	2	
PEE201	-	-	2	2	-	-	2	2	-	
DRE201	-	-	1	1	-	-	1	1	-	
TOTAL	72	18	8	26	38	18	8	26	38	

TABLE 5 – SECOND YEAR ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
HIE203A: Cdn. Mil. History	6	3	-	3	3	-	-	-	-	
HIE289B: Science & Tech on Western	(6)	-	-	-	-	(3)	-	(3)	(3)	E
World	(14)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	A
MAE201: Interm. Calculus	13	2.5	1.5	4	4	2.5	1.5	4	4	
MAE203: Engineering Calculus	14	3	1	4	4	3	1	4	4	
MAE209: Prog'g; Prob & Stats	5	2	-	2	2	2	-	2	2	
PHE205A: Waves & Vibrations	6	2	-	2	2	-	-	-	-	
PHE207A: Electricity & Mag	-	-	3	3	3	-	-	-	-	B
Expt. Physics	11	2	1	3	3	3	-	-	3	
GEE223: Engrg Chem & Mat	6	-	-	-	-	2	2	4	4	
GEE231B: Intro Mechs of Mtrls	(10)	-	-	-	-	(4)	(2)	(6)	(6)	C
GEE235B: Earth Sciences	10	-	-	-	-	4	2	6	6	D
GEE241B: Electr Technology	8	1	2	3	3	1	2	3	3	
GEE263: Engineering Graphics	4	2	-	2	2	-	-	-	-	
GEE283A: Engr Economics	6	-	-	-	-	3	-	3	3	E,C
GEE289B: Sc&Tech on Envirnmnt	-	-	5	5	2	-	5	5	2	
SLEFR2: PEE201:	-	-	2	2	-	-	2	2	-	
DRE201:	-	-	1	1	-	-	1	1	-	
TOTAL	89	17.5	16.5	34	28	18.5	16.5	32	29	

NOTES:
A – Qualified engineering students who wish to take MAE201 are encouraged to do so.
B – Standing in Experimental Physics will be weighted equally into Physics lecture courses.
C – For Civil Engineering.
D – For other Engineering.
E – One course to be selected

TABLE 6 – SECOND YEAR HONOURS SCIENCE AND SPACE SCIENCE

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
HIE203A: Cdn. Mil. History	6	3	-	3	3	-	-	-	-	
HIE289B: Sc & Tech W.Wrld	6	-	-	-	-	3	-	3	3	A
MAE201: Interm. Calculus	(14)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MAE203: Engrg Calculus	13	2.5	1.5	4	4	2.5	1.5	4	4	B
MAE209: Pro'g: Prob & Stats	14	3	1	4	4	3	1	4	4	C
CSE250B: Data Structure	7	-	-	-	-	3	1	4	4	C
CSE352B: Apps in Comp Sci	(7)	-	-	-	-	(3)	(1)	(4)	(4)	D
PHE205A: Waves & Vibrations	5	2	-	2	2	-	-	-	-	
PHE207A: Electricity & Mag	6	2	-	2	2	-	-	-	-	
PHE225B: Modern Physics	6	-	-	-	-	2	-	2	2	
PHE227B: Electromagnetism	5	-	-	-	-	2	-	2	2	
Expt'l. Physics	-	-	3	3	3	-	3	3	3	E
CME223: Phys & Inorg Chem	12	2	1	3	3	3	1	4	4	D
GEE223: Engr & Mat Chem	(11)	(2)	(1)	-	(3)	(3)	-	-	(3)	F
GEE265A: Engineering Drawing	4	1	2	3	3	-	-	-	-	
GEE283A: Engr Economics	4	2	-	2	2	-	-	-	-	
GEE289B: Sc & Tech on Envirnmnt	(6)	-	-	-	-	(3)	(1)	(4)	(4)	A
SLEFR2:	-	-	5	5	2	-	5	5	2	
PEE201:	-	-	2	2	-	-	2	2	-	
DRE201:	-	-	1	1	-	-	1	1	-	
TOTAL	88	17.5	16.5	34	28	18.5	15.5	34	28	

NOTES:
A – One course to be selected.
B – MAE201 is normally required for Honours Science. Other students may take MAE201 with permission from the Dean of Science
C – Students in Science may drop the second term of MAE209 or CSE250B or the second term of CME223 with permission from the Dean of Science
D – Honours Science students intending to take the Math and Comp Sci option or the Physics option could take CSE352B instead of the second term of CME223
E – Standing in Experimental Physics will be weighted equally into the Physics lecture courses.
F – Either CME223 or GEE223 is acceptable. Fall term of both courses is identical.

TABLE 7 – THIRD YEAR ARTS

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A:Org. Behavior & Leadership	6	3	-	3	3	-	-	-	-	
Arts courses: Student must take a minimum of the equivalent of 4.5 full-year Arts courses required to be taken over the Fall & Winter terms.	54	15	-	15	30	12	-	12	24	
Sci. Courses: Student must take one term course in either the fall or winter.	6	(3)	-	(3)	(3)	3	-	3	3	
SLEFR3:			5	5	2		5	5	2	
PEE301:			2	2			2	2		
DRE301:			1	1			1	1		
TOTAL	66	18	8	26	35	15	8	23	29	

NOTES: A – For details on individual programmes and course descriptions see the entries under the respective Departments. Students should consult the yearly listing of courses offered provided by the Registrar's office. Students wishing to obtain a minor must include course selections in this count and obtain the Department Head's approval for the minor. Extra courses are permitted, but require the approval of the Dean of Arts.

B – Arts students must take one single-term science course. A list of courses offered is available from the Registrar's office.

TABLE 8 – THIRD YEAR BUSINESS ADMINISTRATION

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
	6	-	-	-	-	3	-	3	6	
BAE300B: Finance	6	-	-	-	-	3	-	3	6	
BAE308B: Mgt. Acct. Info-Systems	6	3	-	3	6	-	-	-	-	
BAE316A: Intermed. Marketing	6	3	-	3	6	-	-	-	-	
BAE320A: Business Law	6	3	-	3	6	-	-	-	-	
BAE330A: Organizational Theory	6	-	-	-	-	3	-	3	6	
BAE340B: Production Mgmt	6	3	-	3	6	-	-	-	-	
BAE342A: Quant Methods II	12	3	-	3	6	3	-	3	6	
Arts Electives	6	(3)	(-)	(3)	(6)	3	-	3	6	A.B
Science Electives	-	-	5	5	2	-	5	5	2	A.B
SLEFR2:	-	-	2	2	-	-	2	2	-	
PEE201:	-	-	1	1	-	-	1	1	-	
DRE201:										
TOTAL	66	18	8	26	35	15	8	23	32	

NOTES: A – A list of courses can be obtained from the Registrar's office. The list includes courses for minors.
B – Arts and Science electives may be taken in the fall and/or WinterTerms. Students should be sure to balance their course load over the two semesters as much as possible.

TABLE 9 – THIRD YEAR HONOURS SCIENCE

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org Behav & Ldrship	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE302: D.E. & Complex Analysis	12	3	-	3	4	3	-	3	4	B
MAE304A: Algebra & Graph Theory	(6)	(3)	-	(3)	(4)	-	-	-	-	M,P
CSE352B: Appl'n in Comp Science	(7)	-	-	-	-	(3)	(1)	(4)	(4)	M,P,E
CSE321A: Comp & Algor Analysis	(8)	(3)	(2)	(5)	(4)	-	-	-	-	M
CSE323B: Formal Lang & Auto	(8)	-	-	-	-	(3)	(2)	(5)	(4)	M
PHE302: Electromag Waves	(10)	(2)	(1)	(3)	(3)	(2)	(1)	(3)	(3)	P
PHE303B: Stat & Thermal Phys	(6)	-	-	-	-	(3)	-	(3)	(4)	P
PHE304: Quantum Physics	(8)	(2)	-	(2)	(3)	(2)	-	(2)	(3)	P
PHE338B: Undergrad Seminar	(6)	-	-	-	-	(1)	(2)	(3)	(4)	P
PHE364B: Physics Lab	(4)	-	-	-	-	-	(4)	(4)	(2)	P
CME302A: Mol Struct & Spectry	6	3	-	3	4	-	-	-	-	P,C
CME307B: Phys & Inorg Chem II	6	-	-	-	-	3	-	3	4	C
CME317B: Kinetics & Surface Sc	8	-	-	-	-	4	-	4	4	C
CME320B: Chemistry Lab	4	-	-	-	-	-	4	4	4	C
CME337B: Seminar	0	-	-	-	-	-	0.5	0.5	-	C
CME341: Organic Chemistry	14	3	2	5	5	2	2	4	4	C
CME345A: Metallurg Lab	3	-	3	3	3	-	-	-	-	C
CME353A: Struct Solids & Metals	6	3	-	3	4	-	-	-	-	C
CME385B: Biochemistry	6	-	-	-	-	3	-	3	4	C
EEE351A: Cptr. Org & Assm Lang	(8)	(3)	(2)	(5)	(5)	-	-	-	-	M
EEE371B: Operating Systems	(8)	-	-	-	-	(3)	(2)	(5)	(5)	M
Math or Comp Sci elective	(8)	-	-	-	-	(3)	(2)	(5)	(5)	M,E
SLEFR3	-	-	5	5	2	-	5	5	5	
PEE301	-	-	2	2	-	-	2	2	2	
DRE301	-	-	1	1	-	-	1	1	-u	
TOTAL	77	16.5	13	29.5	26.5	16.5	14.5	31	27.5	D

NOTES:
A – A list of courses can be obtained from the Registrar's office.
B – MAE320 is required for Honours Science. For Chemistry option only, MAE305 may be substituted with permission.
C – Chemistry option
D – Weights and hours will vary according to option selected. Figures shown are for Honours Chemistry option.
M – Mathematics and Computer Science option.
P – Physics

TABLE 10 – THIRD YEAR SPACE SCIENCE

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE330: Signal Processing	12	3	-	3	4	3	-	3	4	
MAE350A: Orbital Mechanics	6	3	-	3	4	-	-	-	-	
CSE352B: Computing Applic'ns	7	-	-	-	-	3	1	4	4	B
BAE308B: Mang. Acc & Info Syst	6	-	-	-	-	3	-	3	6	B
PHE300: Modern Physics	8	2	-	2	3	2	-	2	3	
PHE302: Electromag Waves	10	2	1	3	3	2	1	3	3	
PHE331: Instrumentation	12	2	2	4	3	2	2	4	3	
PHE352B: Astronomy	6	-	-	-	-	3	-	3	3	
PHE354A: Space Systems	5	2	1	3	2	-	-	-	-	
PHE364B: Physics Lab	4	-	-	-	-	-	4	4	1	
SLEFR3:	-	-	5	5	2	-	5	5	2	
PEE301:	-	-	2	2	-	-	2	2	-	
DRE301:	-	-	1	1	-	-	1	1	-	
TOTAL	82	18.5	12	30.5	25.5	19.5	16	35.5	30.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.
B – One course to be selected.

TABLE 11 – THIRD YEAR CHEMICAL & MATERIALS ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE315: Appl Math for C&ME	12	3	-	3	3	3	-	3	3	
CME301: Fld Mechs & Heat Tr	9	2.5	-	2.5	2.5	2	-	2	2	
CME303A: Energy & Fuels Engrg	6	3	-	3	-	-	-	-	-	
CME311: Appld Thermodynamics	10	2	-	2	2	3	-	3	3	
CME317B: Kinetics & Surface Sci	8	-	-	-	-	4	-	4	4	
CME321I: Microcomputer Lab	3	-	3	3	3	-	-	-	-	
II: Engineering Lab	5	-	-	-	-	-	5	5	5	
CME337B: Seminar	0	-	-	-	-	-	0.5	0.5	-	
CME341: Organic Chemistry	14	3	2	5	5	2	2	4	4	
CME345A: Metallurgy Lab	3	-	3	3	3	-	-	-	-	
CME353A: Materials Science	6	3	-	3	3	-	-	-	-	
CME385B: Biochem of Environ't	6	-	-	-	-	3	-	3	3	
MEE321B: Heat Engines Lab	(2)	-	-	-	-	-	(2)	(2)	(2)	
SLEFR3:	-	-	5	5	2	-	5	5	2	
PEE301:	-	-	2	2	-	-	2	2	-	
DRE301:	-	-	1	1	-	-	1	1	-	
TOTAL	94	21	16	37	31	18.5	15.5	34	27.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.

TABLE 12 – THIRD YEAR CIVIL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
CEE303A: Strength of Materials	8	3	-	5	5	-	-	-	-	
CEE305B: Structural Theory	7	-	-	-	-	3	2	5	-	
CEE311B: Engineering Materials	7	-	-	-	-	3	2	5	5	
CEE317A: Civ Eng Analysis I	6	2	2	4	4	-	-	-	5	
CEE319B: Civ Eng Analysis II	5	-	-	-	-	2	1	3	-	
CEE355A: Soil Mechanics	7	3	2	5	5	-	-	-	-	
CEE361: Geomatics	13	3	1	4	4	3	1	4	6	
CEE363B: Survey Field School*	6	-	-	-	-	-	-	-	4	
CEE385B: Intro-Env'l Engrg	7	-	-	-	-	3	1	4	-	
CEE387B: Highway Design	(7)	-	-	-	-	3	2	5	5	
MEE315A: Fluid Mechanics	8	3	2	5	5	-	-	-	4	
SLEFR3:	-	-	5	5	2	-	5	5	-	
PEE301:	-	-	2	2	-	-	2	2	2	
DRE301:	-	-	1	1	-	-	1	1	-	
TOTAL	93	18.5	17	35.5	29.5	18.5	17	35.5	29.5	

* The duration of the Winter Term is 12 1/2 weeks, followed by a two week examination period. The two-week survay school is held immediately after the examinations.

NOTES: A – A list of courses can be obtained from the Registrar's office.

TABLE 13 – THIRD YEAR COMPUTER ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE302: D.E. & Complex Anal	(12)	(3)	-	(3)	(4)	(3)	-	(3)	(4)	B
MAE305: C Var, D.E. Bndr Val	14	3	1	4	4	3	1	4	4	
CSE365A: Cmptr Programme	8	3	2	5	5	-	-	-	-	
Design	8	-	-	-	-	3	2	5	5	
EEE307B: Interfacing Techniques	8	-	-	-	-	3	2	5	5	
EEE341B: El Dev & Ccts	8	3	2	5	5	-	-	-	-	
EEE343A: Basic Network Analysis	8	3	2	5	5	-	-	-	-	
EEE345A: Logic Design	8	3	2	5	5	-	-	-	-	
EEE351A: Cptr Org & Assm Lang	8	-	-	-	-	3	2	5	5	
EEE365B: M&S - Digital Systems	8	-	-	-	-	3	2	5	5	
EEE371B: Princs of Op Systems	-	-	5	5	2	-	5	5	2	
SLEFR3:	-	-	2	2	-	-	2	2	-	
PEE301:	-	-	1	1	-	-	1	1	-	
DRE301:										
TOTAL	90	19.5	17	36.5	30.5	16.5	17	33.5	27.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.

B – Those candidates who have completed MAE201 in Second Year and have achieved a Mathematics and Physics average of at least Second Class Honours standing may elect MAE302 instead of MAE305.

TABLE 14 – THIRD YEAR ELECTRICAL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE302: D.E. & Complex Anal	(12)	(3)	-	(3)	(4)	(3)	-	(3)	(4)	B
MAE305: C Var, D.E. Bndr Val	14	3	1	4	4	3	1	4	4	
EEE301B: Applied Electromag	8	-	-	-	-	3	2	5	5	
EEE307B: Interfacing Techniques	8	-	-	-	-	3	2	5	5	
EEE311B: Signals & Systems	8	-	-	-	-	3	2	5	5	
EEE331A: Energy Conservation	8	3	2	5	5	-	-	-	-	
EEE341B: El Dev & Ccts	8	-	-	-	-	3	2	5	5	
EEE343A: Basic Network Analysis	8	3	2	5	5	-	-	-	-	
EEE345A: Logic Design	8	3	2	5	5	-	-	-	-	
EEE351A: Cptr Org & Assm Lang	8	3	2	5	5	-	-	-	-	
SLEFR3:	-	-	5	5	2	-	5	5	2	
PEE301:	-	-	2	2	-	-	2	2	-	
DRE301:	-	-	1	1	-	-	1	1	-	
TOTAL	90	19.5	17	36.5	30.5	16.5	17	33.5	27.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.

B – Those candidates who have completed MAE201 in Second Year, and have achieved a Mathematics and Physics average of at least Second Class Honours standing, may elect MAE302 instead of MAE305.

TABLE 15 -- THIRD YEAR MECHANICAL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE301A: Org. Behavior & Ldsp	6	3	-	3	3	-	-	-	-	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE327A: D.E., Bndr Val, C Var	9	4	1	5	5	-	-	-	-	
MEE301B: Machine Design	8	-	-	-	-	3	-	2	5	
MEE303B: Engineering Design	7	-	-	-	-	3	-	1	4	
MEE311B: Fluid Dynamics	8	-	-	-	-	3	-	2	5	
MEE331A: Strength of Materials	8	3	2	5	5	-	-	-	-	
MEE333A: Metlrgy & Engrg Mtls	8	3	2	5	5	-	-	-	-	
MEE335A: Shopwork & Production	8	3	-	3	3	-	-	-	-	
MEE345B: Applied Mechanics	8	-	-	-	-	3	-	2	5	
MEE351A: Thermodynamics I	8	3	2	5	5	-	-	-	-	
MEE353B: Thermodynamics II	8	-	-	-	-	3	-	2	5	
MEE383B: Meas Dvcs & Systems	8	-	-	-	-	3	-	2	5	
SLEFR3:	-	-	5	5	2	-	-	5	2	
PEE301:	-	-	2	2	-	-	-	2	-	
DRE301:	-	-	1	1	-		-	1	-	
TOTAL	95	17.5	18	35.5	29.5	19.5	19	38.5	32.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.

TABLE 16 – FOURTH YEAR ARTS

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prf'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Courses: Student must take a minimum of the equivalent of 4.5 full-year Arts courses required to be taken over Fall and Winter terms.	54	15	-	15	30	12	-	12	24	A
Sci Courses: Student must take one term course in either the fall or winter	6	3	-	3	3	(3)	-	(3)	(3)	
SLEFR4:	-	-	5	5	2		5	5	2	
PEE401:	-	-	2	2	-		2	2	-	
DRE401:	-	-	1	1	-		1	1	-	
TOTAL	66	18	8	26	35	15	8	23	32	

NOTES: A – For details on individual programmes and course descriptions see the entries under the respective Departments. Students should consult the yearly listing of courses offered provided by the Registrar's office. Students wishing to obtain a minor must include course selections in this count and obtain the Department Head's approval for the minor. Extra courses are permitted but require the approval of the Dean of Arts.

B – Arts student must take one single-term science course; a list of courses offerred is available from the Registrar's office.

TABLE 17 – FOURTH YEAR BUSINESS ADMINISTRATION

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Military Prof & Ethics	6	-	-	-	-	3	-	3	6	
BAE430B: Labor Rlns, Human Res	6	-	-	-	-	3	-	3	6	
BAE450: Advncd Topics in Mgmt	12	3	-	3	6	3	-	3	6	
BAE452: Business Policy	12	3	-	3	6	3	-	3	6	
POE332A: Pub Adm in Canada	6	3	-	3	6	-	-	-	-	
Arts electives	18	6	-	6	12	3	-	3	6	A,B
Science electives	6	(3)	(-)	(3)	(6)	3	-	3	6	A,B
SLEFR3:	-	-	5	5	2	-	5	5	2	
PEE301:	-	-	2	2	-	-	2	2	-	
DRE301:	-	-	1	1	-	-	1	1	-	
TOTAL	66	15	8	23	32	18	8	26	35	

NOTES: A – A list of courses can be obtained from the Registrar's office.
B – Arts and Science electives may be taken in the Fall and/or the Winter Terms. Students should ensure to balance their course load over the two semesters as much as possible.

TABLE 18 – FOURTH YEAR HONOURS SCIENCE †

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MAE402: Applied Mathematics	12	3	-	3	3	3	-	3	4	M,P
MAE456A: Math Modelling	(6)	(3)	(0)	(3)	(4)	-	-	-	-	M
CSE444A: Cptr Applicns Lab	(6)	(0)	(4)	(4)	(4)	-	-	-	-	M,D
CSE483B: Database Management	(8)	-	-	-	-	(3)	(2)	(5)	(5)	M
Math & Computer Science Electives	(16)	(3)	(2)	(5)	(5)	(3)	(2)	(5)	(5)	M
PHE403: Solid State Physics	8	2	-	2	3	2	-	2	3	P
PHE407: Applied Optics	10	2	1	3	4	2	1	4	3	P
PHE413: Nucl & Particle Physics	8	2	-	2	3	2	-	2	3	P
PHE451A: Senior Physics Lab	4	-	4	4	2	-	-	-	-	P
CME403: Mat. Sci: Polymers	(9)	(3)	-	(3)	(4)	(1)	(1)	(2)	(3)	C
CME437B: Seminar	-	-	-	-	-	-	0.5	0.5	-	C
CME441A: Mat'l Anal Lab	(5)	(1)	(3)	(4)	(5)	-	-	-	-	C
CME449: Therm & Electrochem	(10)	(2)	-	(2)	(2)	(2)	(2)	(4)	(4)	C
PHE304: Quantum Physics	(8)	(2)	-	(2)	(3)	(2)	-	(2)	(3)	C
SCE420: Seniors Projects	12	-	6	6	6	-	6	6	6	M,P,C
Science/Engineering Electives	(6)	-	-	-	-	(3)	-	(3)	(3)	M,E
Science/Engineering Electives	12	3	-	3	4	3	-	3	4	P,E
Science/Engineering Electives	(24)	(6)	-	(6)	(6)	(6)	-	(6)	(6)	C,E
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	78	13.5	19	32.5	29.5	16.5	15.5	32	32.5	F

NOTES:
A – A list of courses can be obtained at the Registrar's office
C – Chemistry option
D – One course to be selected.
E – Course selection subject to approval of all the departments involved.
F – Total weights and hours vary according to option chosen. Figures shown are for Physics option.
P – Physics option
M – Mathematics and Computer Science option.

† Fourth Year Honours Science takes effect in 1998-99. For 1997-98, refer to the 1995-97 College Calendar.

TABLE 19 – FOURTH YEAR SPACE SCIENCE

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
POE450B: Space Policy	6	-	-	-	-	3	-	3	6	B
BAE430B: Lab Rel & Topics in H R Mgt	6	-	-	-	-	3	-	3	6	B
MAE430: Signal & Image Proc	12	2	2	4	5	2	2	4	5	
MAE456A: Modelling	6	3	-	3	4	-	-	-	-	C
EEE411A: Communicat'n Theory	8	3	2	5	5	-	-	-	-	C
PHE4071: Applied Optics-Pt 1	5	2	1	3	3	-	-	-	-	
PHE420: Senior Project	12	-	4	4	6	-	4	4	6	D
PHE422: Spacecraft Design (USN)	12	-	4	4	6	-	4	4	6	D
PHE442B: Intro-Astrophysics	6	-	-	-	-	3	-	3	4	E
EEE433B: Satellite & Mbl Comm	8	-	-	-	-	3	2	5	5	E
PHE450A: Space Comm/Navig'n	4	2	-	2	3	-	-	-	-	
PHE452B: Remote Sensing	7	-	-	-	-	3	1	4	5	
CME452: Mtls & Phys of Space	8	2	-	2	4	2	-	2	4	
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	78	12.5	15	27.5	28.5	17.5	15	32.5	39.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.
BC,D,E – One course to be selected from each group.

TABLE 20 – FOURTH YEAR CHEMICAL & MATERIALS ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
CME405: Separat'n Operations	8	2	-	2	2	2	-	2	2	
CME407A: Reaction Engineering	6	3	-	3	3	-	-	-	-	
CME409B: Combustion Engrg	6	-	-	-	-	3	-	3	3	B
CME413B: Modelling, Optimizat'n	6	-	-	-	-	3	-	3	3	
CME415A: Control Systems	6	3	-	3	3	-	-	-	-	
CME417: Design Project	9	-	2	2	2	-	4	4	4	
CME421: Engineering Lab	6	-	3	3	3	-	3	3	3	
CME425: Materials Engrg	9	3	-	3	3	1	1	2	2	
CME427: Corros'n & Electroch	10	3	-	3	3	2	-	2	2	
CME437B: Seminar	0	-	-	-	-	-	0.5	0.5	-	
CME441A: Materials Analysis	5	1	3	4	4	-	-	-	-	
CME485B: Waste Treatment Proc	(6)	-	-	-	-	(3)	-	(3)	(3)	B
NEE401: Nuclear Sc & Engrg	8	2	-	2	2	2	-	2	2	
EEE419B: Energy Conversion	5	-	-	-	-	2	1	3	3	
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	96	18.5	16	34.5	28.5	19.5	17.5	37	29.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.
BC,D,E – One course to be selected from each group.

TABLE 21 – FOURTH YEAR CIVIL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
CEE403A: Intr Conc Reinf Conc	6	2	2	4	4	-	-	-	-	
CEE405A: Structural Analysis	8	3	2	5	5	-	-	-	-	
CEE415B: Reinf Conc Design	8	-	-	-	-	3	2	5	5	
CEE417A: Steel Design	7	3	1	4	4	-	-	-	-	
CEE457B: Foundat'ns, Earthwks	10	-	-	-	-	4	2	6	6	
CEE483A: Hydr & Eng Hydrology	9	3.5	1.5	5	5	-	-	-	-	
CEE485B: Sanitary & Env Eng	10	-	-	-	-	4	2	6	6	
CEE489A: Transp & Planning	8	3	2	5	5	-	-	-	-	
CEE493: CE Project	13	1	3	4	4	-	4	4	4	
SLEFR4:	-	-	5	5	5	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	91	17	19.5	36.5	30.5	15.5	18	33.5	30.5	

NOTES: A – A list of courses can be obtained from the Registrar's office.

TABLE 22 – FOURTH YEAR COMPUTER ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
CSE483B: Data Base Management	(8)	-	-	-	-	(3)	(2)	(5)	(5)	C
EEE403A: Electronic Circuits	8	3	2	5	5	-	-	-	-	
EEE453A: VLSI Tech'y & Design	8	3	2	5	5	-	-	-	-	B
EEE457: Cptr Engr Desgn Proj	8	-	1	1	1	-	4	4	4	
EEE461A: Digital Communic'ns	8	3	2	5	5	-	-	-	-	
EEE463B: Dig Sys Mod & Synth	8	-	-	-	-	3	2	5	5	C
EEE469A: Cptr Organization	8	3	2	5	5	-	-	-	-	
EEE473B: Cptr Communications	8	-	-	-	-	3	2	5	5	
EEE477B: Computer Graphics	(8)	-	-	-	-	(3)	(2)	(5)	(5)	C
EEE479A: Object Oriented Tech	(8)	(3)	(2)	(5)	(5)	-	-	-	-	B
EEE491A: Software Engrg I	8	2	2	5	5	-	-	-	-	
EEE493B: Software Engrg II	(8)	-	-	-	-	(3)	(2)	(5)	(5)	E
EEE495B: Dig Systems Archtctre	8	-	-	-	-	3	2	5	5	D
EEE497B: Dig System Design	8	-	-	-	-	3	2	5	5	D
EEE499B: Real-time Emb Sys	(8)	-	-	-	-	(3)	(2)	(5)	(5)	E
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	92	16.5	19	35.5	29.5	16.5	20	36.5	33.5	

NOTES: A – One course to be selected from each category.
B,C – One course to be selected from each category.
D,E – Students selecting EEE453A also take courses marked 'D' (Hardware option); those choosing EEE479A take the ones marked 'E' (Software option).

TABLE 23 – FOURTH YEAR ELECTRICAL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
EEE403A: Electronic Circuits	8	3	2	5	5	-	-	-	-	
EEE407A: Control Systems I	8	3	2	5	5	-	-	-	-	
EEE409B: Ccts for Communic'n	(8)	-	-	-	-	(3)	(2)	(5)	(5)	C
EEE411A: Communication Theory	8	3	2	5	5	-	-	-	-	
EEE417A: Electrom Prop & Rdn	8	3	2	5	5	-	-	-	-	
EEE425B: Dig Control Systems	8	-	-	-	-	3	2	5	5	E
EEE429A: Elec Machines, Power	8	3	2	5	5	-	-	-	-	B
EEE431B: Dig Signal Process	8	-	-	-	-	3	2	5	5	D,F
EEE433B: Satt & Mobile Comm	8	-	-	-	-	3	2	5	5	D,F
EEE441B: Microwave Systems	(8)	-	-	-	-	(3)	(2)	(5)	(5)	D
EEE445B: Pwr Distribution Sys	8	-	-	-	-	3	2	5	5	E
EEE447B: Robotics	(8)	-	-	-	-	(3)	(2)	(5)	(5)	D,F
EEE449B: Power Electronics	(8)	-	-	-	-	(3)	(2)	(5)	(5)	F
EEE453A: VLSI Tech'y & Design	(8)	(3)	(2)	(5)	(5)	-	-	-	-	B
EEE455: EE Design Project	8	-	1	1	1	-	4	4	4	
EEE473B: Cptr Communications	(8)	-	-	-	-	(3)	(2)	(5)	(5)	C
EEE489B: M&S Digital Systems	(8)	-	-	-	-	(3)	(2)	(5)	(5)	D
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	92	16.5	19	35.5	29.5	16.5	20	33.5	33.5	

NOTES: A – A list of courses can be obtained at the Registrar's Office

B – One course to be selected.

C,D – Students selecting EEE452A also take courses marked 'C' (Comunications and Electronics option) together with two courses marked 'D'.

E,F – Students selecting EEE429A also take courses marked 'E' (Power and Control option) together with two courses marked 'F'.

TABLE 24 – FOURTH YEAR MECHANICAL ENGINEERING

	Weight	Fall Term				Winter Term				Notes
		Periods / Week				Periods / Week				
		Lect.	Lab.	Total	Study	Lect.	Lab.	Total	Study	
PSE401B: Mil Prof'm & Ethics	6	-	-	-	-	3	-	3	6	
Arts Elective	6	1.5	-	1.5	1.5	1.5	-	1.5	1.5	A
MEE403A/B: Dsgn of Engrg Systems	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE405A/B: CAD/CAM	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE411A: Fluid Dynamics	10	4	2	6	6	-	-	-	-	
MEE421B: Heat Transfer	8	-	-	-	-	3	2	5	5	
MEE431A/B: Stress Analysis	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE433A/B: Mech Behav Adv Mtrls	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE443B: Feedback Control	7	-	-	-	-	3	1	4	4	
MEE445A: Dynamic Systems	8	3	2	5	5	-	-	-	-	
MEE451A/B: Combustion Engines	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE457A/B: Compression Flow	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE461A/B: Aeron, Space Proplsn	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE465A/B: Tribology	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE467A/B: Aircraft Performance	(7)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	B
MEE471: Engineering Project	10	-	3	3	3	-	6	6	6	
SLEFR4:	-	-	5	5	2	-	5	5	2	
PEE401:	-	-	2	2	-	-	2	2	-	
DRE401:	-	-	1	1	-	-	1	1	-	
TOTAL	90	17.5	18	35.5	29.5	16.5	19	35.5	32.5	

NOTES: A – A list of courses can be obtained at the Registrar's Office
B – 5 courses to be selected: three in the fall term, two in the winter term.

DEPARTMENT OF BUSINESS ADMINISTRATION

Professot, Head of the Department and co-appointed to the Mechanical Engineering Department - B.W. Simms, CD, rmc, BEng, MSc, PhD, PEng.
Professor and co-appointed to the Mechanical Engineering Department - J. Brimberg, BEng, MEng, MBA, PhD, PEng.
Professor - W.J. Hurley, BSc, MBA, PhD.
Professor - A.L. Jenkins, BA, MA, MBA, PhD, PEng.
Professor - A. St. Pierre, BSc, BSc, MBA, CMA,CGA.
Associate Professor - M. Amami, BSc, Lic. Sc. Éco, PhD, Ing.
Assistant Professor - W.J. Graham, BA, LLB, MBA, PhD.
Assistant Professor - Major P.A. Roman, CD, rmc, BEng, MEng.
Research Assistant - P. M. Anderson, BSc, MSc.

PROGRAMME OBJECTIVE

The study of business administration involves a number of functional areas including accounting and information systems, finance, marketing, production and human resource management. These functional areas are developed from a number of basic disciplines. Fot example, marketing telies on the disciplines of microeconomics and psychology, production relies on mathematics, statistics and psychology and human resource management relies on psychology and sociology. The practice of business administration does not take place in a vacuum. Understanding the environmental context and its relationship with a functional area are essential to the development of effective decisions, policies and strategies.

The Business Administration Programme will have a threefold thtust. The programme will provide the student with a basic understanding of certain core disciplines such as philosophy, quantitative methods, economics and psychology. It will then provide the student with a basic understanding of each of the functional areas. Finally, it will include courses such as Business Policy which require integration of the functional ateas. The emphasis will be on providing the student with a broad, well-grounded education in business administration.

PROGRAMME STRUCTURE

First Year: These courses are designed to bring all students entering Arts to the same level in a number of areas.

Second and Third Years: The programme of studies begins to be specialized in the area of Business Administration. Students must enroll in the Business Administration programme at the beginning of the Second Year.

Fourth Year: The programme of studies is intended to give Business Administtation students a well rounded education in Business Administration rather than being specialized in any one discipline or field. Hence, in the Foutth Year the student will be exposed to advanced material which must be integrated.

BUSINESS ADMINISTRATION PROGRAMME REQUIREMENTS

Students graduating from First Year Arts, with at least a D average, may take the Business Administration programme in Second Year (see table 4): students who take the programme will take all the courses offered in the area and there will be no distinction between honours and general students with respect to the courses taken. The requirements in third and fourth years are shown in tables 5 and 6 respectively.

A Bachelor of Arts degree in Business Administration will be awarded to students successfully completing all courses in the programme. A degree **with Honours** will be granted to those students who, at the end of four yeats of study, have:

a. completed all courses in the programme;
b. attained a minimum of a B average in all Business Administration courses; and
c. attained at least a B- average in their Fourth Year of study.

A degree **with First Class Honours** will be granted to those students who, at the end of four years of study, have:

a. completed all courses in the programme;
b. attained a minimum of an A- average in all Business Administration courses; and
c. attained at least a B- average in their Fourth Year of study.

COURSE DESCRIPTIONS

BAE204: Financial Accounting
(AAF204: Comptabilité générale)

For students in Second Year Business Administration and others with the permission of the Department.

This course provides an introduction to the principles, practice and process of financial accounting. The student is introduced to the theory and mechanics of financial accounting with an emphasis on the presentation and development of accounting as an information system. Majot topic areas include accounting theory, the processing of accounting data, accounting for assets, liabilities, owner's equity and the preparation and interpretation of financial statements.

3 - 0 - 6 Weight: 12

BAE216B: Marketing Fundamentals
(AAF216B: Principes fondamentaux de la commercialisation)

For students in Second Year Business Administration and others with the permission of the Department.

This course provides an introduction to the fundamentals of Marketing within a business organization. The course will begin with an examination of consumer and business to business markets, before moving on to the major components of competitive marketing strategy, namely product/service development, pricing, distribution and promotion. The course will provide a foundation for future work in this area.

No prerequisites are required although a knowledge of differential calculus or microeconomics is helpful.

3 - 0 - 6 Weight: 6

BAE242A: Quantitative Methods I
(AAF242A: Méthodes quantitatives I)

For students in Second Year Business Administration and others with the permission of the Department.

This course introduces students to the application of probabilistic and statistical techniques to business problems. Major topics include probability theory, estimation, confidence intervals and inference, all in the context of business problems.

3 - 0 - 6 Weight: 6

GEE283A: Engineering Economics
(IGF283A: Génie et économie)

For all students in Second Year Engineering or Science.

An introduction to the economic analysis of engineering and production activities: time-value of money; cash flows and equivalence; depreciation concepts and analysis; economic equipment replacement decisions; capital budgeting; effects of taxation and price level changes.

2 - 0 - 2 Weight: 4

BAE300B: Finance
(AAF300B: Finance)

For students in Third Year Business Administration and others with the permission of the Department.

This coutse introduces the students to principles of financial decision making. Topics include the theory of present value and interest, capital markets and valuation and decision-making within the firm including the financing decision, working capital management and capital budgeting. The emphasis is on the application of the principles to solve business, militaty and administrative problems.
Prerequisite - Quantitative Methods I

3 - 0 - 6 Weight: 6

BAE308B: Management Accounting and Information Systems
(AAF308B: Systèmes de comptabilité et d'information de gestion)

For students in Third Year Business Administration and others with the permission of the Department.

This course introduces the student to the related disciplines of management accounting and information systems. Management accounting topics include construction of simple manufacturing income statements, concepts of cost, estimation of variable and fixed costs, relevant costs, the budget and variance analysis.

3 - 0 - 6 Weight: 6

BAE316A: Intermediate Marketing
(AAF316A: Commercialisation intermédiaire)

For students in Third Yeat Business Administration and others with the permission of the Department.

This course builds on the marketing basics by showing how marketing strategy is constrained by a firm's competitiveness and other environments. The course will examine how all the elements of the marketing mix can be coordinated to best achieve the firm's goals given those constraints. The course will also examine how to respond to changes in the firm's environment.
Pretequisites - Marketing Fundamentals and Quantitative Methods I

3 - 0 - 6 Weight: 6

BAE320A: Business Law
(AAF320A: Droit commercial)

For students in Third Year Business Administration and others with the permission of the Department.

A basic introduction to the Canadian legal system with a focus on the areas of law of particular relevance to business. The course will briefly discuss the court system and civil procedure. Gteater emphasis will be placed on the law of tort and contract.

3 - 0 - 6 Weight: 6

BAE330A: Organizational Theory
(AAF330A: Théorie de l'organisation)

For students in Third Year Business Administration and others with the permission of the Department.

This course examines organizational theories, structures and processes. Organizational theories to be examined include classical management theory, contingency theory, open systems theories, theories based on technological imperatives and theories of bureaucracy. Emphasis will be placed on issues relating to process including organizational change, politics, power and control in organizations, organizational legitimacy and organizational design.

3 - 0 - 6 Weight: 6

BAE340B: Production Management
(AAF340B: Gestion de la production)

For students in Third Year Business Administration and others with the permission of the department.

This course introduces the student to various topics in production including competitiveness , productivity, product conception and manufacturing processes, service industries, scheduling, inventory and purchasing systems, flow of materials, quality control, plant and floor design and maintenance and reliability. The emphasis is on the application of the mathematical tools developed to problems in production in a variety of settings, including military settings.

Prerequisite - Quantitative Methods I

3 - 0 - 6 Weight: 6

BAE342A: Quantitative Methods II
(AAF342A: Méthodes quantitatives II)

For students in Third Year Business Administration and others with the permission of the Department.

This course introduces the student to the disciplines of operations research and management science and their application to business, military and administrative problems. Topics include linear programmeming, integer programmeming, networks, an introduction to algorithms and complexity and various topics in stochastic operations research. As is the case in the prerequisite course, emphasis is on application and each topic is introduced and motivated by a specific management issue or problem.

Prerequisite - Quantitative Methods I

3 - 0 - 6 Weight: 6

BAE410A: Information Systems
(AAF410A: Système d'information)

For students in Fourth Year Business Administration and others with the permission of the Department.

The objectives of this course are to provide a solid managerial perspective in the concepts essential to: 1) analyse and understand the capabilities and limitations of information technology so one can be an effective user of computers; 2) analyse, design, develop, implement and use MIS in organisations. Subjects covered include: role of information technology in organizations; strategic role of information systems in organizations; concepts, tools and techniques for systems development; managing information systems implementation; managing information system resources, Decision Support Systems; and managing International Information Systems.

3 - 0 - 6 Weight: 6

BAE430B: Labour Relations and Topics in Human Resources Management
(AAF430B: Relations de travail et sujets en gestion des ressources humaines)

For students in Fourth Year Business Administration and others with the permission of the Department.

This course examines the basic issues in labour relations such as union certification and negotiation and administration of collective agreements. Other selected topics in labour relations and human resources management will also be covered.

3 - 0 - 6 Weight: 6

BAE 450B: Advanced Topics in Management
(AAF450B: Sujets avancés en gestion)

For students in Fourth Year Business Administration.

This course examines topics from a number of management areas. The course will provide the student who has completed the more basic courses with exposure to more complex issues in areas such as accounting, marketing, production, quantitative methods and human resources management. In addition, the course examines areas of management the student has not previously been exposed to such as international business and logistics. Coverage of topics will be on a selective basis.

Prerequisites: all Second and Third Year Business Administration courses

3 - 0 - 6 Weight: 12

BAE452: Business Policy
(AAF452: Politique de l'entreprise)

For students in Fourth Year Business Administration.

This course is intended to pull together material from the various Business Administration courses and illustrates the complex overlap that exists between areas in applied situations. In the examination of corporate strategy the focus will be on the application of theories, concepts and analytical techniques developed in other courses, to a variety of case problems and situations. The course examines how the internal resources of the firm, the organization of the firm and the environment of the firm, all influence the strategic choices that the firm makes. Over the two terms of the course students will also be required to work on a major project involving the development of a comprehensive business plan, for presentation to faculty and invited guests.

Prerequisites - all Second and Third Year Business Administration courses

3 - 0 - 6 Weight: 12

DEPARTMENT OF ENGLISH

Professor and Head of the Department - T.B. Vincent, BA, MA, PhD.
Professor - S.R. Bonnycastle, BA, PhD.
Professor - P.S. Sri, BSc, MA, PhD.
Associate Professor - M. Hurley, BA, MA, PhD.
Associate Professor - L. Shirinian, BA, MA, PhD.
Associate Professor - A.M. Skabarnicki, BA, MPhil, PhD.
Assistant Professor - S. Berg, BA, MA, PhD.

PROGRAMME OBJECTIVES

The primary purpose of the English Studies programme at RMC is to provide a university-level education to officer cadets as one of the essential elements of their professional development. In meeting that responsibility, the programme is designed to foster both the general intellectual development achieved through university education and the particular skills and insights derived from the study of literary culture and language. At all levels of instruction, the courses offered by the Department have three basic objectives:

to develop clarity, precision, and maturity in spoken and written communication;

to focus attention on the importance of cultural and social values in developing an understanding of the forces that have shaped civilization and that are shaping the contemporary world; and

to develop a flexible intellectual capacity centred around thinking-skills and problem-solving abilities which can be applied to a wide range of professional responsibilities where individuals must take action in the face of concrete human problems.

COMMUNICATION SKILLS: In English Studies, particular emphasis is placed on refining writing and verbal skills in the First and Second Year courses, but that emphasis continues in senior courses, especially for those cadets enroled in the English Honours or General stream of the Humanities degree programme. At the same time, analytical study of complex literary works develops the other half of communication: the ability to listen carefully and to understand in detail what another person is attempting to communicate. Together, the development of writing and reading skills heighten awareness both of the potential and of the limitations of verbal communication.

PERCEPTIVE INSIGHT: The study of literature offers valuable insights into the cultural and social values of a people or a particular group, and acknowledges that these values represent (and have always represented) powerful driving forces shaping the development of any given society, whether it be our own or that of others. At all levels of instruction, English Studies attempt to demonstrate that the influence of social and cultural forces is as important as the role political, economic, historical and strategic realities in understanding the historical development of societies and the complex nature of the contemporary world.

INTELLECTUAL DEVELOPMENT: English Studies share with other disciplines a concern for developing traditional patterns of logical analysis and evaluation. However, because of the nature of creative literature, the English programme is also conscious of the value of developing non-linear forms of thought — intuition, imagination, and emotive perception. Such skills are particularly valuable in understanding and dealing with human problems. Creative literature is almost always about understanding a concrete human situation in depth, and the effort to find a creative solution to the problems raised. Studying and analyzing such problems develop a flexible and responsive intelligence, one well suited to the demands of leadership responsibilities.

PROGRAMME STRUCTURE

First Year: These courses are designed to refine basic writing and reading skills, and to introduce students to the variety and range of English literature that form an important part of their general cultural heritage.

Second Year: This course is offered to all students in Arts and is designed to explore significant aspects of 20th Century thought, problems, and concerns as a broad foundation in contemporary social and cultural issues for students entering various Humanities, Social Science, and Business Administration degree programmes.

Third and Fourth Years: Senior courses are designed for students pursuing an Honours or a General Humanities degree in English, as well as for those taking English courses as electives for other degree programmes. These courses fall into three main groupings.

British Literary Tradition: These courses deal with the works of major English writers from 1550-1900, which collectively represent the intellectual foundation for the literatures of the contemporary world, and transmit the major aspects of European social and cultural values from the Renaissance, the Enlightenment, and the 19th Century to the present.

National and Ethnic Literatures of the Contemporary World: These courses focus on the literatures of various national and ethnic groups in the contemporary world. They are designed to offer insights into the complex spectrum of social and cultural values in the modern world.

Special Focus Courses: These courses focus on a particular genre or are designed for a specific group of students. Two examples of genre-focused courses are: The Literature of War and Forms of Drama. Special-groups courses include the Arts Options for Engineering and Science programmes.

SENIOR COURSE STRUCTURE

Note that most senior offerings are divided into courses of one semester, with the "A" group taught in the Fall Term and the "B" group in the Winter Term. A full course consists of two courses of

one semester each, normally linked in subject matter. For staffing reasons, most senior courses are offered in alternate years. Students are urged to plan ahead and to discuss their whole programme with the Depattment Head at the time they are applying to enter the English degree stream.

ENGLISH DEGREE: REQUIREMENTS

The Department offers three levels of "standing" in its degtee stream: General, Honours, and First-Class Honours. Students normally apply for entry into the degree programme at the beginning of their Third Year, but are encouraged to take at least one full senior English course in their Second Year (as one of their Arts Electives) in order to create greater flexibility in course selection in Third and Fourth Yeat. Students wishing to apply for Honours standing should achieve at least a B- in their Second Year English course (ot courses), although individual cases may be accepted on a ptobationary basis at the disctetion of the Department Head.

The **General English Stream** requires:

Completion of the four-year Humanities degree programme.

At least 8 full courses (16 courses of one semestet) selected from the offerings of the English Department, normally including the mandatory First and Second Year English courses taken by all Arts students.

ENE326A and ENE324B, as part of the English course component fot the degree, normally taken in Second ot Thitd Year.

The **Honours English Stream** requites:

Completion of the four-year Humanities degree programme.

At least 10 full courses (20 courses of one semester), selected from the offerings of the English Department and normally including the mandatory First and Second Year English courses taken by all Arts students.

Included among the courses taken must be:

1. ENE326A and ENE324B (notmally taken in Second or Third Year);

2. at least one of either ENE304 or ENE412A/ENE414B;
3. at least one of either ENE306A/ENE308B or ENE430A/ENE432B; and

4. ENE428 (to be taken in Fourth Year).

To maintain Honours standing, students must achieve at least a B average in their English courses in the Third and Fourth Years, and at least a B- average in all their academic courses in Fourth Year.

First-Class Honours Standing in English will be granted upon:

Fulfilment of the Honours standing requirements noted above.

At least an A- average in English courses taken in Third and Fourth Years.

Minors

Arts students may take a minor in English. The requirements for the minor are four full courses in English and at least a B- avetage for these courses.

COURSE DESCRIPTIONS

NOTE: The specific content and the scheduling of the courses listed below are subject to change. Fot the most current information on course offerings, students should contact the Department Head.

ENE100: Introduction to Literary Studies and University Writing Skills

Mandatory for all Anglophone students of the First Year in the General Programme.

This course has two main objectives: to provide instruction in the techniques of expository writing and to foster an understanding and enjoyment of literature. The first term in particulat will concentrate on correcting grammar and punctuation, organizing ideas, fotmulating petsuasive atguments, and prepating tesearch papers. Approximately one-quarter of the periods involves writing skills. The literary texts are spread through both terms and provide a sampling of different genres (the essay, the short story, lytic and narrative poetry, the novel, and the drama). Students are encouraged to develop an awareness of how the creative imagination expresses itself in literature as well as of how language shapes our perceptions of ourselves, society, and the universe.

The classes are divided into small sections for tutorials and discussions. There is a common core of texts consisting of narrative poetty, short stories, two novels, one Shakespeare play, and one modern play.

Texts as assigned by instructors.

3 - 1 - 4 Weight: 16

ENE110: Introduction to Literary Studies and University Writing Skills

Mandatory for all Anglophone students of the First Year in the Arts Entry Programme.

This course has two main objectives: to ptovide instruction in the techniques of expository writing and to foster an understanding and enjoyment of literature. The first term in particular will concentrate on cortecting grammar and punctuation, organizing ideas, formulating persuasive arguments, and preparing tesearch papers. Approximately one quarter of the periods involves writing skills. The literary texts are spread thtough both terms and provide a sampling of different genres (the essay, the short story, lyric and narrative poetry, the novel, and the drama). Students are encouraged to develop an awareness of how the cteative imagination expresses itself in literature as well as of how language shapes out petceptions of ourselves, society, and the universe.

The classes are divided into small sections for tutorials and discussions. There is a common core of texts consisting of narrative poetry, short stories, two novels, one Shakespeare play, and one modetn play.

Texts as assigned by instructors.

3 - 1 - 6 Weight: 12

ENE200: Cross-currents of Thought in 20th-Century Literature

Mandatory for students in the Second Year taking Arts.

This course is designed to provide the student with an insight into major aspects of 20th-Century western thought as represented in selected works of English, Canadian, American, German, and Italian literature of the period. Special attention will be given to the varied pattetn of 20th-Century social and psychological concepts, the continuous shifting of moral norms, and the search for a stable, authentic set of cultural and spiritual values. Works studied will include novels, poetry, drama and song lyrics; together, they offer both a regional and a planetary perspective on humanity, allowing us to consider variations in national and personal definitions of such things as heroism, "the good life," utopia/dystopia, male/female roles and gender issues, social and individual responsibility, and freedom. Essays will be required in both the Fall and Winter Terms.

3 - 0 - 6 Weight: 12

ENE201: Forms of Literature and Culture: Detective Fiction

(Offered in 1997-98)

Arts option for students of the Third and Fourth Year taking Engineering and Sciences.

This course will examine literary themes and forms. Courses in the past have shown great diversity in focus: science fiction, mythology, the novel and film, the detective story, and the Canadian novel have all been offered. Students will read litetary works not merely as entertainment but will study them as insttuments of social analysis, in particular for examining the relations between individuals and the society in which they live. Since the specific emphasis of the course will change depending upon the instructor, students should consult with the Department about the current focus.

1.5 - 0 - 1.5 Weight: 6

ENE301: War in Literature

Arts option for students of the Third or Fourth Year taking Engineering or Science.

This course is an exploration of war novels of the twentieth-century. Many of these imaginative works have evolved out of their authors' own experiences in the trenches, aboard ship, or in the air. Class discussion will focus on the physical, psychological, and ethical responses of the individual to combat conditions, and the ways in which groups of individuals interact in order to survive. Canadian, British, American, German and Japanese novels will be studied. Students should consult with the Department regarding texts.

1.5 - 0 - 1.5 Weight: 6

ENE304: English Renaissance Literature

(Offered in 1998-99 and alternate years)

This course presents a survey of non-dramatic English prose and poetry from the time of Henry VIII to the end of the Puritan Commonwealth, an era often referred to as "the golden age of English literature." Examination of authors' individual achievements will be combined with studies of fotm and genre in the period. The intention of the coutse is to provide an appreciation of the intellectual, cultural, and social milieu of the Renaissance. Students will study, for example, the sonnets of Shakespeare and the sixteenth-century poetry of Sidney, Spencer, Wyatt and Surrey within the contexts of humanism, courtly love and neoplatonism. In studying Renaissance education as a humanist ideal, they will examine such works as Sidney's "Defence of Poesy," the great Renaissance defence of the study of

literature, as well as Spencer's *Faerie Queene*, one of the finest allegories in the English language. In studying the Renaissance ideal of order, students will read Elyot's *The Book Named the Governour* and Sir Thomas More's *Utopia* . The study of seventeenth-century literature will include a detailed examination of Milton's *Paradise Lost*, the finest religious epic in English literature; Milton's *Aereopagitica*, his famous essay on censorship; Sir Francis Bacon's popular *Essays*, containing Bacon's thoughts on such topics as marriage, single life and friendship; and selected metaphysical poets, foremost among them John Donne, who revolted against the conventionalism of earlier Renaissance poets.

3 - 0 - 6 Weight: 12

ENE306A: The English Romantic Novel

(Offered in 1997- 98 and alternate years)

This course focuses on the evolution of the novel in England from the end of the eighteenth century into the nineteenth. The class will be introduced to traditional critical methods of novel analysis and will examine how the novels reflect contemporary social and cultural concerns. Texts may include the following: Jane Austen, *Pride and Prejudice*, Charlotte Bronte, *Jane Eyre*, Emily Bronte, *Wuthering Heights*, Charles Dickens, *Hard Times* and *Tale of Two Cities*, and Mary Shelley, *Frankenstein.*

3 - 0 - 6 Weight: 6

ENE308B: The English Victorian Novel

(Offered in 1997-98 and alternate years)

This course concentrates on the continuing development of the novel through Queen Victoria's reign and up to World War I. Using a variety of critical methods, such themes as the growing schism between science and religion, the rise of materialism, the destruction of the land, and the evolution of the Empire will be examined. Texts may include the following: Samuel Butler, *The Way of All Flesh*, George Eliot, *Middlemarch*, Thomas Hardy, *Tess of the D'Urbervilles*, R.L. Stevenson, *Dr. Jekyll and Mr. Hyde*, W.M. Thackeray, *Vanity Fair*, and Oscar Wilde, *The Picture of Dorian Gray.*

3 - 0 - 6 Weight: 6

ENE324B: Literary Principles

Mandatory for students taking Honours or Genetal English; normally taken in Third Year. Also open to other interested students.

This course is an introduction to some of the main general questions which arise in the study of literature. Among the topics to be studied are (i) practical criticism (the analysis and evaluation of individual works of literature); (ii) the organization of literature as a field of study; (iii) the significance of the historical context of a work of literature; (iv) the contribution which other disciplines, such as psychology, anthropology, sociology, and linguistics, can make to the study of literature; and (v) the proper function of literature in the general intellectual economy of an individual and a society. A primary aim of the course will be to develop the student's skill as a critic, that is, his or her ability to speak and write about literature.

3 - 0 - 6 Weight: 6

ENE326A: Cultural Backgrounds to Literature

Mandatory for students taking Honours or General English; normally taken in Third Year. Also open to other interested students.

This course is an introduction to the cultural backgrounds essential to the study of English Literature. Students will examine the Bible as literature, the influence of classical mythology on English texts, and a selection of Greek and Roman texts in translation.

3 - 0 - 6 Weight: 6

ENE332A: The Literature of War: The First World War

This course will deal with the works of First World War writers, mainly novelists, from Canada, the United States, Great Britain, France and Germany. It will focus on their efforts to understand and articulate the effects of the war and combat experience on individuals and on society generally. The broad purpose of the coutse is to explore the perceptions of modern warfare as these emerge through the writings of former combatants who, indirectly through fiction, attempt to objectify and find meaning in their personal experiences of combat. Students will be expected to present a seminar on an assigned text and to write a term essay based on that seminar.

3 - 0 - 6 Weight: 6

ENE334B: The Literature of War: The Second World War and After

This course deals with the works of Second World War writers, mainly novelists, from Canada, Great Britain, the United States, Germany, Italy, and Japan. At the end of the course, there will be some discussion of works relating to more recent conflicts (Korea, Vietnam) against the background of earlier fiction. The general purpose of this course is to explore the evolving perceptions of modern warfare in light of the range and complexity of Second

World War combat experience. Works will reflect air, sea, and land warfare in Europe and the Pacific and on all sides of the conflict. Students will be expected to present a seminat on an assigned text and to write a term essay based on that seminar.

3 - 0 - 6 Weight: 6

ENE350A: Canadian Literature, Beginnings to 1945

(Offeted in 1998-99 and alternate years)

Through a survey of English-Canadian fiction and poetry from the beginnings to the mid-twentieth century, this coutse attempts to identify shared perspectives, attitudes, ideas, and techniques characteristic of our own distinctive litetature. The writers under study invite us to reflect on who we are, where we came from and where we are going, as well as on the relationship between the nation's character and its landscape and on both the blessings and the challenges posed by the diversity of our rich multicultural mosaic. Representative writers include Richardson, Moodie, Haliburton, Lampman, Pratt, Leacock, Callaghan, MacLennan, and O'Hagan.

3 - 0 - 6 Weight: 6

ENE352B: Canadian Literature, 1945 to the Present

(Offeted in 1998-99 and alternate years)

Through a survey of English-Canadian fiction, drama, and poetry from the mid-twentieth century to the present, this course endeavouts to identify shared perspectives, attitudes, ideas and techniques chatacteristic of out unique literature. While designated as the complement to ENE350A, it is helpful but not necessary to take both courses togethet. No less than their predecessors, modern and contempotary writers like Findley, Davies, Laurence, Munro and Reaney encoutage us to reflect on urgent questions of petsonal and national identity and survival: who we are, where we come from and where we are going. Atwood, Putdy and others explore the relationship between a nation's character and its landscape and assess the impact of the environment on storytelling, while Ondaatje, Layton and Coupland investigate how we respond to various social and cultural pressures, especially both the potential for growth and the challenges posed by the diversity of a shifting multicultural mosaic.

3 - 0 - 6 Weight: 6

ENE380B: Post-Colonial Literature of Emerging Nations: Latin America

(Offered in 1997-98 and alternate years)

This course will familiatize students with the literatutes of emerging nations in Latin America where the populations are a mix of indigenous and European ethnic groups. For centuries these countries' political and cultural traditions have been influenced by the European and American presence, often at the expense of local ttaditions. Within a context that ftequently includes foreign domination, arbitrary violence, and ethnic sttife, Latin American writers have remained sensitive to the movements in international cultute, while they strive to voice the aspirations of their own community, to define the role of the artist in society, and even to debate the nature of the state itself. The wtiters to be studied are available in English translation.

3 - 0 - 6 Weight: 6

ENE382A: Post-Colonial Literature of Emerging Nations: South Asia and Africa

(Offered in 1997-98 and alternate years)

Designed as the complement to ENE380A, this course focuses chiefly on writers from South Asia and Africa. While this survey will tecognize vast differences in societies that are sptead ovet two continents, these societies nevertheless are similar in having centuries of tradition befote the Eutopean presence in the nineteenth and twentieth centuties challenged and changed these traditions. Similarly, the physical depatture of Europeans did not end the influence ot the stresses among indigenous ethnic groups. Attention will be given to the historical, cultural, and social contexts in which contemporary writers offer petspectives on their tegions. Some of these wtitets use English as theit wotking language while othets have been translated into English.

3 - 0 - 6 Weight: 6

ENE401: Readings in Literature

(Offered in 1998-99 and alternate years.)

For students of the Third or Fourth Year taking Engineering ot Sciences.

This course is concerned with reading literary works intelligently and critically. The texts selected will be focused around a particular issue or theme in society which will be chosen by the instructot. The course may also be used to develop students' writing abilities. Since the emphasis will change depending upon the instructor, students should consult with the Department about the current focus of the course.

1.5 - 0 - 3 Weight: 6

ENE412A: Restoration and Eighteenth Century Literature: Satire and the Age of Reason

(Offered in 1998-99 and alternate years)

This course deals with English literature of the period 1660 to 1740, and is concerned with the moral, intellectual, social and cultural values of that era, sometimes called The Age of Reason or the Neo-Classical Age. Studies will focus on important works of satire by such writers as Butler, Dryden, Pope and Swift. These writings will be explored with an eye to understanding the central concepts of the period: the idea of a rational universe, the threat of disorder, and the role of reason in human society and human psychology. Students will write a term essay on a selected topic.

3 - 0 - 6 Weight: 6

ENE414B: Restoration and Eighteenth-Century Literature: Emergence of the English Novel and the Rise of the Middle Class

(Offered in 1998-99 and alternate years)

This course deals with the emergence and development of the English novel between 1740 and 1800. It will focus on the works of such writers as Defoe, Richardson, Fielding, Smollett, Goldsmith, and Sterne. Studies will explore the influence of sentimentalism on early English fiction and the effect of a growing middle-class readership on the fictional worlds created by these novelists. The purpose of the course is aimed at understanding better the role of the novel in articulating and shaping the ethical, moral, and social values of the late eighteenth century. Students will write a term essay on a selected topic.

3 - 0 - 6 Weight: 6

ENE426: Advanced Directed Study

For students in Fourth Year Honours English at the discretion of the Department Head.

This course is offered under special circumstances and at the discretion of the Department Head where a student with high standing in earlier English courses wishes to pursue a specific topic in some depth. The course is normally conducted on a tutorial basis and usually includes a considerable amount of written work.

3 - 0 - 6 Weight: 12

ENE428: Shakespeare

Mandatory for students enroled in Honours English; normally taken in the fourth year. Also open to other interested students. This course will be focused entirely on the dramas of William Shakespeare. Students will examine Shakespeare's tragedies, comedies, histories, Roman plays, and romances within the context of a variety of critical approaches. A study of Shakespeare's plays will reveal the remarkable artistry of this great Elizabethan who is recognized as the world's finest dramatist, whose plays are performed more than those of any other playwright, and who has had a greater influence on English literature than any other literary figure. Dramas to be studied may vary from year to year but a typical course outline would include the following plays: *Romeo and Juliet, A Midsummer Night's Dream, Much Ado About Nothing, Henry V, Julius Caesar, Twelfth Night, Hamlet, Othello, King Lear, Macbeth, The Winter's Tale* and *The Tempest.* Students will study independently two additional plays.

Students will submit an essay each term and, because the course will have a seminar format, students will frequently give seminar presentations, both major and minor.

3 - 0 - 6 Weight: 12

ENE430A: Prose and Poetry of the Romantic Period in England

(Offered in 1997-98 and alternate years)

This course focuses on the prose and poetry produced in an era of profound philosophical, economic and social change (1789-1832). Following Europe's revolutionary lead, the English began to reject the eighteenth-century reliance on logic, reason, tradition and authority, emphasizing instead the primary importance of feeling, individuality and imagination, valuing even irrational states like ecstasy and fantasy. Writers such as Blake and Wordsworth expressed their horror at the exploitation of the poor and their outrage at the numbing of the senses, the imagination and the spirit. Women like Mary Wollstonecraft also began to speak out against their own subjection. Younger Romantic poets like Byron and Shelley revolted against all social and moral taboos and became personal icons for a whole generation long before Jim Morrison and Axl Rose. The course will examine the language and ideas of this radical period from which the twentieth century has inherited its faith in the value and goodness of the individual, its belief in the importance of nature, and its desire to regard all people as inherently equal.

Perkins (ed.) *English Romantic Writers*
Abrams *The Mirror and the Lamp*
Breen (ed.) *Women Romantic Poets, 1785-1832*

3 - 0 - 6 Weight: 6

ENE432B: Prose and Poetry of the Victorian Period in England

(Offered in 1997-98 and alternate years)

Evolving out of the radical and revolutionary concerns of the Romantic period, the Victorian period (1832-1901) is characterized by prose writers and poets who deplore the social and environmental abuses that come with the growth of cities and the development of heavy industry during the reign of Queen Victoria. Gradually, they shift their focus from outrage to analysis and a search for possible solutions: solutions (like those of Carlyle) that were way ahead of their time and solutions (like those of Arnold) that we are still debating today. The course focuses on the Victorian writers' examination of contemporary problems in government, religion, education, industry, culture, love, gender issues, and foreign affairs.

Houghton and Stange (eds.) *Victorian Poetry and Poetics*
Altick. *Victorian People and Ideas*
Haight (ed.) *The Victorian Portable Reader*

3 - 0 - 6 Weight: 6

ENE434A: Twentieth-Century British Literature, 1890-1945

(Offered in 1998-99 and alternate years)

This course introduces students to the work of outstanding novelists and poets of the British Isles in the first half of the twentieth century. The selections reflect such important social developments as World War One and the decline of Britain as a major imperial and industrial world power. The writers of this period are associated with the Aesthetic movement of the 1890s and the Modernist movement that began around 1914. Writers to be studied include Joseph Conrad, James Joyce, W.B. Yeats, D.H. Lawrence, E.M. Forster, and the War Poets. The student's mark will be based on class participation, brief reports, a term paper, and an exam.

3 - 0 - 6 Weight: 6

ENE436B: British Literature in the Post-War World, 1945 to the Present

(Offered in 1998-99 and alternate years)

This course introduces students to novelists and poets of the British Isles since 1945. In this period, beginning with the Cold War and ending with the new post-communist world order, Britain discarded its overseas empire and associated itself with the European community. Since 1945 the post-Modernist movement and the rise of new critical theories have influenced many writers' responses to the world around them. Writers to be studied include Christopher Isherwood, W.H. Auden, Dylan Thomas, Evelyn Waugh, John Wain, Alan Sillitoe, Philip Larkin, Ted Hughes, and A.S. Byatt. The student's mark will be based on class participation, brief reports, a term paper, and an exam.

3 - 0 - 6 Weight: 6

ENE442A: English Dramatic Forms

(Offered in 1997-98 and alternate years)

In this study of dramatic literature from medieval to modern times, students will examine a rich diversity of dramatic forms. The course will begin with an introduction to classical drama and its sustained influence on English literature and then proceed to a study of medieval religious allegorical drama, Renaissance tragedy and satiric comedy, Restoration and eighteenth-century comedies of manners, nineteenth-century comedy, modern discussion drama, tragicomedy, and musical drama. Plays by dramatists such as Sophocles, Marlowe, Jonson, Sheridan, Wilde, Shaw, O'Casey, Beckett, Peterson and Grey will be studied as representatives of dramatic forms and placed within their social and historical contexts. Plays to be studied may vary from year to year but a typical course outline might include the following dramas: Oedipus Rex, Everyman, Dr. Faustus, Volpone, School for Scandal, The Importance of Being Earnest, Major Barbara, Juno and the Paycock, Waiting for Godot, Billy Bishop Goes to War.

The course will be given in a seminar format and in addition to submitting a term essay, students will frequently give seminar presentations, both major and minor.

3 - 0 - 6 Weight: 6

ENE444B: Twentieth-Century Dramatic Literature

(Offered in 1997-98 and alternate years)

In this course which focuses on dramatic literature of the twentieth century, students will be introduced to a wide variety of modern dramas by eminent playwrights from North America, Britain, Europe, and Africa. Many of these writers have challenged traditional approaches to drama to invent new dramatic styles such as realism, naturalism, poetic drama, symbolism, expressionism, the epic theatre, the theatre of the absurd, and surrealism, to name only a few. Employing innovative dramatic forms and techniques, these writers use the dramatic medium to confront their audiences with major issues troubling the twentieth-century world. The conflict between individual rights and collective responsibility, the impact of colonialism, the relations between races and between men and women, the impact of war, the pursuit of the American dream, the moral obligation of the scientist are just some of the topics confronted in these dramas. All of these dramas—like the great literary works of previous eras—present a sharply focused image of mankind in some crucial area of his existence. The modern theatre has its great definitive scenes which sum up man as he has come to sense himself in the twentieth century—his most fundamental hopes and fears, his understanding of the shape and currents of the world, and his intuition of his stance in relation to that world.

Plays and playwrights to be studied will vary from year to year, according to text availability and students' interests, but a typical course outline might include plays by Arthur Miller,

Berthold Btecht, Ftiedtich Dürtenmatt, Wole Soyinka, Athol Fugard, John Arden, Caryl Chutchill, Lorraine Hansberry, and Sharon Pollock.

Students will submit a term essay and, because the course will be given in a seminar format, they will frequently give seminar presentations, both major and minot.

3 - 0 - 6 Weight: 6

ENE456A: The Literatures of Multicultural North America: Canada

(Offered in 1998-99 and alternate years)

This course introduces students to the concepts of bilingualism, biculturalism, multiculturalism, pluralism, and the way in which Canadian federal govetnment policies have fostered the growth of hyphenated literatures. The students will analyze texts wtitten by people from different cultutal communities in Canada. Problems of integration and acculturation of ethnic Canadians are central features of these texts as is their social criticism.

3 - 0 - 6 Weight: 6

ENE462A: Classic American Literature, Beginnings to 1945

(Offered in 1997-98 and altetnate years)

This course deals with American writing from the mid-nineteenth century to the mid-twentieth century. Through the nineteenth century, authors explored the American expetience and emerging American identity by declaring their cultural independence from Europe. Their wtitings deal with such motifs as the escape from authority, the concepts of progress and perfectibility, race relations, and the quest for identity. Nineteenth-century American writing introduces readers to many of the preoccupations of twentieth-century American literature.

In the early twentieth century the American "modernists" developed impottant innovations in poetry and prose. Aftet the First Wotld Wat many of these works wete part of intetnational culture, in which Ametican wtiting, movies, and technology played an important part. Poets to be studied include Emerson, Ftost, Sandburg, William Carlos Williams, Stevens, and T.S. Eliot. Core novels include Twain's Huckleberry Finn, James's Daisy Miller, Crane's The Red Badge of Courage, Hemingway's A Farewell to Arms/The Sun Also Rises, Fitzgetald's The Gteat Gatsby, and Faulkner's The Sound and the Fury.

3 - 0 - 6 Weight: 6

ENE464B: American Literature Since 1945

(Offeted in 1997-98 and alternate years)

This course deals with the petiod in which the United States has been the most important intetnational power in the world. Many of the texts to be studied reflect both directly and indirectly the political, economic, and cultural fotces that have preoccupied American authors as they looked at the world at large and looked inward at the American psyche. Some of the pteoccupations in these writings include the paranoia stemming from the Cold War, the splits in American society caused by tace relations and the Vietnam War, the impact of rapid technological changes, the ways in which mass media shape values, and the questioning of the American Dteam, as ttaditional frontiers for American expansion closed. Poets to be studied include Robert Lowell, Allen Ginsberg, James Dickey, and Adrienne Rich. Cote novels include Warren's *All the King's Men*, Ellison's *Invisible Man*, Bellow's *Sieze the Day*, Ketouac's *On the Road*, Webb's *Fields of Fire*, and Mason's *In Country*. A sampling of recent short stories will be included.

3 - 0 - 6 Weight: 6

ENE466B: The Literatures of Multicultural North America: The United States

(Offered in 1998-99 and alternate years)

The concepts of ethnicity, multiculturalism and pluralism provide a background to the way ethnic Americans view their host society. The material coveted on this coutse petmits a comparative approach to the minority literatures of Canada and the United States. Questions of individual and collective identity are central concetns of these texts by different people who all share the same space called North America.

3 - 0 - 6 Weight: 6

ENE470A: The European Novel in Translation: Pasternak and Existentialism

(Offered in 1998-99 and alternate years)

The main purpose of this course is to introduce students to some of the gteat novels written in Europe since 1850. Students will investigate how these novels work as verbal and narrative structures, and how they contribute to our present understanding of the world. This course and ENE472B are not survey courses; they ptesent the novels studied as patt of the intellectual economy of the 1990s rathet than in the context of the histotical petiods during which they were written. Particular attention will be paid to what the novels say about contentious general issues such as the nature of romance, love, and marriage, the meaning of authenticity, and the unusual role of the artist in society. The class

will discuss theories of how "great novels" attain their unusual and privileged status in the literary community.

Pasternak's *Dr. Zhivago* and a number of novelists in the existentialist tradition, including Camus (*The Outsider* and *The Plague*), Sartre, and Kafka, will form the primary texts.

3 - 0 - 6 Weight: 6

ENE472B: The European Novel in Translation: Tolstoy and Other Realists

(Offered in 1998-99 and alternate years)

The main purpose of this course is to introduce students to some of the great novels written in Europe since 1850. Students will investigate how these novels work as verbal and narrative structures, and how they contribute to our present understanding of the world. This course and ENE470A are not survey courses; they present the novels studied as part of the intellectual economy of the 1990s rather than in the context of the historical periods during which they were written.

A major novel by Tolstoy (either *Anna Karenina* or *War and Peace*) and works by other authors in the tradition of realism, such as Balzac, Flaubert, and Thomas Mann, will form the primary texts.

3 - 0 - 6 Weight: 6

ENE480A: Commonwealth Literature: Africa, Caribbean, and Canada

(Offered in 1997-98 and alternate years)

Through an examination of novels, short stories, plays and poetry from Africa, the Caribbean and Canada, this course will introduce students to some of the major writers of the "new literatures in English." Such writers invite us to consider how we encounter, explore and engage other countries and cultures, how we respond to foreign values and perspectives, how we meet new and unexpected challenges and unusual circumstances. Attention will be given to historical, social and cultural contexts as well as to appreciating the works within their own emerging tradition and within the parent tradition of English literature. Readings will be selected to illuminate such themes as human relationships in a changing moral and social world order and variations in national definitions of heroism, leadership, "the good life," racial and gender issues, relationships between the individual and society and between a nation's character and its landscape. Commonwealth writers to be discussed include the internationally renowned V.S. Naipaul, Derek Walcott, Nadine Gordimer, Chinua Achebe, Ngugi wa Thiong'o, and Margaret Atwood.

3 - 0 - 6 Weight: 6

ENE482B: Commonwealth Literature: Australia, New Zealand, India

(Offered in 1997-98 and alternate years)

Through a survey of novels, short stories and poetry from Australia, New Zealand and India, students will familiarize themselves with outstanding writers of the "new literatures in English." Such writers invite us to consider how we encounter, explore and engage other countries and cultures, how we respond to foreign values and perspectives, how we meet new and unexpected challenges and unusual circumstances. The works are approached within their own social and cultural contexts as well as within their own emerging tradition and the parent tradition of English literature. Class discussion will focus on such themes as human relationships in a rapidly changing world and variations in national definitions of heroism, leadership, "the good life," racial and gender issues, relationships between the individual and society and between a nation's character and its landscape. Commonwealth writers under study include the internationally renowned Patrick White, Anita Desai, Thomas Keneally, R.K. Narayan, Miles Franklin and Keri Hulme.

3 - 0 - 6 Weight: 6

DEPARTMENT OF FRENCH STUDIES

Professor and Head of the Department - G. Quillard, BA, MA(Litt), MA(Lit), PhD.
Associate Ptofessot - M. Benson, BA, BEd, MA, PhD.
Associate Professor - C. Maingon, BEd, MA, PhD.
Assistant Professor - P.G. Meagher, BA, MA, PhD.
Assistant Professor - G.J.A. Monette, BA, MA(Ens), MA(Litt), PhD.

GENERAL

The Department of French Studies offers a progtamme that focuses mainly on French and French-Canadian literature and other aspects of French studies such as civilization and language (linguistics and stylistics).

The Department offers an Honours Bachelor of Arts (French Studies) and a Bachelor of Arts (French Studies). In order to be admitted to these programmes, students must have taken FRF152 and FRF262 or equivalent courses.

French is the only working language within the Department. Most courses may be taken by all students possessing the required knowledge and ability. The final decision on eligibility will be made by the course instructor, with the approval of the Head of the Department.

The Department also offers courses in German and Spanish. For students completing an Honours or a Major programme, these courses are considered as courses taken outside the Department.

Objectives of the programme

The French Studies programme is intended to provide students with university education, promote their intellectual development and give them the knowledge and abilities that can be gained through the study of literature and language.

The courses offered by the Department have four main objectives:

to teach students how to express themselves clearly and accurately, orally and in writing, and how to discuss various subjects rigorously and at length;

to make students aware of interference from the second language;

to draw students' attention to the importance of cultural and social values in the evolution of civilization and the contemporary world, particularly the French-speaking world; and
to develop students' intellectual faculties, especially the ability to think and to analyse. These skills are often required in the exercise of their profession, particularly in the areas of human relationships and problems.

Ability to communicate

While the mastering of oral and written communication is emphasized in the First and Second Year courses, these skills are also stressed in the Third and Fourth Year courses, particularly for students doing an Honours or a Major in French Studies.

The analysis of literary texts is useful in developing a critical mind; knowledge of critical and analytical methods leads to a better appreciation of language's potential and limitations.

Perceptual development: Literary studies enable students to fully understand and appreciate the cultural and social values of a people or community and help them to recognize the forces that lead to the evolution of a society. The French Studies programme demonstrates, at all levels, that the influence of cultural and social forces is as important as the influence of political, economic, strategic and historical realities in understanding the past evolution of societies and the complex nature of the contemporary world.

Intellectual development: French studies, like studies in other disciplines, enable students to acquire the methods involved in logical analysis and evaluation. However, because of the very nature of literature, French studies also help to promote less Cartesian forms of thinking, such as intuition, imagination and a sense of aesthetics. These kinds of thinking are particularly useful for resolving human problems.

A literary work generally deals with human problems and the measures taken to resolve them. These problems require intellectual flexibility and an ability to analyse. Such abilities are extremely useful for people in management and other positions of responsibility.

First Year: Courses designed to improve the student's composition, style and understanding of French literature in general and French-Canadian literature in particular.

Second Year: Courses designed to perfect the student's style and to teach an appreciation of the most important French literary works of the 19th and 20th centuries. These courses can also serve as a foundation for future studies in the humanities, social sciences or administration.

Third and Fourth Years: Courses designed mainly for students doing a Major or an Honours in French. These courses may also be taken by students enrolled in other programmes.

The courses cover two main areas: literature and linguistics. There are three categories of literature courses: French literature, French-Canadian literature, and literature by French-speaking authors from other cultures.

Structure of the Third and Fourth Year courses

Most of the courses offered in the Third and Fourth Years are divided into two half-courses lasting one semester each (partA is given in the fall; partB in the winter) and given every two years. It is highly recommended that students choose their courses in advance, seek advice from the professors in the Department and discuss their choices with the Department administration.

FRENCH STUDIES DEGREE: REQUIREMENTS

The Department offers three levels of "standing" in its degree streams: General, Honours and First-Class Honours.

The **General French Studies Stream** requires:

Completion of the four-year Humanities degtee ptogramme.

At least eight full courses (16 courses of one semester) selected from the offerings of the French Studies Department (excluding courses in German and Spanish). FRF152, FRF262, FRF344, one course in French literature and one course in French-Canadian literature ate requited.

The **Honours French Studies** stteam requires:

Completion of the four-year Humanities degree ptogramme.

At least ten full coutses (20 courses of one semestet) selected ftom the offerings of the French Studies Department (excluding courses in German and Russian). Included in these coutses must be FRF152, FRF262, FRF344, and eithet FRF352 and FRF354B or FRF452A and FRF454B.

To maintain Honours standing, students must achieve at least a B average in their French Studies courses in the Third and Fourth Years, and at least a B- avetage in all their academic coutses in Fourth Year.

First Class Honours standing in Ftench Studies will be granted upon:

Fulfilment of the Honours standing requirements above.

At least an A- average in French Studies courses taken in Third and Fourth Years.

Minor in French Studies

Arts students may take a minor in French Studies. The requirements for the minor are four full courses in French Studies and at least a B- average fot the courses.

COURSE DESCRIPTIONS

FRF151: Cours de composition et d'introduction aux études littéraires.

Compulsory course for French-speaking Fitst Year General Programme students.

The course is aimed at providing specialized training in oral and written French so that students become familiar with the main cultural and artistic expressions of the Francophone world. During this course, students will progress from the study of grammar and composition techniques to the study of French literature and culture.

4 - 0 - 8 Weight: 16

FRF152: Cours de composition et d'introduction aux études littéraires I.

Compulsory course for French-speaking First Year Arts students.

The course is aimed at providing specialized training in oral and wtitten French so that students become familiar with the main cultural and artistic expressions of the Francophone world. During this coutse, students will progress from the study of grammar and composition techniques to the study of French literature and culture.

4 - 0 - 8 Weight: 12

FRF201: L'image des Canadiens français à travers la littérature canadienne-française du XXe siècle.

(Offered in 1996-97 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Engineeting students who speak and wtite French fluently.

Literary works (novels, poems, plays) will be used to study the major themes of French-Canadian literature and the way in which the French-Canadian community pottrays itself. The main stages in the evolution of this self-portrayal will be studied. Students will also examine the main aesthetic and critical trends in French Canada in the 20th century.

1.5 - 0 - 3 Weight: 6

FRF202: L'image des Canadiens français à travers la littérature canadienne-française du XXe siècle.

(Offered in 1996-97 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students who speak and write French fluently.

This course is similar in content to FRF201.

3 - 0 - 6 Weight: 12

FRF262: Cours de composition et d'introduction aux études littéraires II

Compulsory course for French-speaking Second Year Arts students.

This course teaches advanced writing techniques and provides an introduction to the main trends of French literature in the 19th and 20th centuries and to the authors most representative of that period.

3 - 0 - 6 Weight: 12

FRE303: Comparative Linguistics between English and French

(Offered in 1997-98 and every second year thereafter.)

This course is intended for English-speaking Second, Third and Fourth Year Engineering and Science students.

The course examines the linguistic differences between the two languages, focussing mainly on interference (anglicisms). The translation exercises are taken from military texts.

1.5 - 3 - 0 Weight: 6

FRE304: Comparative Linguistics between English and French

(Offered in 1997-98 and every second year thereafter.)

This course is intended for English-speaking Second, Third and Fourth Year Arts students.

The course examines the linguistic differences between the two languages, focussing mainly on interference (anglicisms). The translation exercises are taken from military texts.

3 - 0 - 6 Weight: 12

FRF309: Littérature et civilisation canadiennes-françaises

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Engineering and Science students.

The course provides an overview of the cultural evolution and the main literary trends in French Canada from the 19th century to the present.

1.5 - 0 - 3 Weight: 6

FRF310: Littérature et civilisation canadiennes-françaises

(Offered in 1998-99 and every second Year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course provides an overview of the cultural evolution and the main literary trends in French Canada from the 19th century to the present.

3 - 0 - 6 Weight: 12

FRF311: Linguistique différentielle de l'anglais et du français

(Offered in 1997-98 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Engineering and Science students.

The course is a study of the linguistic differences between the two languages, focussing mainly on interference (anglicisms). The translation exercises are taken from general and military texts.

1.5 - 0 - 3 Weight: 6

FRE314: Civilization of the French-speaking World

This course is intended for Third and Fourth Year Arts students.

The course provides an overview of French culture through the study of short literary works and general documents. The course work includes writing exercises.

3 - 0 - 6 Weight: 12

FRF316A: Linguistique différentielle de l'anglais et du français I

(Offered in 1997-98 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Arts students.

The course examines the linguistic differences between the two languages, focussing mainly on interference (anglicisms). The translation exercises are taken from general and military texts.

3 - 0 - 6 Weight: 6

FRF318B: Linguistique différentielle de l'anglais et du français II

(Offered in 1997-98 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Arts students.

The course examines the linguistic differences between the two languages, focussing mainly on interference (anglicisms). The translation exercises are taken from general and military texts.

3 - 0 - 6 Weight: 6

FRF330A: La Guerre et la condition militaire dans la littérature d'expression française I.

This course is intended for Second, Third and Fourth Year Arts students.

The course examines the portrayal of war and military life, in French literature and in writings which have had a determining influence on French literature, from Antiquity to the present day. The works covered in the course include novels, memoirs and poetry. Students will be required to take part in seminar discussions and prepare dissertations.

3 - 0 - 6 Weight: 6

FRF332B: La Guerre et la condition militaire dans la littérature d'expression française II.

This course is intended for Second, Third and Fourth Year Arts students.

The course examines the portrayal of war and military life, in French literature and in writings which have had a determining influence on French literature, from Antiquity to the present day. The works covered in the course include novels, memoirs and poetry. Students will be required to take part in seminar discussions and prepare dissertations.

3 - 0 - 6 Weight: 6

FRF344: Stylistique française

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Third and Fourth Year Arts students.

Students will acquire the knowledge necessary to appreciate and analyse stylistic effects and improve their writing style.

A wide range of documents (newspaper articles, speeches, literary texts, advertising and so on) will be analysed. The writing exercises will teach the students to adopt the style best suited to the end use of the texts they produce.

3 - 0 - 6 Weight: 12

FRF348: Approche historique et linguistique de la langue française

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Third and Fourth Year Arts students.

The course will first present a historical panorama of the development of the French language and then examine the research done on the language, the evolution of this research (structuralism, functionalism, generativism) and the influence of this work on other disciplines.

3 - 0 - 6 Weight: 12

FRF352A: Le roman français au XIXe siècle et ses antécédents

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course is a study of the evolution of the novelistic genre from the Middle Ages to the present day, with emphasis on the 19th century. The main trends and notable works will be examined in relation to the art and thinking associated with each period.

In addition to the readings, students will be required to write in-depth compositions.

3 - 0 - 6 Weight: 6

FRF354B: Le roman français au XXe siècle et ses antécédents

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth-Year Arts students.

The course is a study of the evolution of the novelistic genre, with emphasis on the 20th century. The main trends and notable works will be examined in relation ro the art and thinking associated with each period.

In addirion to the readings, srudents will be required ro write in-depth compositions.

3 - 0 - 6 Weighr: 6

FRF366: Étude de l'histoire et des formes de la poésie française

(Offered in 1997-98 and every second year rhereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course is a study of the evolurion of French poetry in Europe from the Middle Ages to the presenr day, with emphasis on rhe 19th and 20th cenruries. The main rrends and notable works will be examined in relation to the art and thinking associated with each period.

3 - 0 - 6 Weight: 12

FRF370: La littérature française du moyen âge

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

After a brief considération of important social and hisrorical elements and an overview of rhe principles of medieval French, rhis course will deal with the major lirerary genres of the Middle Ages : epic narrative, *fabliau*, theatre (farce, morality plays, *mystères*, etc.), novel, *chanson de geste*, lyric poetry (*chanson de toile, lai, jeu-parti*, erc.), amongsr others. From rhe *Serments de Strasbourg* ro rhe poerry of François Villon, study will be made of rhe mosr important works of rhis period. The close link between music and lirerature will also be explored.

3 - 0 - 6 Weight: 12

FRF372A: Histoire du théâtre médiéval et classique

This course is inrended for Second, Third and Fourrh Year Arts srudenrs.

This course will study medieval rheatre, including farces and mystery, miracle and morality plays, French Renaissance rhearre and classical theatre.

3 - 0 - 6 Weight: 6

FRF374B: Histoire du théâtre moderne

This course is inrended for Second, Third and Fourrh Year Arts srudents.

The course will focus on conremporary rhearre in rhe context of an absolute monarchy (Corneille, Racine, Molière). This will be followed by a study of the works of Beaumarchais and Marivaux. We will end with an overview of rhe aesthetics of modern theatre.

3 - 0 - 6 Weighr: 6

FRF380: Les grands moralistes français

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourrh Year Arts students.

The course presents a selecrion of the major works of French moralists. In particular, it will examine *Essais*, by Montaigne, *Pensées*, by Pascal, *Maximes*, by LaRochefoucauld, *Caractères*, by LaBruyère, *Oeuvres*, by Vauvenargues, and other works representative of this genre, including works by Chamfort, Rivarol, Voltaire and Diderot. In this way, the students will gain a better appreciarion of the wrirers' rhoughts on human narure and the human condition, and of their methodology and influence on the evolution of ideas. By rhe end of the course, students should be familiar with this typically French school of rhought and be able to appreciate the thinking and style of rhese writers.

3 - 0 - 6 Weighr: 12

FRF386: La littérature française du siècle des lumières

(Offered in 1998-99 and every second year rhereafter.)

This course is intended for Second, Third and Fourrh Year Arts students.

The course is an introduction to the thinking and lirerature of the 18rh century. The works studied will include *Lettres persanes*, by Montesquieu, *Lettres philosophiques*, Zadig and *Candide*, by

Voltaire, *Manon Lescaut*, by Prévost, *Neveu de Romeau*, by Diderot, *Discours sur l'inégalité* and *Discours sur les sciences et les arts*, by Rousseau, and other representative works. The study of the literature included in this course should enable students to gain an accurate idea of what constituted the Age of the Enlightenment, appreciate the thinking and style of the authors and situate the works studied within the context of this philosophical movement.

3 - 0 - 6 Weight: 12

FRF392A: Le roman comique au XVIe siècle

This course is intended for Second, Third and Fourth Year Arts students.

This course attempts to determine the social function of comedy, parody and satire. It begins with a study of the works of a great comedian, François Rabelais. These works will be examined as analysed by one of the greatest theoreticians of carnivalesque comedy, Mikhail Bakhtine.

Bakhtine characterizes the works of Rabelais as grotesque or carnivalesque. These works will be used to study the history and forms of comedy, the vocabulary of the public arena, festivals and grotesque portrayals of the human image.

3 - 0 - 6 Weight: 6

FRF394B: Le roman comique au XVIIe siècle

The course is intended for Second, Third and Fourth Year Arts students.

This course attempts to determine the social function of comedy, parody and satire. In the late 16th century, the carnivalesque style of Rabelais was continued by Michel de Cervantes and his *Don Quichotte de la Manche* and by Noël du Fail and his *Treize Propos rustiques*. The *Roman comique* and *Satyre Ménippée* by Scarron will also be studied. They are of a genre which Bakhtine calls grotesque or carnivalesque. These works will be used to study the history and forms of comedy, the vocabulary of the public arena, festivals and grotesque portrayals of the human image.

3 - 0 - 6 Weight: 6

FRE403: Comparative stylistics between English and French

(Offered in 1998-99 and every second year thereafter.)

This course is intended for English-speaking Third and Fourth Year Engineering or Science students.

The course studies the linguistic, stylistic and cultural codes of the two languages, using translations of texts in the military field.

1.5 - 0 - 3 Weight: 6

FRE404: Comparative Stylistics (English and French)

(Offered in 1998-99 and every second year thereafter.)

This course is intended for English-speaking Third and Fourth Year Arts students.

The course studies the linguistic, stylistic and cultural codes of the two languages, using translations of texts in the military field.

3 - 0 - 6 Weight: 12

FRF405: Civilisation canadienne-française

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Engineering and Science students.

The major currents of thought in French Canada are studied through an analysis of literary works.

1.5 - 0 - 3 Weight: 6

FRF411: Stylistique comparée de l'anglais et du français

(Offered in 1998-99 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Engineering or Science students.

The course studies the linguistic, stylistic and cultural codes of the two languages, using translations of texts in the military field.

1.5 - 0 - 3 Weight: 6

FRF416A: Stylistique comparée de l'anglais et français I

(Offered in 1998-99 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Arts students.

The course studies the linguistic, stylistic and cultural codes of the two languages, using translations of texts in the military field.

3 - 0 - 6 Weight: 6

FRF418B: Stylistique comparée de l'anglais et français II

(Offered in 1998-99 and every second year thereafter.)

This course is intended for French-speaking Third and Fourth Year Arts students.

The course studies the linguistic, stylistic and cultural codes of the two languages, using translations of texts in the military field.

3 - 0 - 6 Weight: 6

FRF426: Études dirigées avancées

This course is intended for students in Fourth Year Honours French Studies. It has to be approved by the Department Head.

This course is given on a tutorial basis by one member of the department. It include a considerable amount of written work.

FRF452A: Le roman canadien d'expression française avant 1940

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth-Year Arts students.

After some more or less successful attempts in the 19th century, the French-Canadian novel won acclaim in the 20th century. This course provides an overview of this evolution through novels representative of the main stages.

3 - 0 - 6 Weight: 6

RF454B: Le roman canadien d'expression française après 1940

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course provides an overview of the evolution of the French-Canadian novel after 1940 through novels representative of the main stages.

3 - 0 - 6 Weight: 6

FRF466: Poésie des grands aînés

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course will focus on the works of Grandbois, Hébert, Saint-Denys Garneau and Lasnier. After examining the poetic attempts that preceded the works of these four poets, the course will demonstrate how these authors led the way in Canadian poetry.

3 - 0 - 6 Weight: 12

FRF470: Théâtre canadien d'expression française

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

Following a brief overview of the history of French-Canadian theatre, this course will focus on the rapid growth of this genre since the 1960s. Special attention will be given to the works of well-known French-Canadian playwrights.

3 - 0 - 6 Weight: 12

FRF482A: Civilisation canadienne-française de 1760 à 1880

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The major currents of thought in French Canada are studied through an analysis of literary works.

3 - 0 - 6 Weight: 6

FRF484B: Civilisation canadienne-française de 1880 à nos jours

(Offered in 1998-99 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The major currents of thought in French Canada are studied through an analysis of literary works.

3 - 0 - 6 Weight: 6

FRF490: Émergence d'une autonomie littéraire

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course is intended to show how, from the 16th to the 19th century, Canadian literature gradually laid the groundwork for the attainment of full literary autonomy in the 20th century.

3 - 0 - 6 Weight: 12

FRF492A: La littérature de la francophonie antillaise et africaine

This course is intended for Second, Third and Fourth Year Arts students.

It provides an overview of the literature of Francophone communities outside France and Quebec, focussing in particular on emerging French literature. An attempt will be made to trace the main stages in its development: the transition from oral to written expression, the opposition to Colonialism, emulation and affirmation of their difference. The purpose of the course is to prepare students to better understand the Francophone cultures that differ from theirs not in their language but in their view of the world. The course will begin with a study of the literarure of the West Indies. This will be followed by an examination of African French literature.

3 - 0 - 6 Weight: 6

FRF494B: La littérature de la francophonie américaine et arabe

This course is intended for Second, Third and Fourth Year Arts students.

The course will present works that are representative of Acadian and Franco-Ontarian literature. The semester will end with a study of Arab literature.

3 - 0 - 6 Weight: 6

FRF496A: La sociolinguistique et la francophonie I

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

After presenting the various sociolinguistic trends, this course will focus mainly on the studies done on the standards, taboos and myths that govern the different varieties of French.

3 - 0 6 Weight: 6

FRF498B: La sociolinguistique et la francophonie II

(Offered in 1997-98 and every second year thereafter.)

This course is intended for Second, Third and Fourth Year Arts students.

The course will focus mainly on the most recent works in sociolinguistics and deal in particular with the different variants of French in specific areas (relationships between language and power and between language and social organization, for example).

3 - 0 - 6 Weight: 6

GME301: Introduction to German
(ALF301: Introduction à l'allemand)

This course is intended for Third and Fourth Year Engineering and Science students.

The course provides students with a basic knowledge of oral and written German and provides an overview of the German culture.

1.5 - 0 - 3 Weight: 6

GME302: Introduction to German
(ALF302: Introduction à l'allemand)

This course is intended for Third and Fourth Year Arts students.

The course provides students with a basic knowledge of oral and written German and provides an overview of the German culture.

3 - 0 - 6 Weight: 12

GME401: Intermediate German
(ALF401: allemand intermédiaire)

This course is intended for Third and Fourth Year Engineering and Science students.

The course provides students with an improved knowledge of oral and written German and of the German culture.

1.5 - 0 - 3 Weight: 6

GME402: Intermediate German
(ALF402: allemand intermédiaire)

This course is intended for Third and Fourth Year Arts students.

The course provides students with an improved knowledge of oral and written German and of the German culture.

3 - 0 - 6 Weight: 12

SPE300: Introduction to Spanish
(ESF300: Introduction à l'espagnol)

This course is intended for Second, Third and Fourth Year Arts students.

It provides an introduction to the study of Spanish civilization and language.

3 - 0 - 3 Weight: 12

SPE301: Introduction to Spanish
(ESF301: Introduction à l'espagnol)

This course is intended for Second, Third and Fourth Year Engineering and Science students.

It provides an introduction to the study of Spanish civilization and language.

1.5 - 0 - 3 Weight: 6

SPE400: Intermediate Spanish
(ESF400 : espagnol intermédiaire)

This course is intended for Third and Fourth Year Arts students.

The course provides students with an improved knowledge of oral and written Spanish and of the Spanish culture.

3 - 0 - 6 Weight: 12

SPE 401: Intermediate Spanish
(ESF401: espagnol intermédiaire)

This course is intended for Third and Fourth Year Engineering and Science students.

The course provides students with an improved knowledge of oral and written Spanish and of the Spanish culture.

1.5 - 0 - 3 Coefficient: 6

MILITARY AND STRATEGIC STUDIES PROGRAMME

Chairman and Dean of Arts - R.G. Haycock, BA, MA, PhD.
Professor-in-Charge - A. H. Ion, BA, MA, PhD.

PROGRAMME OBJECTIVES

This interdisciplinary programme is unique in North America at the undergraduate level. The Military and Strategic Studies programme gives students a sound grounding in military history, strategic thought, international relations, as well as in Canadian government, politics and economics, English or French and military psychology. It leads to a Bachelor of Arts degree in Military and Strategic Studies at either Honours or General levels which provides a solid basis for postgraduate studies and a professional career.

Officer Cadets aie encouraged to take at least one course in Military and Strategic Studies in their second language. Students with the requisite language profile are free to take all or a combination of courses in either official language in obtaining their degree.

As well as their academic work, officer cadets enrolled in the Military and Strategic Studies programme are encouraged to participate in the various extra-curricula activities of the programme which includes the production of an in-house journal Strategos, the staging of a bi-annual French language workshop on an appropriate topic in military and strategic studies, as well as the organization of a field trip for those enrolled in the programme designed to heighren awareness of defence and international problems.

DEGREE REQUIREMENTS

Students desiring a degree in Military and Strategic Studies must pursue one of two patterns of study:

a) Military and Strategic Studies;

b) Military and Strategic Studies with Minor in English, French or Military Psychology and Leadership.

Students desiring an **Honours Degree** must complete, over their four years of study:

a) 12 required courses within the Military and Strategic Studies pattern: nine of which are MSS core courses and three courses in Year 1 from among offerings in English, History, Economics or Politics or the appropriate course for a minor.

N.B. *For full course description consult the course number entry in the appropriate Department's course offerings.*

HIE 202: Canada
HIE 270: An Introduction to Military History
GOE 304: A Geography of the World's People and Places[1]
POE 316: Introduction to International Relations
POE 320: Comparative Politics[2]
POE 326: Canadian Government[2]
HIE 380: Peacekeeping and Peacemaking
HIE 470: Strategy and Strategists
MSE 424: Thesis or MSE 426: Advanced Directed Studies.

b) maintain a minimum of B average in honours courses taken in the last two years of study; and

c) attain at least a B- average in the fourth year of study.

Students desiring a **General Degree** must complete over their four years of studies:

a) 11 required courses within the Military and Strategic Studies pattern: eight of which are MSS core courses and three courses in Year 1 from among offerings in English, History, Economics or Politics or the appropriate course for a minor.

HIE 202: Canada
HIE 270: An Introduction to Military History
GOE 304: A Geography of the World's People and Places[1]
POE 316: Introduction to International Relations
POE 320: Comparative Politics[2]
POE 326: Canadian Government[2]
HIE 380: Peacekeeping and Peacemaking
HIE 470: Strategy and Strategist

b) attain a pass standing at the end of four years of study.

[1] ECE 318B or ECE 424B and approved 0.5 year Economics course can be substituted for GOE 304.
[2] Those pursuing Military and Strategic Studies with minors in either English, French or MPL will not be required to take POE 320 or POE 326.

COURSE OF STUDY

	Honours	General
Year 1:	ENE 110 / FRF 152	ENE 110 / FRF 152
	HIE 100	HIE 100
	PSE 102	PSE 102
	ECE 102	ECE 102

	POE 104	POE 104
	MAE 100	MAE 100
	SCE 100A	SCE 100A

PATTERN ONE: MILITARY AND STRATEGIC STUDIES

REQUIRED COURSES

Year 2:	ENE 200 / FRF 262	ENE 200 / FRF 262
	HIE 202	HIE 202
	HIE 270	HIE 270
	POE 316	POE 316
	1/2 Science Elective 1	1/2 Science Elective
	1/2 Science Elective	1/2 Science Elective
Year 3:	GOE 304[1]	GOE 304[1]
	POE 320	POE 320
	HIE 380	HIE 380
	PSE 301A	PSE 301A
	1/2 Science Elective	1/2 Science Elective
Electives:		
	1-1/2 approved Economics, Geography, History or Politics course*	1-1/2 approved Economics, Geography, History or Politics course*
Year 4:	MSE 424 or 426	POE 326
	POE 326	HIE 470
	HIE 470	PSE 401B
	PSE 401B	1/2 Science Elective
	1/2 Science Elective	
Electives:		
	1-1/2 approved, Economics English, French, Geography, History, MPL or Politics course*	2 -/12 approved Economics, English, French, Geography, History, MPL or Politics course*

It is strongly recommended that cadets choose electives from among the following courses in Years 3 and 4:

ECE 316A, ECE 318B, ECE 424B, GOE 402A, GOF 420B, HIF 340A, HIF 342B, HIE 372A, HIE 374B, HIE 378, HIE 390A, HIE 392B, HIE 454, HIF 400, HIE 406A, HIE 408B, HIE 472, HIE 474A, HIE 476B, HIF 478, POE 412B, POE 416B, POE 422, POE 424.

[1] ECE 318B or ECE 424B and approved 0.5 year Economics course can be substituted for GOE 304

* To be approved by the Military and Strategic Studies Committee.

PATTERN TWO: MILITARY AND STRATEGIC STUDIES WITH MINOR IN ENGLISH, FRENCH OR MILITARY PSYCHOLOGY AND LEADERSHIP

REQUIRED COURSES

	Honours	General
Year 2:	ENE 200 / FRF 262	ENE 200 / FRF 262
	HIE 202	HIE 202
	HIE 270	HIE 270
	Course in Minor Programme	Course in Minor Programme
	1/2 Science Elective	1/2 Science Elective
	1/2 Science Elective	1/2 Science Elective
Year 3:	GOE 304[1]	GOE 304[1]
	POE 316	POE 316
	HIE 380	HIE 380
	PSE 301A[2]	PSE 301A[2]
	Course in Minor Programme	Course in Minor Programme
	1/2 Science Elective	1/2 Science Elective
Electives:	1/2 or 1 approved English,French, Politics, History or MPL course*	1/2 or 1 approved English, French Politics, History ot MPL course*
Year 4:	MSE 424 or 426	HIE 470
	HIE 470	PSE 401B
	PSE 401B	Course in Minor Programme
	Course in Minor Programme	1/2 Science Elective
	1/2 Science Elective	
Electives:		
	1-1/2 approved , English, French, History, MPL or Politics course*	2-1/2 approved, English, French, History, MPL or Politics course*

[1] ECE 318B or ECE 424B and approved 1/2 year Economics course can be substituted for GOE 304.

[2] Students doing a minor in Military Psychology and Leadership would substitute the appropriate course.

* To be approve by the Military and Strategic Studies Committee.

DEPARTMENT OF HISTORY

Professor Emeritus - R.A. Preston, BA, MA, PhD, DipED, FRHistS.
Professor Emeritus - D.M. Schurman, BA, MA, PhD.
Professor Emeritus - Colonel The Honourable G.F.G. Stanley, OC, CD, KStJ, BA, MA, MLitt, DPhil, DèsL, DLitt, DCL, LLD, FRHistS, FRSC.
Professor and Dean of Arts - R.G. Haycock, BA, MA, PhD.
Professor and Chair of the Department - E.J. Errington, BA, BEd, MA, PhD.
Professor - N.F. Dreisziger, BA, MA, DipREES, PhD.
Professor - A.H. Ion, BA, MA, PhD.
Professor - H.P. Klepak, CD, BA, MA, PhD.
Professor - B.C.J. McKercher, BA, MA, PhD, FR HistS.
Professor - K.E. Neilson, Bsc, BA, MA, PhD.
Associate Professor - J.P. Gagnon, BA, LèsL, MA, PhD.
Associate Professor - F. Gendron, BA, MA, PhD.
Associate Professor - R.A. Prete, BA, MA, PhD.
Assistant Professor - M.A. Hennessy, BA, MA, PhD.
Assistant Professor - R. Legault, BA, MA, PhD.

THE GOALS OF THE DEPARTMENT OF HISTORY

The Department of History shares in the primary mission of the College's Academic Wing: to provide university-level education to officer cadets as one of the essential elements of their professional development. To this end, the programme in history is designed to meet the specific needs of two types of students - those who major in history and those taking degrees in other departments and divisions who have an interest in the discipline.

The Department of History has three primary goals:

i) to teach the essential elements of the craft of historical analysis, including the ability to think in historical terms, to research various issues and to present information and analysis in sound historiographical arguments both verbally and in writing;

ii) to impart the story of the past in both survey and specialist courses that cover national and regional histories (like Canada, France, the Far East, and modern Europe), thematic histories (social, economic, and intellectual) and topical histories (modern international relations, strategic thought, and the military); and

iii) to explain and utilise the different historiographic methodologies (economic determinism, realism, corporatism, gender, etc.).

ENTRY AND QUALIFICATIONS

Students desiring an Honours Degree in the Humanities (History) must take at least 10 history courses over their four years of study. The selection of courses must be guided by the outlines given in the following section and by the Academic Regulations, and must be approved by the Department of History. History 100, History 202, History 270 and, in the Fourth Year, either History 424 or 426 are compulsory course requirements for an Honours Degree.

Students desiring a General Degree in the Humanities (History) must take at least 8 history courses over their four years of study.

For information regarding further requirements for an Honours Degree in the Humanities (History), see Academic Regulations.

COURSES OF STUDY

HISTORY

HONOURS REQUIREMENTS

Ten History Courses approved by the Department of History, including:

History 100
History 202
History 270
History 424 or 426

Year 1:
Common programme of study for all Arts students, which includes

History 100

Year 2:
Common courses for all Arts students, which includes
History 202
History 270

Year 3:
Three or four History courses
Two and 1/2 or one and 1/2 other courses

Year 4:
Three or four History courses, including History 424 or History 426.
Two and 1/2 or one and 1/2 other courses

GENERAL REQUIREMENTS

Eight History Courses, approved by the Department of History

Year 1:
Common programme for all Arts students, which includes History 100

Year 2:
Common courses for all Arts students, which includes History 202
History 270 is highly recommended

Year 3:
Two or three History Courses
Three and 1/2 or two and 1/2 other courses

Year 4:
Two or three History courses
Three and 1/2 or two and 1/2 other courses

MINORS

Arts students may take a minor in History. The requirements for the minor are four full courses in History and at least a B- average for these courses.

MILITARY AND STRATEGIC STUDIES

See seperate entry for Military & Strategic Studies Programme

COURSE DESCRIPTIONS

Courses listed in the 300 series are open to Arts students in Years Two, Three and Four. Courses listed in the 400 series are open to students in Years Three and Four only. Odd-numbered courses (e.g. HIE203A, HIE289B, HIE473) are courses offered for Science and for Engineering students. Further, certain courses are offered only in alternate years. In selecting their programme in Years Two and Three, students should take into consideration, as far as possible, the courses which will be available in the following year(s).

HIE100: A History of Europe since the Middle Ages
(HIF100: L'histoire de l'Europe depuis le Moyen Âge)

For students in the First Year taking Arts.

This is a survey course of European history since the Middle Ages. The course will provide students with a basic chronological framework of events, with attention paid to political, social, economic, intellectual, cultural, and military developments. In this context, these developments will be placed in the context of wider issues like feudalism, the Renaissance, the Enlightenment, the growth of nationalism, and the impact of urbanisation and industrialisation.

3 - 0 - 6 Weight: 12

HIE202: Canadian Military History
(HIF202: L'histoire militaire du Canada)

For students in the Second Year taking Arts.

A survey of the military history of Canada from the early days of New France to the present. Emphasis will be placed on Canada's wars and their impact on national development. The evolution of Canada's Armed Forces, their role in the First and Second World Wars, in NATO, and in peacekeeping operations, will also be studied.

3 - 0 - 6 Weight: 12

HIE203A: Canadian Military History
(HIF203A: L'histoire militaire du Canada)

For students in the Second Year taking Science or Engineering.

A survey of the military history of Canada from the rise of New France to the present. Emphasis will be given to the evolution of the Armed Forces, the economic and political background of the major wars involving Canada, and development of the Forces through the Cold War.

3 - 0 - 3 Weight: 6

HIE270: An Introduction to Military History
(HIF270: Introduction à l'histoire militaire)

Mandatory for students taking Honours History.

A study of the evolution of strategy, war and conflict from Machiavelli to the present. It will include classical theories of battles and siegecraft; theorists of seapower and amphibious warfare; the impact of the industrial revolution on war; mechanized and mass strategy; armoured and aerial warfare; nuclear weapons policy; arms control and disarmament; and civil military relations. Examples of how these various aspects interconnect in warfare will be presented through an analysis of military conflict from 1400-1988.

3 - 0 - 6 Weight: 12

HIE289B: The Impact of Science and Technology on Modern Europe and the "Western" World
(HIF289B: L'impact de la science et de la technologie sur l'Europe moderne et le monde occidental

For students in the Second Year taking Science or Engineering.

A lecture course on the impact of modern science and technology on modern society in Europe and North America from the 16th century to the present. The focus is primarily on technology and social change and will consider technical or scientific knowledge in their wider economic, political and social context.

3 - 0 - 3 Weight: 6

HIE312A: The United States, 1750 - 1877
(HIF312A: Les États-Unis, de 1750 à 1877)

(Offered in 1998-99 and alternate years)

A study of the political, social and economic development of the United States from the mid-18th century to Reconstruction.

3 - 0 - 6 Weight: 6

HIE314B: The United States, 1865 - 1980
(HIF314B: Les États-Unis, de 1865 à 1980)

(Offered in 1998-99 and alternate years)

A study of the political, economic and social development of the United States from the American Civil Wat to the Reagan years.

3 - 0 - 6 Weight: 6

HIF340A: L'histoire militaire de la Première Guerre mondiale

(Offered in 1997-98 and alternate years.)

A study of the nature of total war at the beginning of the 20th century, including the origins of war, the process of strategic planning, the problems of coalition warfare, great battles on land, on the sea and in the air, propaganda, public opinion and espionage, technological changes and the social, political and economic consequences of war.

3 - 0 - 6 Weight: 6

HIF341: Histore militaire - Les Première et Seconde Guerres mondiales

(Offered in 1997-98 and alternate years.)

A study of the nature of total war in the twentieth century, including the origins of war, strategic planning, the problems of coalition warfare, the great battles on land, on sea and in the air, public opinion and espionage and the social, political and economic consequences of total war.

1.5 - 0 - 1.5 Weight: 6

HIF342B: L'histoire militaire de la Deuxième Guerre mondiale

(Offered in 1997-98 and alternate years.)

A study of the nature of World War II, including the origins of war, the process of strategic planning, the problems of coalition warfare, great battles on land, on the sea and in the air, propaganda, public opinion and espionage, technological changes and the social, political and economic consequences of war.

3 - 0 - 6 Weight: 6

HIE356A: War and Tradition in the Islamic World

(Offered in 1997-98 and alternate years.)

A study of the rise of Islam and its enduring impact on Europe, Asia and Africa. Special attention will be paid to the roots of conflict in the Middle East, the Gulf and Indian Ocean states from the emergence of Islam to proclamation of the Turkish Republic in 1922.

3 - 0 - 6 Weight: 6

HIE358B: War and Peace in the Modern Islamic World

(Offered in 1997-98 and alternate years.)

A study of war and peace in the modern Islamic World from the beginning of the Turkish Republic to the present. Attention will be paid to the political, military, economic and religious development of the Middle East, the Gulf and Indian Ocean states.

3 - 0 - 6 Weight: 6

HIE372A: The Diplomacy of Great Power Rivalry: International History, 1870-1914

(Offered in 1998-99 and alternate years.)

A lecture course concentrating on the major political, economic, and social developments in international history between 1870 and 1914. Emphasis will be placed upon the foreign policies of the European Great Powers, as well as the United States And Japan, the rise and development of the European Alliance system, colonial rivalries, differing national and imperial strategic requirements, and the origins of the First World War.

3 - 0 - 6 Weight: 6

HIE374B: From World War to World War: International History 1914-1945

(Offered in 1998-99 and altetnate years.)

A lecture course concentrating on the majot political, economic and social developments in international history between 1914 and 1945. Emphasis will be placed upon the origins of the Fitst World War, the development of war aims and peace tetms, inter-alliance relations, the Paris Peace Settlement, interwar diplomacy, the 'appeasement' debate, and the diplomacy of the Second World War.

3 - 0 - 6 Weight: 6

HIE378: Cold War, Limited War, and Diplomacy: International History, 1945 - 1980
(HIF378: La guerre froide, la guerre limitée et la diplomatie: les relations internationales, 1945 - 1980)

(Offered in 1997-98 and alternate years.)

A lecture course concentrating on the major political, economic, and social developments in international history after 1945. Emphasis will be placed upon the settlements following the Second World War, the reconstruction of Eutope and the Far East, and the formation of NATO and the Warsaw Pact. The otigins of the Cold War, the tise of the global Super Powers, the end of European hegemony overseas, the trend towards European integration, and the emergence of the Third World as an effective factor in intetnational politics will also be discussed.

3 - 0 - 6 Weight: 12

HIE379: Cold War, Limited War and Diplomacy, 1945-1980
(HIF379: La guerre froide, la guerre limitée et la diplomatie: les relations internationales, 1945 - 1980)

(Offered in 1997-98 and altetnate years.)

An examination of the major political, economic, and social developments in international history after 1945. Emphasis will be placed upon the settlements following the Second World War, the teconstruction of Europe and the Far East, and the formation of NATO and the Warsaw Pact, the otigins of the Cold War, the tise of the global Super Powers, the end of European hegemony ovetseas, the trend towards European integration, and the emetgence of the Third Wotld as an effective factor in intetnational politics.

1.5 - 0 - 1.5 Weight: 6

HIE380: Peacekeeping and Peacemaking
(HIF380: Le maintien de la paix et le "peacemaking")

A study of peacekeeping and peacemaking operations in the 20th century from the Boxer Intervention of 1900 to the present. Operations taken under the auspices of the League of Nations and the United Nations will be analyzed as well as those endeavours involving cooperation between alliance ot coalition pattnets. Special attention will be paid to the roles and the missions undertaken by the Canadian Armed Fotces in the post-1945 era.

3 - 0 - 6 Weight: 12

HIE384: Modern Europe
(HIF384: L'Europe contemporaine)

An examination of European history from 1789 to the present. In addition to dealing with the political history of the Eutopean state system, attention will be paid to such general European themes as industtialization, urbanization, the growth of political ideologies, the rise of a mass cultute and the total wars of the 20th century.

3 - 0 - 6 Weight: 12

HIE386A: Eastern Europe to 1918

(Offered in 1998-99 and alternate years.)

A study of the history of East Central and Eastern Europe — the lands between the German and Russian tealms — from medieval times to the end of the First Wotld War. Aside from examining the evolution of the majot national groups of the tegion, the course will cover such themes as international conflict in the region, the struggles for national liberation, the impact of industrialization, the rise of nationalism.

3 - 0 - 6 Weight: 6

HIE388B: Eastern Europe from 1919 to 1989

(Offered in 1998-99 and alternate years.)

The evolution of Eastern Eutope from the post-Wotld War I peace settlements to the collapse of the Soviet Empire. The course will survey the newly emerged independent states aftet 1918; intetnal problems and foteign intetfetence in the tegion; social, ethnic, and intra-regional conflicts; the impact of Wotld War II; the tise and demise of Soviet-style communism. (It is tecommended that HIE386A, Eastetn Eutope be taken priot to taking this course.)

3 - 0 - 6 Weight: 6

HIE390A: European Imperialism - the Early Stages in Renaissance Europe
(HIF390A: L'impérialisme européen - les premières étapes de l'Europe de la Renaissance)

(Offered in 1997-98 and alternate years.)

An introduction to the early expression of European Imperialism in the 15th, 16th and 17th centuries, and particularly the Spanish and Portuguese experience. In addition, the formation of the first British Empire, to 1783 and the French Imperial experience to 1759 will be considered and contrasted with that of the Netherlands.

3 - 0 - 6 Weight: 6

HIE392B: European Imperialism - Nineteenth and Twentieth Centuries
(HIF392B: L'impérialisme européen - les 19e et 20e siècles)

(Offered in 1997-98 and alternate years.)

An examination of the phenomenon of modern European imperialism, concentrating on the British and French Empires. The growth of colonial nationalisms and the emergence of independence movements within those empires will also be considered. (It is recommended that HIE390A, European Imperialism be taken prior to this course.)

3 - 0 - 6 Weight: 6

HIF400: L'héritage militaire du Canada français

(Offered in 1997-98 and alternate years.)

A study of the relationship between French Canadian society, the Armed Forces and war. Themes discussed will include Pierre Lemoyne d'Iberville, the "compagnies franches de la Marine", Charles-Michel de Salaberry, the Van Doos, the 425th Squadron, the implementation of bilinguism in the Canadian Forces and other aspects of 350 years of French Canadians and Quebecers soldiering.

3 - 0 - 6 Weight: 12

HIE402A: A Developing Canadian Community, 1870 - 1920
(HIF402A: L'essor d'une communauté canadienne, 1870 - 1920)

(Offered in 1997-98 and alternate years.)

A seminar course which will consider selected issues in the development of modern Canadian society after 1870. Topics will include industrialization and its varied social, political and economic impacts; immigration; urbanization; attempts at reform.

3 - 0 - 6 Weight: 6

HIE404B: A Maturing Canadian Community, 1920 to the Present
(HIF404B: Une communauté canadienne qui mûrit, 1920 à aujourd'hui)

(Offered in 1997-98 and alternate years.)

A seminar course which will consider, among other things, the growth of regionalism, northern development, cultural conflict and the impact of ethnic, racial and economic diversity on the Canadian community.

3 - 0 - 6 Weight: 6

HIE406A: Canadian External Relations
(HIF406A: La politique extérieure du Canada)

A study of selected aspects of the history of Canadian foreign policy, including studies of Canada's role within the Empire-Commonwealth, North America, Europe, Asia and the Third World.

3 - 0 - 6 Weight: 6

HIE408B: Canadian Defence Policy
(HIF408B: La politique de défense du Canada)

A study of selected aspects of Canadian defence policy including the development of the modern military force and its role in military operations; an examination of domestic and international factors influencing the formulation of defence policy and the use of the armed forces as an instrument of national policy

3 - 0 - 6 Weight: 6

HIE410: Canada and War
(HIF410: Le Canada et la guerre)

(Offered in 1998-99 and alternate years.)

An examination of the impact of modern wars on Canadian society from 1860 to the present. Specific themes will include Canadian reaction to North American conflicts and to British imperial wars; the impact of World War I and II; Canada and Cold War and Canada and peacekeeping.

3 - 0 - 6 Weight: 12

HIE416A: The United States as an Emerging World Power to 1919
(HIF416A: Les États-Unis comme puissance mondiale naissante jusqu'à 1919)

(Offered in 1997-98 and alternate years.)

A thematic study of the United States and its relations with foreign powers from the early national period to the end of World War I. Issues that will be considered will include the development of a continental nation, the foreign policy consequences of industrialization and America's growing involvement in international affairs. (It is recommended that HIE/F312A & 314B, The United States, 1750-1877, be taken prior to or coincident with this course.)

3 - 0 - 6 Weight: 6

HIE417: US Foreign Policy
(HIF417: La politique étrangère des États-Unis)

(Offered in 1997-98 and alternate years.)

An examination of selecred issues in American foreign policy from the mid-19th century to the present.

1.5 - 0 - 1.5 Weight: 6

HIE418B: The United States as a World Power, 1919 to the Present
(HIF418B: Les États-Unis comme puissance mondiale, 1919 à nos jours)

(Offered in 1997-98 and alternate years.)

This course will consider, through a combination of lectures and seminars the actions of the United States as a World Power. Themes and topics discussed will include the tension between isolationism and international commitments and the interplay of foreign policy and domestic developments. (It is recommended that HIE/F416A, The US as an Emerging World Power, be taken prior to this course.)

3 - 0 - 6 Weight: 6

HIE420: Making a New World: Colonial Societies in North America
(HIF420: Bâtir le nouveau monde: les sociétés coloniales en Amérique du Nord)

(Offered in 1998-99 and alternate years.)

A study of the development of French and English colonial societies in North America from the 16th century to about 1840. Class discussions will consider, among other things the development of New France, Acadia and the English colonies on the continent before 1776 and the changing face of British North America.

3 - 0 - 6 Weight: 12

HIE424: Thesis
(HIF424: Mémoire)

Special research on an approved subject to be prepared as a thesis, which will be examined by a committee constituted for the purpose. The thesis must be submitted for examination no later than 31 March. (Taken only with permission of the Department.)

Weight: 12

HIE426: Advanced Directed Studies
(HIF426: Études dirigées avancées)

Special research on an approved subject, under the direction of an instructor, resulting in the submission of at least 2 major research papers. (Taken only with permission of the Department.)

Weight: 12

HIF432: Histoire diplomatique et militaire de l'Amérique latine

(Offered in 1998-99 and alternate years.)

An introduction to the diplomatic and military influences which affected the development of Latin America. Among othet things, the course will consider pre-contact indigenous societies, and how various wars have influenced the state of modern society.

3 - 0 - 6 Weight: 12

HIE448: The rise of Modern Communism and Fascism

(Offeted in 1997-98 and alternate years.)

A thematic examination of the emergence and triumph of radical leftist or tight-wing movements in Russia, Italy, and Germany. The intellectual and populist otigins of communism, fascism and Nazism, the national and intetnational context of the evolution of these movements, as well as other related themes will also be studied. (It is recommended that HIE/F384, Modern Europe, be taken prior to ot coincident with this course.)

3 - 0 - 6 Weight: 12

HIE454: War, Peace and Diplomacy: the Foreign Policies of the Great Powers since 1815.
(HIF454: La guerre, la paix et la diplomatie: les relations entre les grandes puissances depuis 1815.)

A seminar course on the conduct of Gteat Powet relations since the Congress of Vienna.

3 - 0 - 6 Weight: 12

(HIF460A: La Révolution Française)

(Offered in 1998-99 and alternate years)

Study of causes and the main events of the French Revolution through the popular days: 14 July, 5 and 6 October, 10 August, 31 May etc.. The course will also consider the dialectic between the popular movement and the bourgeois reaction and concerns over human tights. The students will give presentations and critique ptimary documents of the revolution.

3 - 0 - 6 Weight: 6

(HIF462B: Napoléon et le Premier Empire)

(Offered in 1998-99 and alternate years)

This course will consider the first empire and the tise of impetialism. It will consider the seven coalitions raised by England and the grand battles of the tegime: Aboukit, Trafalgar, Austetlitz, Wagram and Waterloo. Students will analyse the continental blockade, the war in Spain, the Russian campaign, the campaign in France and the congress of Vienna. And it's attempts to stop the emperot and the destruction of the French Revolution.

3 - 0 - 6 Weight: 6

HIE470: Strategy and Strategists
(HIF470: La stratégie et les stratèges)

A study of the most impottant interpreters of warfare from classical thinkets (Thucydides and Sun-Tzu) to the present. Also considered will be airpowet and its ptoponents; geopolitical and maritime doctrines of war; the developments of military technology since 1945 and their impact on strategic thinking; the theories of deterrence, revolutionary and guetilla war; disarmament and arms control and the international law of war.

3 - 0 - 6 Weight: 12

HIE472: Naval History: The Ages of Sail and Steam

(Offered in 1998-99 and alternate years.)

A survey of naval and maritime history from the 16th through the 20th centuries. The btoad themes addressed include organizational, technological and social developments impinging upon the conduct of naval operations, and the course of maritime commerce. In addition, selected aspects of the "world wars" of the 18th and 20th centuries will be examined to illusttate ttansitions in technology, tactical doctrine, and majot strategical debates.

3 - 0 - 6 Weight: 12

HIE473: Naval History: The Ages of Sail and Steam

(Offered in 1998-99 and alternate years.)

A survey of naval and maritime history from the 16th through the 20th centuries. The broad themes addressed include organizational, technological and social developments impinging upon the conduct of naval operations, and the course of maritime commerce. Selected aspects of the "world wars" of the 18th and 20th centuries will be examined to illustrate transitions in technology, tactical doctrine, and major strategical debates.

1.5 - 0 - 1.5 Weight: 6

HIE474A: Military Technology: Men, Machines and War
(HIF474A: La technologie militaire: les hommes, les machines et la guerre)

An examination of the impact of technology on wat, and the relation of these to society as a whole. In addition to identifying the key technological advances in weapon development and defence-related fields, this course will look at the effect of technology on tactics, strategy, and society itself, from the pre-gunpowder period to the nuclear age.

3 - 0 - 6 Weight: 6

HIE476B: Guerrilla and Revolutionary War
(HIF476B: La guerre révolutionnaire et la guérilla)

A study of the role and conduct of guerrilla warfare and its connection with other types of conflict. This course will trace the development of thinking about guerrilla warfare as well as the evolution of its practice.

3 - 0 - 6 Weight: 6

HIF478: L'histoire du droit des conflits armes

(Offered in 1997-98 and alternate years)

This course will examine the principles governing the use of force in armed conflict, as established in the Haye and Geneva Conventions. Various basic laws of the conduct of war will be considered including: the treatment of civilians, individuals under arms, medical and aid personnel; cultural property; undefended targets; the use of weapons that cause unnecessary suffering or indiscriminate impact; acts of treachery; and unnecessary destruction. The course will also consider the treatment of individuals - combatants, civilians, "guerrillas", prisoners of war, spies and mercenaries; and war crimes, crimes against humanity and the trials at Nuremberg and in the former Yugoslavia.

3 - 0 - 6 Weight: 12

HIE480: War, Revolution and the Rise of Modern China

(Offered in 1997-98 and alternate years.)

A study of the transformation of China from cultural Empire to a modern state. Particular attention will be given to the indigenous response of China to the impact of the West. Emphasis will be given to the influence of war and revolution on the development of China from the early 19th century to the present.

3 - 0 - 6 Weight: 12

HIE482: War and the Emergence of Modern Japan

(Offered in 1998-99 and alternate years.)

A study of the impact of war and the military ethos on the emergence of Japan as a world power. Attention will be paid to bushido and the samurai, the evolution of modern armed forces, military education, the general staff, the military-industrial complex, civil-military relations, the military and colonial policy, and alliance diplomacy.

3 - 0 - 6 Weight: 12

HIE486A: Russia to 1917

(Offered in 1997-98 and alternate years.)

A survey of Russia from 1861 to the Revolution of 1917. Particular attention will be paid to the emancipation of the serfs, the industrialization of Russia, the modernization of government and the Bolshevik revolution. (It is recommended that HIE/F384, Modern Europe, be taken prior to or coincident with this course.)

3 - 0 - 6 Weight: 6

HIE487: A History of Russia and the USSR

(Offered in 1997-98 and alternate years.)

A study of the development of the Russian military from its origins to the present.

1.5 - 0 - 1.5 Weight: 6

HIE488B: The History of the USSR

(Offered in 1997-98 and alternate years.)

A survey of the USSR from 1917 to the present. Particular attention will be paid to the Stalinist system, the role of the USSR as a great power, the Second World War and the collapse of Communism. (It is recommended that HIE 486A, Russia to 1917, be taken prior to or coincident with this course.)

3 - 0 - 6 Weight: 6

HIF493: Histoire de la France

(Offered in 1997-98 and alternate years.)

A study of France from the Middle Ages to the present, including an examination of the rise of absolutism, the French Revolution, the search for political stability, and role of France in the European and international world and the evolution of its military institutions.

1.5 - 0 - 1.5 Weight: 6

HIF494A: La France moderne jusqu'à 1848

(Offered in 1997-98 and alternate years.)

Political, economic, social and cultural developments in France from the Middle Ages to 1848, with emphasis on the growth of royal absolutism, the French Revolution and the subsequent quest for political stability to 1848. The role of France in the European context will be explored, as well as its military institutions. (It is recommended that HIE/F384, Modern Europe, be taken prior to or coincident with this course.)

3 - 0 - 6 Weight: 6

HIF496B: La France contemporaine

(Offered in 1997-98 and alternate years.)

A study of the political, economic, social and cultural developments in France from 1848 to the present. Among other things, the course will consider the political, military and cultural development in France since the second Republic and the repercussion of the great wars of the 20th century. (It is recommended that HIF494A, La France moderne jusqu'à 1848, be taken prior to this course.)

3 - 0 - 6 Weight: 6

HIE498: Modern Britain

(Offered in 1998-99 and alternate years.)

A survey of British history from 1750 to the present. In addition to examining the course of British political history, particular attention will be paid to the industrial revolution and urbanization, Britain's extra-European dimension, Britain's role as a great power and the contraction of British influence in the second half of the twentieth century. (It is recommended that HIE/F384, Modern Europe, be taken prior to or coincident with this course.)

3 - 0 - 6 Weight: 12

MSE424: Thesis
(EMF424: Mémoire)

Special research on an approved subject in one of the areas studied in Military and Strategic Studies. The student will prepare a thesis which will be examined by a committee constituted for the purpose. The thesis must be submitted for examination no later than 31 March. (Taken only with permission of the Military and Strategic Studies Committee.)

Weight: 12

MSE426: Advanced Directed Studies
(EMF426: Études dirigées avancées)

Special Research on an approved subject in one of the areas studied in Military and Strategic Studies. The student will submit at least two major research papers to an advisor. (Taken only with the permission of the Military and Strategic Studies Committee.)

Weight: 12

DEPARTMENT OF MILITARY PSYCHOLOGY AND LEADERSHIP

Associate Professor and Head of the Departmenr - Lieutenant-Colonel J. P.Bradley, CD, BA, MA, PhD.
Professor - S.H. Guimond, BA, MSc, DEA, PhD.
Associate Professor - R.C. St. John, BA, MA, PhD.
Assistant Professor - D. Charbonneau, BEng, MA, PhD.
Assistant Professor - Major J.P.R. Hau, CD, BA, MA.
Assistant Professor - Captain C. Gingras, MTh, MCL, ICL, MSW.
Assistant Professor - Captain M. Villeneuve, BA.
Lecturer - Captain A. Carty, Cd, BA, MEd.
Lecturer - Captain J. D. Klammer, BA, MSc.

PROGRAMME OBJECTIVES

As a department of the Faculty of Arts, the Military Psychology and Leadership (MPL) Department teaches a mandatory programme to all Officer Cadets during their four years at the College, and a psychology minor programme to Arts students who wish to pursue this option. The challenge is to deliver an academically sound and militarily relevant course of study that will yield practical social, employment and leadership skills supported by psychological theory.

Mandatory Programme

In fulfilling its mandatory mission, the MPL Department recognizes the need to provide leadership education, raise social consciousness and positively impact the psychological, philosophical and moral development of students. To achieve this goal, the Department concentrates on the following requirements:

a. Meeting the increasingly unique and complex challenges of an officer in the Canadian Forces today presupposes a combination of practical skills, cognitive abilities, and progressive thinking that was not required only a short while ago. To prepare officers for their future responsibilities, the psychology programme promotes self-understanding and appreciation of human behaviour by providing an introductory course focusing on basic psychological phenomena such as learning, perception, memory, personality and emotion.

b. Beyond self-awareness, an officer must be able to predict the type and degree of influence effective leadership can bring to bear on individuals and groups. Also, situational factors such as political or group pressures have been shown to have powerful influences on group behaviour and the ability to lead. Through projects, assignments and discussion groups, students examine human behaviour in organizational and social contexts by studying such topics as values, attitudes, obedience, aggression, conflict resolution, racial and gender relations, and prejudice.

c. Particular emphasis is placed on an officer's ability to diagnose organizational performance, adapt effective leadership approaches to various situations, and convey the appropriate leadership style to followers. This ability is gained through developing an understanding of leadership theories, human motivation, power and politics, organizational culture, and managing resistance to change.

d. An officer's ability to function will be greatly impaired if his/her leadership is seen as lacking in integrity. In this vein, a sustained focus is placed on the necessity for personal inregrity, the importance of human dignity, and the need to reflect continually on one's own values and professional conduct. These concepts are reinforced by readings and discussions centered on the function of ethics in social and organizational life, ethical theories and decision criteria which distinguish between right and wrong, the impact of situational factors on ethical behaviour, the nature of military professionalism and ethical obligations, specific codes of conduct extant in war, and value conflicts and moral dilemmas inherent in military service.

The following Table delineates rhe mandatory programmes for Arts and Engineering and Science students:

	Arts students	**Engineering or Science students**
Yr 1	PSE112 Intro to Psychology	PSE123A Fundamentals of Human Psychology (note 1)
Yr 2	no requirements	no requirements
Yr 3	PSE301A Organizational Behaviour and Leadership	PSE301A Organizational Behaviout and Leadership
Yr 4	PSE401B Military Professionalism and Ethics	PSE401B Military Professionalism and Ethics

Note 1: Engineering and Science students may take psychology electives upon achieving a minimum B- grade in PSE123A or obtaining the professor's permission.

Minor Programme

The minor programme in psychology offers Arts students an opportunity to examine in greater detail issues raised as part of the mandatory programme, and to develop the knowledge and skills necessary to apply psychological concepts in a productive way. More specifically, the programme is oriented towards applied organizational psychology, an area with direct relevance to many military occupations. Examples of subject matter within this area include military psychology and combat stress, leadership and motivation, personnel selection and appraisal, interviewing and counseling, and applied research in organizational settings.

A minor concentration in psychology offers an excellent counterpart to the Military Strategic Studies and Business Administration programmes. Similarly, the insight and understanding of the human condition that comes with the study of psychology has great benefit for the Social Science and Humanities degree streams as well. Therefore, the objectives of the minor programme in psychology are to:

a. provide courses and electives that will have maximum applicability across a wide range of military occupations; and

b. offer a concentration in psychology that will enhance the Military Strategic Studies and Business Administration degree streams as well as complement the Social Science and Humanities programmes.

Arts students who register in the minor programme must complete the equivalent of four full courses and must include the following:

PSE112 Introductory Psychology;
PSE228A Group Dynamics;
PSE214B Research Methodology in Psychology;
PSE304A Organizational Behaviour and Leadership;
PSE312B Military Psychology and Combat;
PSE454B Applied Leadership and Motivation; and,
One optional course in psychology to be selected from the current year offerings.

For the minor concentration in psychology to appear on the student's transcript, a B- average must be achieved in the equivalent of three full courses.

COURSE DESCRIPTIONS

PSE112: Introduction to Psychology
(PSF112: Introduction à la psychologie)

Compulsory for all students in the First Year Arts.

This course is designed to provide the student with an understanding of people as psychological beings and to establish the foundation for future required MPL courses. Concepts such as perception, learning, memory, motivation, personality, and emotion will provide the student with an enriched background for future study. Additionally, a comprehensive treatment of the major topics and issues in social psychology is included to provide the student with a fundamental understanding of human social behaviour. Theories of social behaviour in such areas as social perception, values and attitudes, attitude change, persuasion, conformity and obedience, prejudice and discrimination, aggression and conflict, organizational diversity, social influence, and socialization are examined.

3 - 0 - 6 Weight: 12

PSE123A: Fundamentals of Human Psychology
(PSF123A: Notions fondamentales de la psychologie humaine)

Compulsory for all students in the First Year General Programme.

This course introduces the student to the basic concepts of modern psychology with emphasis on personality, and social psychology, thereby providing the foundation for future required psychology courses. It includes the essentials of the scientific method and its application to psychology. The first half incorporates the basic concepts of people as psychological beings (e.g., learning, emotion, intelligence) followed by emphasis on fundamental social psychology elements (e.g., attitudes, group behaviour, social influence).

3 - 0 - 3 Weight: 6

PSE192: Directed Readings in Psychology
(PSF192: Lectures dirigées en psychologie)

Available, upon permission of the Department Head, to First Year Arts students repeating First year without previous failure in PSE112.

The content of this course is more advanced than that of PSE112, and is related to the studies already completed by the student.

Directed Reading only Weight: 12

PSE193: Directed Readings in Psychology
(PSF193: Lectures dirigées en psychologie)

Available, upon permission of the Department Head, to First Year General Programme students repeating First year without previous failure in PSE123A.

The content of this course is more advanced than that of PSE123A, and is related to the studies already completed by the student.

Directed Reading only Weight: 6

PSE214A: Research Methodology in Psychology

(PSF214A: Méthodes de recherche en psychologie)

For students in Second or Third Year Arts. Required for students who are taking a minor in psychology.

This course takes a broad approach to research methods in the behavioural sciences. Students are introduced to basic concepts in experimental design and statistical analysis of psychological data. More specifically, students are taught how to obtain reliable and valid measures of human behaviour and psychological attributes. Insights into methodological issues related to the study of psychological phenomena in applied contexts are gained through having students design simple research projects.

3 - 0 - 6 Weight: 6

PSE228B: Group Dynamics
(PSF228B: Dynamique de Groupe)

For students in Second Year or Third Year Arts. Required for students who are taking a minor in psychology.

The objective of the coutse is to enable students to develop an understanding of small group processes, particularly influences that groups have on individual members, as well as those factors which determine group effectiveness. The principal topics to be addressed are: the stages of group development; socialization processes; communication; decision-making process; and, group norms, cohesion and role definition.

3 - 0 - 6 Weight: 6

PSE301A: Organizational Behaviour and Leadership
(PSF301A: Comportement organisationnel et leadership)

Compulsory for all students in the Third Year except those taking a minor in psychology, in which case refer to PSE304A.

This course is designed to familiarize students with basic theories, concepts, and skills related to organizational behaviour and effective leadership. Students will examine how individuals in organizations, groups in organizations, and otganizational processes can be impacted by leaders in order to enhance organizational effectiveness. A special emphasis is placed on how leaders can use their knowledge and understanding of organizational behaviour to improve performance and increase the well-being of members. Major topics include motivation theories and applications, diagnosing performance discrepancies, performance feedback, power and influence, leadership theories and applications, organizational culture, organizational structure, and overall change strategies. Part of the material will be presented in a didactic form. A number of individual and group exercises will be used as a supplementary learning tool to reinforce class lectures and assigned readings. Student class participation is highly encouraged.

3 - 0 - 3 Weight: 6

PSE304A: Organizational Behaviour and Leadership

(PSF304A: Comportement organisationnel et leadership)

Compulsory for students in Third Year taking a minor in psychology.

In addition to meeting the requirements for the PSE301A course, students will familiarize themselves with a particular area of recent psychological research. Specifically, students will learn how to conduct a critical analysis of recent psychological research in a specialized field directly related to organizational behaviour and/or leadership, and infer practical applications from this area of research to the Canadian Forces or military operations in general. Students will also be expected to orally present the results of their study.

3 - 0 - 6 Weight: 6

PSE305: Human Resource Management
(PSF305: Gestion des ressources humaines)

(Not offered every year.)

For students in the Third or Fourth Year taking Engineering or Science.

The basic purpose of every human resource system is to acquire, develop, and maintain the right kinds and numbers of people necessary to achieve organizational objectives. Taking a general systems approach, this course examines the major human resource management (HRM) functions and their impact on organizational effectiveness. Extensive reference is made to the Canadian Forces personnel system to illustrate points of discussion. Representative topics include: demographics and personnel supply; human rights legislation and employment equity; human resource planning; recruiting and selection; training and development; career management; pay and benefits; personnel turnover; quality of working life; occupational stress; and assessing the utility of HRM activities.

1.5 - 0 - 1.5 Weight: 6

Note: Engineering or Science students' prerequisite is a B- in PSE123A or professor's approval.

PSE306A/B: Human Resource Management
(PSF306A/B: Gestion des ressources humaines)

(Not offered every year.)

For students in the Third or Fourth Year taking Arts. Elective course for students taking a minor in Psychology.

The course content is essentially the same as for PSE305. However, greater emphasis is placed on the integration and analysis of theoretical models applicable to HRM. Students will

be are demonstrate their comprehension of relevant HRM issues by completing projects in these areas.

3 - 0 - 6 Weight: 6

PSE311: Military Psychology and Combat
(PSF311: Psychologie militaire et combat)

(To be offered in 1997- 98.)

For students in the Third or Fourth Year taking Engineering or Science.

This course is intended to provide future leaders with a better understanding of the human element in combat and pre-combat by examining the application of psychology to military issues. The course examines individual, group, and leadership factors affecting combat and pre-combat performance, including selection, training, person-weapon interface, cohesion, morale, combat stress, hostile environments, combat behaviour, and psychological warfare.

1.5 - 0 - 1.5 Weight: 6

Note: Engineering or Science students' prerequisite is a B- in PSE123A or professor's approval.

PSE312B: Military Psychology and Combat
(PSF312B: Psychologie militaire et combat)

For students in the Third or Fourth Year Arts. Required for students taking a minor in Psychology.

The content of the course is essentially the same as for PSE311. However, greater emphasis is given to the integration and analysis of all factors associated with behaviour in combat situations. Students are expected to participate in seminar discussions and to prepare and present comprehensive reports on selected topics.

3 - 0 - 6 Weight: 6

PSE332A/B: Introduction to Counselling
(PSF332A/B: Initiation au Counselling)

For students in Third or Fourth Year Arts. Elective for students taking a minor in Psychology

The goal of this course is to provide students with an opportunity to learn and practice basic counselling and helping skills. Course topics will include: the preparation and conduct of a counselling interview; active listening; verbal and non-verbal communication, problem solving; facilitating attitudes used in counselling interviews; and, a systems view of interpersonal relationships. Case studies and practical applications will be presented throughout the course.

3 - 0 - 6 Weight: 6

PSE394A: Leadership Project
(PSF394A: Projet de leadership)

Available, upon permission of the Department Head, to Third Year students repeating their year without previous failure in PSE304A.

The content of this course will be more advanced than that of PSE304A. Students will be required to do an in-depth paper in a particular area of recent psychological research. Specifically students will learn how to conduct a critical analysis of recent psychological research in a specialized field directly related to organizational behaviour and/or leadership, and infer practical applications from this area of research to the Canadian Forces or military operations in general. Students will be required to meet with the instructor on an individual basis at regular intervals to discuss their work.

Directed Reading only Weight: 6

PSE399A: Leadership Project
(PSF399A: Projet de leadership)

Available, upon permission of the Department Head, to Third Year students repeating their year without previous failure in PSE301A.

The content of this course will be more advanced than that of PSE301A. Students will be required to do an in-depth paper in a particular area of recent psychological research. Specifically students will learn how to conduct a critical analysis of recent psychological research in a specialized field directly related to organizational behaviour and/or leadership, and infer practical applications from this area of research to the Canadian Forces or military operations in general. Students be required to meet with the instructor on an individual basis at regular intervals to discuss their work.

Directed Reading only Weight: 6

PSE401B: Military Professionalism and Ethics
(PSF401B: Professionnalisme militaire et Éthique)

Compulsory for all students in the Fourth Year.

The purpose of this course is to develop student understanding of the professional and ethical dimensions of officership. Throughout, a distinction is made between the normative ideals of behaviour prescribed by ethical and military theorists and the reality of behaviour as described and explained by cognitive, social, and other psychological factors. Course content is drawn from moral philosophy, psychology, and military sociology and includes readings and discussions on: the function of ethics in social and organizational life; the major ethical theories and decision frameworks developed by moral philosophers to distinguish between right and wrong; individual difference factors in moral development and moral cognition; situational and organizational factors which either foster or undermine ethical behaviour; psychological models of ethical decision-making and action; the nature of military professionalism and the ethical obligations which derive from the military's social role and legitimate power; the military ethic and military codes of conduct; specific codes of conduct applicable in war; and value conflicts and ethical dilemmas inherent in military service.

3 - 0 - 6 Weight: 6

PSE444A/B: Psychology of Sports Performance
(PSF444A/B Psychologie de la performance sportive)

For students in the Third or Fourth Year Arts. Elective course for students taking a minor in Psychology

The aim of this course is to familiarize students with the psychological and social mechanisms that influence personal development and individual performance in sports. The course will introduce students to certain psychological models which attempt to increase athletic performance through individual and group intervention strategies. Some of the topics addressed include: stress and stress control; anxiety control; concentration strategies; motivation; personality; attitudes; cohesion and goal-setting.

3 - 0 - 6 Weight: 6

PSE454B: Advanced Leadership and Motivation
(PSF454B: Leadership avancé et motivation)

For students in the Third or Fourth Year Arts. Required for students who are taking a minor in psychology.

The general objective of this course is to explore leadership theory and practice in depth, building on the concepts introduced in PSE301A or PSE304A, and secondly, to develop an appreciation of how these impact on work performance and motivation. The general focus will be on the critical analysis of current leadership theories and their application to the military. Students will also be introduced to diagnostic and intervention strategies related to organizational development and to the leader as an agent of change. Ultimately, the student will be able to evaluate work situations and employ strategies to increase personnel performance and improve motivation and job satisfaction.

3 - 0 - 6 Weight: 6

DEPARTMENT OF POLITICS AND ECONOMICS

Professor Emeritus - H.H. Binhammer, ndc, BA, MA, PhD.
Professor Emeritus - J.P. Cairns, ndc, BA, MA, PhD.
Professor Emeritus - M.D. Chaudhry, BA, MA, PhD.
Professor of Politics and Head of the Department - J.J. Sokolsky, BA, MA, PhD.
Professor of Politics - Y. Gagnon, rmc, BA, MA, PhD.
Professor of Politics - A.J. Whitehorn, BA, MA, PhD.
Professor of Economics and Co-appointed to the Business Administration Department- P.J.S. Dunnett, BSc, MA, PhD
Professor of Economics - J.M. Treddenick, CD, rmc, nadc, BA, PhD.
Associate Professor of Politics - P. Constantineau, BA, MA, PhD.
Associate Professor of Politics - J.S. Finan, BA, MA, PhD.
Associate Professor of Politics - J.D. Young, BA, SpécScpol, MScSoc, PhD.
Associate Professor of Economics - G. Lepore, BSc, MA, PhD.
Associate Professor of Economics - L.C. McDonough, rmc, BA, MA, PhD.
Associate Professor of Economics - P.J. Paquette, BCom, MA, PhD.
Associate Professor of Geography - L.Y. Luciuk, BSc, MA, PhD.
Assistant Professor of Politics - H. Hassan-Yari, BA, MA, PhD.
Assistant Professor of Politics - T.L. Thomas, BA, MA, PhD.
Assistant Professor of Economics and co-appointed to the Business Administration Department - U.G. Berkok, BA, MA, PhD.
Assistant Professor of Economics and co-appointed to the Business Administration Department - S. Kéita, BEng, MSc, PhD.
Assistant Professor of Geography - G. Labrecque, BA, LLL, MA, PhD.

PROGRAMME OBJECTIVES

The primary purpose of the Politics and Economics Department is to provide the Officer Cadets of the Royal Military College of Canada with the best possible university-level education in two major fields of the social sciences - economics and politics. This education must benefit first and foremost the students themselves and, as a direct consequence, the professional development of the future officers of the Canadian Forces. The quality of this education must be such that the doors of every graduate school will be opened to the best of these students.

Social scientists seek to understand and to predict human behaviour. In their study of society they make both normative and positive statements. Normative statements concern what one believes ought to be. They are based on value judgements related to philosophical, cultural and religious systems. Positive statements, on the other hand, are about matters of fact. They are testable statements and can be proved by empirical evidence. Successfully predicting the behaviour of a large group of people, for example, is made possible by the statistical "law" of large numbers which asserts that irregularities in individual behaviour tend to cancel each other out and regularities tend to show up in repeated observations.

Language and writing skills are a basic requirement for studying social sciences. Hence students are encouraged to take maximum advantage of all the opportunities made available to them during their first two years of study to develop these skills.

POLITICAL SCIENCE

Political science is divided into five major fields of study: 1. political theory, 2. Canadian government, 3. public administration and policy, 4. comparative politics, and 5. international relations. Students will complete at least one full-year (two terms) course, and preferably two if allowed by timetable constraints, in each of these five fields of study.

1. **Political theory** studies the methods of inquiry of political analysis and considers the tenants of the political philosophers over the centuries. Every course in politics is founded on political theory, especially POE104, 314, 326, and POE418 which deals with political "isms" (i.e. socialism, liberalism, capitalism, etc).

2. The study of **Canadian government** examines the structure, the institutions and the decision-making process of the Canadian polity in the context of the roles and goals of the citizens in the polity. Political parties, interest groups, elections, the constitution, the Charter of Rights, the judiciary and the rule of law are closely scrutinized. While POE326 provides an overview of all aspects of Canadian government, POE416A concentrates on defence and foreign affairs.

3. Modern governments are large organizations or bureaucracies faced with problems of leadership and authority, communication and accountability, policy formulation and delivery, and many others. How governments organize themselves to solve these problems is the study of **public administration**. In POE332A students study organization theory and its application to the practice of public administration in Canada. POE334B studies theories of public policy-making and their application in the federal government of Canada.

4. Each country in the world has adopted a somewhat different system of government that reflects its particular history, development, culture, values and resources. The study of **comparative politics** examines the diversity of political systems and approaches. In POE320 students are introduced to theories of comparative politics and their application. POE424 concentrates on the politics of the Third World.

5. In POE316 students are introduced to the theory and practice of international relations. This is followed by POE412B and POE416A which focus on contemporary foreign and defence policies of the United States and Canada respectively. POE422 deals with international conflict analysis from the political, economic, social and military perspectives.

Courses in political science focus on a broad spectrum of domestic and international social issues whose resolution has political implications. Courses in economics, on the other hand, focus on many of the same issues, but with emphasis on their economic implications.

ECONOMICS

Economics is a social science in that it studies social problems of choice from the scientific viewpoint, which means that it is built on a systematic explanation of problems of choice where resources to satisfy unlimited human wants are scarce. This systematic explanation involves both the formation of theories and the examination of data. Unlike the approach generally used by political scientists, economists commonly construct models of the economy using varying degrees of mathematical sophistication to depict particular features of the economy with which they are concerned.

Students are introduced to economics in the First Year course, ECE102, elements of economics. This course which familiarizes students to the methods of economics is divided into microeconomics and macroeconomics. Microeconomics studies the behaviour of individual decision makers such as firms and households. It deals with determination of prices and quantities in individual markets and with the relationship among markets. In contrast, macroeconomics looks at the behaviour of the economy as a whole, in particular the behaviour of such aggregate measures as overall rates of unemployment, inflation, economic growth and the balance of trade. Separate courses taken by all students in their senior years, ECE306A, ECE308B, ECE324A and ECE326B, concentrate on macroeconomics and microeconomics, respectively, in much greater depth with respect to both theory and policy issues.

In addition to the above courses in economics all student are required to take a one-term course in Statistical Analysis for Social Scientists. To complete the number of courses in economics required in the two senior years, they may select the appropriate number from the following courses: Canadian Economic History (316A), International Economic Problems (ECE318B), Industrial Organization (ECE320A), Statistical Analysis for Social Scientists II (ECE372B, Economic Analysis of Public Policy Issues (ECE442), and Money, Financial Institutions and Markets (ECE300B), Public Finance (ECE410), and Economics of Defence (ECE424B). Students who contemplate later on pursuing postgraduate degrees in economics are strongly urged to include the two courses in quantitative analysis in their undergraduate studies. They also are encouraged to take as many courses in economics as are allowed in the joint politics and economics degree programme at the College.

GEOGRAPHY

At RMC Geography is housed within the Department of Politics and Economics.

Courses in Geography survey the evolution of the world's existing regions, with an emphasis on Europe and Asia, coupled with study of such geopolitical patterns and processes as the causes and consequences of the disintegration of empires, geostrategic theories and regions, the spacial patterns and import of refugee migration, nationalism and religious fundamentalism, population growth, North/South relations, resource development and the ecological consequences of natural resource exploitation. One or more talks are organized annually in the "Distinguished Speakers Series in Political Geography," which provides a venue for noted political geographers and other scholars to speak to College audiences on issues of current geopolitical relevance. Seminar courses are also offered in the historical and contemporary urban-economic and cultural geography of North America and geopolitical aspects of international law. A directed reading course is available for advanced students interested in undertaking a more intensive study of selected issues in political, cultural, historical or urban-economic geography.

DEGREE IN SOCIAL SCIENCES (POLITICS AND ECONOMICS)

PROGRAMME REQUIREMENTS

Students successfully completing their first year in Arts are eligible for entry into the programme leading to an Honours or General Degree in Social Sciences (Politics and Economics). The first year political science and economics courses are part of the core compulsory courses and will count toward the degree requirements noted below. In consultation with departmental faculty, students will select courses each year which fulfil the degree requirements which are best suited to student interest.

HONOURS

Requirements:
A minimum of twelve courses in Economics and Politics, with at least five from each of the two disciplines. B average standing in courses in Economics and Politics in Third and Fourth Year; overall B- average in Fourth Year.

GENERAL

Requirements:
A minimum of ten courses, five from each discipline, Pass standing. The 6-1/2 courses specified above are compulsory.

The following courses are compulsory for Honours and General:

ECE/F102: Elements of Economics - Éléments d'économique
ECE/F306A: Macroeconomic Theory and Policy I - Macroéconomie: théorie et politique I
ECE/F308B: Macroeconomic Theory and Policy II - Macroéconomie: théorie et politique II
ECE/F324A: Microeconomics I - Microéconomique I
ECE/F326B: Microeconomics II - Microéconomique II
ECE/F370A: Statistical Analysis for Social Scientists I * - Analyse statistique à l'intention des étudiants en sciences sociales I *
POE/F104: Introduction to Government and Politics - Introduction à la science politique
POE/F314: Political Theory - Théorie politique
POE/F326: Canadian Government - Gouvernement canadien

* This course may count toward either the Politics or Economics requirement for five (5) courses in each discipline.

Other courses to choose from:

ECE/F300B: Money, Financial Institutions and Markets - Monnaie, banques et institutions financières
ECE/F312B: The Development of Economic Ideas - L'évolution des idées économiques
ECE/F316A: Canadian Economic History - Histoire économique du Canada
ECE/F318B: International Economic Problems - Problèmes économiques internationaux
ECE/F320A: Industrial Organization - Organisation industrielle
ECE/F372B: Statistical Analysis for Social Scientists II - Analyse statistique à l'intention des étudiants en sciences sociales II
ECE/F410: Public Finance - Finance publique
ECE/F424B: Economics of Defence - Économie de la défense
ECE/F442: Economic Analysis of Public Policy Issues - Analyse économique des questions de politique gouvernementale
POE/F316: Introduction to International Relations - Introduction aux relations internationales
POE/F320: Comparative Politics - Politique comparée
POE/F332A: Public Administration in Canada - Administration publique de Canada
POE/F334B: Canadian Public Policy-Making - Prise de décision du gouvernement canadien, théorie et pratique
POE/F412B: Contemporary American Foreign and Defence Policy - La politique étrangère et de défense des États-Unis
POE/F416A: Contemporary Canadian External Relations and Defence Policy - La politique étrangère et de défense du Canada
POE/F418: Modern Political Theory - Théorie politique avancée
POE/F422: International Conflict Analysis - Analyse des conflits internationaux
POE/F424: Politics of the Third World - Politique du Tiers-Monde
POE/F450B: Space Policy - Politique de l'espace

Arts elective courses for Engineering and Science students:

ECE/F201: Principles of Economics - Principes d'économique
POE/F201: Introduction to Politics and Government - Introduction à la science politique
POE/F403: International Security Relations and Canadian Defence Policy since 1945 - Les relations de sécurité internationale et la politique de défense du Canada depuis 1945

MINORS

Arts students may take a minor in either Political Science or Economics. The requirements for the minor are four courses in one or the other discipline. The first year course in either Political Science or Economics can count toward the minor as well as one other full-year course (or two half-year courses) from the core of the student's major programme. Students choosing to minor in Political Science or Economics must maintain a minimum of a B- average in their three best courses of the minor.

COURSE DESCRIPTIONS

ECE102: Elements of Economics
(ECF102: Éléments d'économique)

For students of the First Year taking Arts.

This course is designed as an introduction to the fundamental building blocks of economic analysis. Choices made by consumers and producers are shown to give rise to demand and supply. The role of the price system providing information and incentives is discussed. Various public policies, particularly price controls and taxation, are used to motivate the analysis of demand and supply as well as the need to measure changes in demand and supply. National income accounting and the terminology used in macroeconomics are presented together with actual data for the Canadian Economy. The way in which fiscal and monetary policies can be implemented and their potential effects on the macro economy are discussed.

3 - 0 - 6 Weight: 12

ECE201: Principles of Economics
(ECF201: Principes d'économique)

For students of the Second, Third or Fourth Year taking Science or Engineering.

An introduction to the methods of economics: the central problems of every economic society, the elements of supply and demand, theory of production and the firm, the concept and determination of national income and product, and Canadian economic problems and policy.

1.5 - 0 - 1.5 Weight: 6

ECE300B: Money, Financial Institutions and Markets
(ECF300B: Monnaie, banques et institutions financières)

For students of the Third or Fourth Year taking Arts.

This course examines money supply determinants, Canadian financial markets (the money market, the stock market, bond markets, mortgage markets, options markets, futures markets, the foreign exchange market) and the operations of financial institutions that participate in these markets.

3 - 0 - 6 Weight: 6

ECE301: Public Finance and Economics of Defence
(ECF301: Finance publique et économie de la défense)

For students of the Third or Fourth Year taking Engineering or Science.

The use of economic analysis to deal with the problem of decision- making within the public sector generally, and the defence budget in particular, will constitute the heart of the course. A brief survey of the principles of public finance and fiscal policy and a discussion of the significance of defence expenditures in the Canadian economy will introduce the topic. Alternate methods of budgeting will be compared and evaluated, and problems of criteria and sub-optimization discussed, all from the point of view of promoting rational use of limited resources in a complex environment.

1.5 - 0 - 1.5 Weight: 6

ECE306A: Macroeconomic Theory and Policy I
(ECF306A: Macroéconomique: théorie et politique I)

For students of the Second and Third Year taking Arts and other students with the permission of the Department.

This intermediate macro course covers the fundamental theory underlying national income determination. The role of Monetary and Fiscal Policies in closed and open economies is studied with particular reference to the contemporary Canadian economy. Purchasing Power parity and Interest Rate parity are also discussed.

3 - 0 - 6 Weight: 6

ECE308B: Macroeconomic Theory and Policy II
(ECF308B: Macroéconomique: théorie et politique II)

This course examines major themes in macroeconomics including deficits and debt, inflation, expectations and growth theory. Students are exposed to the Canadian experience in debt accumulation and inflation policies. Neo-classical growth theory is used to differentiate between nominal, real and per capita growth and those factors which give rise to continuous growth or simply periodic spurts in growth. Technological change is linked both to growth and to globalization.

3 - 0 - 6 Weight: 6

ECE312B: The Development of Economic Ideas
(ECF312B: L'évolution des idées économiques)

For students of the Second, Third or Fourth Year taking Arts.

This course is intended to broaden the view of students who have studied intermediate theory. The ideas of Smith and Ricardo and the Marginlist School will start the course. Potential topics include Marxian economics, institutional economics and social planning.

3 - 0 - 6 Weight: 6

ECE314A: Economic Development
(ECF314A: Développement économique)

For students of the Second, Third or Fourth Year taking Arts.

This course is concerned with the economic problems of the less developed economies. Particular attention is paid to the economic characteristics of those economies and the implications of these characteristics for development policy.

3 - 0 - 6 Weight: 6

ECE316A: Canadian Economic History
(ECF316A: Histoire économique du Canada)

Fot students of the Second, Thitd ot Fourth Year taking Arts.

The development of the Canadian economy with special reference to capital, population, and technology, in the light of modern growth theories.

3 - 0 - 6 Weight: 6

ECE318B: International Economic Problems
(ECF318B: Problèmes économiques internationaux)

The course will examine the following topics: world trade patterns and commodity markets, theory and structure of tatiffs, customs unions, balance of payments, foreign investment, international monetary system, and intetnational aid.

3 - 0 - 6 Weight: 6

ECE320A: Industrial Organization
(ECF320A: Organisation industrielle)

For students of the Thitd and Fourth Yeat taking Arts.

Industrial Otganization examines the structure, conduct and performance of industry. Topics to be covered will include: industry concenttation, economics of scale, patents, vertical integration and bartiets to entry, the goals of the fitm, the growth of the fitm, multi-nationals, advertising, ptice formation and government influences on industtial organization.

3 - 0 - 6 Weight: 6

ECE324A: Microeconomics I
(ECF324A: Microéconomique I)

This course is intended to provide theoretical and ptactical knowledge of matkets. It concentrates on price determination, business decision-making and consumer behaviour within different forms of market organization. A major goal of the course is to demonstrate the practical advantages of applying mictoeconomic concepts and models to the recognition and analysis of social and business issues.

3 - 0 - 6 Weight: 6

ECE326B: Microeconomics II
(ECF326B: Microéconomique II)

This course extends the scope and methods of market analysis introduced in ECE324A. The syllabus includes an examination of matkets chatacterized by monopolistic competition, oligopoly, and ptice disctimination. Special attention is paid to questions of market efficiency, including public regulation of markets and the economic role of government. Additional topics include introductions to the economics of finance and to the economics of information.

3 - 0 - 6 Weight: 6

ECE370A: Statistical Analysis for Social Scientists I
(ECF370A: Analyse statistique à l'intention des étudiants en sciences sociales I)

Fot students of the Second, Thitd or Fourth Year taking Arts.

This is an introductory coutse in statistics designed fot students in Social Science. Topics include visual and statistical descriptions of data, sampling and sampling disttibutions, and the estimation of sample statistics. Ptoblem solving is emphasized using hypothesis testing and confidence intervals on means, ptopottions and differences. Vatiance tests are also analysed.

3 - 0 - 6 Weight: 6

ECE372B: Statistical Analysis for Social Scientists II
(ECF372B: Analyse statistique à l'intention des étudiants en sciences sociales II)

For students of the Second, Third ot Fourth Year taking Arts.

This coutse follows Statistical Analysis for Social Scientists I. The course discusses survey planning, sample design, and questionnaire design. Statistical analysis focuses on simple and multiple tegression methods. Instruction will also be given in the use of computer tesources both for the collection of data as well as data analysis. Students will be given the oppottunity to conduct a small ptoject which will include model specification, data collection, examination, display, and model analysis.

3-0-6 Weight 6

ECE410: Public Finance
(ECF410: Finance publique)

For students of the Fourth Year taking Arts.

The course is concerned with the role of the public sector in the economy. Topics studied include: the theory of public expenditure, the size and growth of government expenditures and of the public debt, the principles of benefit-cost analysis, efficiency and equity in taxation, the effects of taxation on incentives, the incidence of taxation, and fiscal federalism. An attempt is made to relate the discussion to the Canadian context.

3 - 0 - 6 Weight: 12

ECE416: International Trade
(ECF416: Commerce international)

For students of the Fourth Year or by permission of the instructor.

Theoretical foundations of international trade theory are examined within the framework of welfare economics. Effects of various policy measures on trade patterns are analyzed including foreign exchange rates adjustment mechanisms of balance of payments and international monetary relations.

3 - 0 - 6 Weight: 12

ECE424B: Economics of Defence
(ECF424B: Économie de la défense)

For students of the Third or Fourth Year taking Arts..

A consideration of the economics of defence resources management, particularly in the Canadian context. Emphasis is placed on a systems approach to defence management and on quantitative analysis.

3 - 0 - 6 Weight: 6

ECE442: Economic Analysis of Public Policy Issues
(ECF442: Analyse économique des questions de politique gouvernementale)

For students of the Third and Fourth Year taking Arts.

The economic analysis of public policy issues typically involves the application of fundamental economic theory to a particular public policy problem. In the first term, students will be exposed to a broad range of public policy issues, the ways in which economic theory can address the issues and the data required to further the analysis. The student will write a supervised paper in the second term. Students will prepare proposals which outline the basic issue of interest, the economics of the issue in broad terms as well as data requirements. Formal presentations of the proposal and of the completed paper are required.

3 - 0 - 6 Weight: 12

ECE450B: Applied Economics
(ECF450B: Économie appliquée)

For all students of the Third and Fourth Year taking Arts.

Applied Economics is an advanced course designed to till the gap between economic theory and concrete economic phenomena. The course covers a limited number of selected problems (e.g. from procurement contract design under different market structures; privatization and contracting out of services; insurance; employment contracts; recruitment/retention and pension problems; organization and hierarchy design; analysis of cooperation, confrontation and brinkmanship; removal and transportation problems; housing subsidies; etc) in depth.

Prerequisites: ECE/F306A, ECE/F308B; ECE/F324A, ECE/F326B

3 - 0 - 6 Weight: 6

ECE490: Directed Readings in Economics
(ECF490: Études dirigées en économie)

For students of the Fourth Year taking Arts, with the permission of the head of the Department.

1 - 0 - 9 Weight: 12

POE104: Introduction to Government and Politics
(POF104: Introduction aux institutions gouvernementales et à la politique)

For students of the First Year taking Arts.

An introduction to the main trends of political thought, the elements of political analysis, and the concepts used in the study of political science. Amongst the topics discussed are the nature of man, the state and society. Examples will be drawn mostly from the Canadian context.

3 - 0 - 6 Weight: 12

POE201: Introduction to Politics and Government
(POF201: Introduction à la politique)

For students of the Second, Third or Fourth Year taking Engineering or Science.

A basic introduction to politics and government on the domestic and foreign policy level, including defence policies. Integrated into the course is an overview of government in Canada.

1.5 - 0 - 1.5 Weight: 6

POE202: Introduction to Politics and Government
(POF202: Introduction à la politique et au gouvernement)

For students of the Third and Fourth Years taking Arts with permission of the head of the Department.

Similar to POE201.

3 - 0 - 6 Weight: 12

POE314: Political Theory
(POF314: Théorie politique)

For students of the Second, Third or Fourth Year taking Arts.

This course is a critical examination of the major political theorists. The books studied include Plato's Republic, Aristotle's Politics, Hobbes's Leviathan, Locke's Second Treatise on Civil Government, Rousseau's Social Contract, Mill's On Liberty, and The Communist Manifesto of Marx and Engels. Some attention is paid to the elucidation of such key concepts as democracy and freedom. Two essays are written during the year on subjects related to the course.

3 - 0 - 6 Weight: 12

POE316: Introduction to International Relations
(POF316: Introduction aux relations internationales)

For students of the Second, Third or Fourth Year taking Arts.

An analysis of the characteristics of the international system, its major actors and the means by which their relationships are adjusted (such as diplomacy, international law, the balance of power and collective security). The student will also be introduced to more recent approaches to the analysis of international relations.

3 - 0 - 6 Weight: 12

POE320: Comparative Politics
(POF320: Gouvernement comparé)

For students of the Second, Third or Fourth Year taking Arts.

This course is intended as an introduction to comparative politics.
This course will first analyze different theories of comparative politics and then use a country-by-country approach. The countries covered in depth include Great Britain, the United States, Russia (the former Soviet Union), China, Mexico and Canada and several optional countries selected by students.

3 - 0 - 6 Weight: 12

POE326: Canadian Government
(POF326: Gouvernement canadien)

For students of the Second, Third or Fourth Year taking Arts.

A study of the functioning of the Canadian government and of the principles underlying the policies of this government. Epistemological problems in the study of the social sciences are briefly analysed at the onset of the course.

3 - 0 - 6 Weight: 12

POE332A: Public Administration in Canada
(POF332A: Administration publique de Canada)

For students of the Third or Fourth Year taking Arts.

A study of organization theory and its application to the practice of public administration in the Canadian bureaucracy and government.

3 - 0 - 6 Weight: 6

POE334B: Canadian Public Policy-Making
(POF334B: Prise de décision du gouvernement canadien, théorie et pratique)

For students of the Third or Fourth Year taking Arts.

A study of many theories of public policy and their application in the federal government of Canada. The consequences of the choice of these theories on the outcome of public policies is also analyzed.

3 - 0 - 6 Weight: 6

POE403: International Security Relations and Canadian Defence Policy since 1945
(POF403: Les relations de sécurité internationale et la politique de défense du Canada depuis 1945)

For students of Third or Fourth Year taking Engineering or Science.

The purpose of this course is to familiarize students with the major trends in strategic relations since 1945 and their impact upon Canadian defence policy. Topics covered include: the origins of the Cold War, the advent of nuclear weapons, Canadian defence postures, Soviet-American relations, NATO, NORAD, nuclear strategies and limited war.

1.5 - 0 - 1.5 Weight: 6

POE404: International Security Relations and Canadian Defence Policy since 1945
(POF404: Les relations de sécurité internationale et la politique de défense du Canada depuis 1945)

For students of the Third and Fourth Yeat taking Arts with permission of the head of the Department.

Similat to POE403.

3 - 0 - 6 Weight: 12

POE412B: Contemporary American Foreign and Defence Policy
(POF412B: La politique étrangère et défence des États-Unis)

For students of the Third or Fourth Year taking Arts.

A study of majot policy trends in United States foreign and defence policy from the Nixon administration to the ptesent. Beginning with a btief teview of the Cold War years, the course will consider such topics as: the impact of the Vietnam War, detente, the Strategic Arms Limitation Talks (SALT), ttends in nuclear and conventional weapons and strategy in the 1970s and 80s, arms control and United States relations with the Third World. Also covered will be the role of various branches of the U.S. government in the conduct of foreign and defence policy.

3 - 0 - 6 Weight: 6

POE416A: Contemporary Canadian External Relations and Defence Policy
(POF416A: La politique étrangère et défence du Canada)

For students of the Thitd or Fourth Year taking Arts.

A study of major trends in Canadian external relations and defence policy ftom the Ttudeau govetnment to the ptesent. Beginning with a review of the Cold War years, the course will consider such topics as: the Trudeau defence and foreign policy reviews, relations with the United States, including the Free Trade Agreement, the Impact of international political and strategic trends on Canadian defence policy, and Canada's telations with intetnational organizations and the Thitd World. Also covered will be the process, politics and organization of the Department of External Affairs and National Defence.

3 - 0 - 6 Weight: 6

POE418: Modern Political Theory
(POF418: Théorie politique avancée)

For students of the Third or Fourth Year taking Arts.

This coutse will deal in depth with modern political ideologies such as conservatism, liberalism, socialism, communism, anarchism, nationalism and fascism. Emphasis will be on teading matetials ftom spokespersons of each docttine. Amongst the authors to be discussed are Butke, Locke, Mill, Marx, Lenin, Mao Tse-tung, Hitler, Mussolini, Tolstoy and Gandhi. Thete will also be some discussion of newly emetging political ideas such as environmentalism and feminism.

3 - 0 - 6 Weight: 12

POE422: International Conflict Analysis
(POF422: Analyse des conflits internationaux)

For students of the Third and Fourth Year taking Arts who have obtained credit in POE/F316.

An examination of the dynamics of contemporary intetnational conflict ftom the political, economic, social and military perspectives.

3 - 0 - 6 Weight: 12

POE424: Politics of the Third World
(POF424: Politique du Tiers-Monde)

For students of the Third or Fourth Year taking Arts.

The course will commence with an analysis of the key theoties of political modetnization and the majot models of development. The second tetm will focus upon selected third world countries as case studies to explore the problems and political practices of such societies. Amongst the countries to be studied in depth are China, India, Egypt, Nigeria, Cuba and Mexico. In addition several optional countries selected by students will be covered. Students are encouraged to obtain a credit in POE/F320.

3 - 0 - 6 Weight: 12

POE450B: Space Policy
(POF450B: Politique de l'espace)

Fot students of the Fourth Year taking Arts or Science.

Space policy, strategy, doctrine and planning, space law, space agteements and conventions, use of space for civilian surveillance of space, surveillance from space, peaceful use of space, civilian and military space agencies, international coopetation in space operations, assured access to space, DND space requitements, operations, space education and training. Canadian aerospace industry, Canada's tole and future in space.

3 - 0 - 6 Weight: 6

POE490: Directed Readings in Politics
(POF490: Études dirigées en politique)

For students of the Fourth Year taking Arts, with permission of the head of the Department.

1 - 0 - 9 Weight: 12

GOE304: A Geography of the World's Peoples and Places
(GOF304: Géographie des peuples et des lieux)

For students of the Second, Third or Fourth Year taking Arts.

A systematic introduction to the discipline of geography followed by a detailed treatment of selected regions and states around the world, with particular emphasis on the dynamics of regionalism in Eastern Europe and/or the Soviet Union and Canada.

3 - 0 - 6 Weight: 12

GOE401: World Regional Geography
(GOF401: Géographie régionale du monde)

For students of the Second, Third or Fourth Year taking Engineering or Science.

A systematic introduction to the discipline of geography followed by a detailed treatment of the political and regional geography of selected states and regions.

1.5 - 0 - 1.5 Weight: 6

GOE402A: Geopolitics, Peoples and Places
(GOF402A: Géopolitique, peuples et lieux)

A seminar course intended to allow students of the Third Year taking Politics, and with permission of the instructor, for other students of the Third or Fourth Year taking Arts, the opportunity to study selected world problems from a geographical perspective. This course is also open to selected candidates with permission from the Dean of Arts.

3 - 0 - 6 Weight: 6

GOE404B: Geopolitical Perspectives on a World Divided
(GOF404B: Perspectives géopolitiques sur un monde divisé)

For students of the Third or Fourth Year taking Arts.

An introduction to the theories and methods of political geography followed by an examination of selected issues including the geography of population, ethnicity, migration, the refugee experience and the evolution of geopolitical thought from ancient times to the present.

3 - 0 - 6 Weight: 6

GOE418B: Approaches to Cultural and Historical Geography

In English only.

For students of the Third or Fourth Year taking Arts.

An examination of the cultural and historical dimensions of geographical inquiry with special emphasis on the changing relationships between human societies and their environments, as well as their relationships with each other. Themes to be addressed include the methods and theories of historical and cultural geography, the study of cultural landscapes and ecological relationships within modern and traditional societies, the impact of colonialism and modernization upon populations and resources, and geographies of cultural globalization. Special attention will be given to analysis of the historical and cultural geography of Canadian society in the global context.

3 - 0 - 6 Weight: 6

GOF420B: Fondement géopolitiques du droit international

In French only.

For students of the Third or Fourth Year taking Arts.

Genesis of International Public Law. International Organizations. Conditions for the recognition of the existence of individual States. Legal means of territorial expansion. Cases of reduced sovereignty. Geographical definition of the territories under national jurisdictions: horizontal and vertical extensions. Borders and jointly occupied territories. Rules governing territories under international jurisdiction: canals, seaways, rivers, high seas, sea-bed resources, polar regions, outer space. Peaceful methods of resolving international conflicts.

3 - 0 - 6 Weight: 6

GOE490: Directed Readings in Geography
(GOF490: Études dirigées en géographie)

For students of the Fourth Year taking Arts, with the permission of the head of the Department.

1 - 0 - 9 Weight: 12

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Professor Emeritus - N.K. Pope, BSc, MSc, PhD.
Professor and Dean of Science Division - B.J. Fugère, BSc, MSc, PhD.
Professor and Dean of Canadian Forces Military College, Dean of Continuing Studies- A.J. Barrett, CD, tmc, BSc, MSc, PhD.
Professor - R. Benesch, BSc, MSc, PhD.
Professor - M.L. Chaudhry, BA, MA, PhD.
Professor - R. Gervais, ndc, BA, BSc, MSc, PhD.
Professor - P. Gravel, ndc, BMath, MMath, PhD.
Professor - G. Isac, LSc, DSc.
Professor - G. Labonté, BSc, MSc, PhD.
Professor - R.M. Shoucri, BSc, MSc, MSc, PhD, PEng.
Professor - M.J. Wilmut, ndc, BSc, MA, PhD.
Associate Professor - P.G. Buckholtz, BSc, MSc, PhD.
Associate Professor - R. Godard, Lic ès Sci, Dr 3rd Cycle, PhD.
Associate Professor - L.E. Haddad, Lic ès Sci, MSc, PhD.
Associate Professor - E.V. Jezak, AB, PhD.
Associate Professor - R.E. Johnson, BSc, MS, PhD.
Associate Professor - G.E. Simons, BMath, MSc, PhD.
Associate Professor - S.M. Thomas, BSc, MSc, PhD.
Associate Professor - D.L. Wehlau, BSc, MA, PhD.
Assistant Professor - P. Baille, Lic ès Sci, Dr 3rd Cycle, PhD.
Assistant Professor - J.H. Lindsay, BA, MA.
Assistant Professor - B.G. Ong, BSc, SM, PhD, PEng.
Lecturer - Captain J.S. Fournier, BEng.
Research Associate - Y. Liang, BSc, MSc, PhD.

COURSES OF STUDY

The Department of Mathematics and Computer Science offers courses to students of each programme of the Academic Divisions of the College.

Moreovet, the Department of Mathematics and Computer Science offets two programmes in Mathematics and Computet Science. The first one, Honours Science with concentration in Mathematics and Computer Science, is a programme aimed at giving the student a solid foundation in both domains: Mathematics and Computet Science. It is a challenging programme with possibilities to take courses not only within the department, but also with the Depattment of Electtical and Computet Engineering and Queen's University. This programme leads naturally to the possibility fot graduate studies in Mathematics or Computer Science.

The second programme given by the Department is Science with concentration in Mathematics and Computer Science. The second programme offers the most flexibility in the choice of courses allowing the student to choose his/her programme to his/het needs and capacity. The corresponding descriptions and regulations may be found in the Academic Programmes and Course Outlines sections of this calendar.

Mathematics and Computet Science Course Requirements in each programme:
[Elective courses are indicated within brackets, except for the option Mathematics and Computer Science in the Honours Science programme where they are omitted]

Students in Arts:
Mathematics 100, 220B (for Business Administration students)
[Mathematics 200A, 220B (except Business Administration students)]
[Mathematics 362A/B, Computer Science 360A/B]

Students in Honours Science, option Mathematics and Computer Science:
Mathematics 101, 109, 201 or 203*, 209
Computer Science 250B
Mathematics 302, 304A, 402
Computer Science 352B, 321A, 323B
Science 338B, 420
fot Infotmation Science concentration: Computet Science 365A, 444A/B, 483B

Students in Honours Science, option Chemistry:
Mathematics 101, 109, 201 ot 203*, 209
Computer Science 250B
Mathematis 302 ot 305Students in Honours Science, option Physics:
Mathematics 101, 109, 201 ot 203*, 209
Computet Science 250B
Mathematics 302 or 305, 304A
Computet Science 352B

* 201 is recommended

Students in Space Science:
Mathematics 101, 109, 203, 209
[Computer Science 250B]
Mathematics 330, 430, [456A]
[Computet Science 352B]

Students in Civil Engineering:
Mathematics 101, 109, 203, 209

Students in Chemistry and Matetials Engineering:
Mathematics 101, 109, 203, 209
Mathematics 315

Students in Computer Engineering:
Mathematics 101, 109, 203, 209
Mathematics 305
Computer Science 365A
[Mathematics 425B, Computer Science 483B]

Students in Electrical Engineering:
Mathematics 101, 109, 203, 209
Mathematics 305
[Mathematics 425B]

Students in Mechanical Engineering:
Mathematics 101, 109, 203, 209
Mathematics 327A

COMPUTING FACILITIES

Extensive use is made of the College computing facilities (see General Information) to support the Mathematics and Computer Science courses offered by the Department.

COURSE DESCRIPTIONS

An explanation of the conventions concerning the naming and numbering of courses may be found at the beginning of Course Outlines. The course descriptions are grouped in three classes: Science, Mathematics, and Computer Science, and are ordered by year within each class.

SCE338B: Undergraduate Seminar
(SCF338B: Séminaire du premier cycle)

For students of the Third Year taking Honours Science.

Each student to choose an undergraduate topic not otherwise covered in the syllabus from a list drawn up by the Science faculty; according to the topic chosen, the student will be assigned to a faculty supervisor who will assign readings and problem sets, and otherwise monitor the student's progress culminating in the presentation of a seminar to Honours Science students and a faculty assessment committee at term's end. The nominal assignment of 1+2 is intended as a guide to the amount of weekly contact time with the faculty supervisor. The weight of 6 reflects the intention that the total academic work should correspond to that of a conventional one semester course.

1 - 2 - 4 Weight: 6

SCE420: Senior Project
(SCF420: Projet de fin d'étude)

For students of the Fourth Year taking Honours Science.

The purpose of this course is to offer the possibility of doing an in-depth study of a scientific topic in which the student is particularly interested. The format is flexible and depends on the topic area. At one end of the spectrum, the student could be associated with a research team in either Physics, Chemistry or Mathematics, and be given responsibility for part of a research project. At the other end, the student may choose a programme of independent study under the supervision of a member of the faculty. In all cases, the student's progress would be regularly monitored and an interim report would be submitted by the student at the end of the Fall Term. The final mark would be based on a combination of assessment by the faculty supervisor(s) and an oral presentation to the Honours Science students and a faculty assessment committee.

0 - 4 - 4 Weight: 12

MAE100: Elements of Calculus
(MAF100: Eléments du calcul différentiel et intégral)

For students of the First Year taking Arts.

Review of pre-calculus mathematics. Functions and graphs, supply and demand and market equilibriums. Limits, continuity. Derivatives, differentiation. Rate of change and marginal analysis. Approximation by differentials, implicit differentiation, curve sketching. Optimization problems and their applications to business and economics, marginal cost, elasticity of demand, elasticity and revenue. Exponential and logarithmic functions, compound interest. Antidifferentiation. Integration by substitution, integration by parts, definite integrals, area, volume, average value. Business applications, consumer's surplus, inventory, present and future value. Survival and renewal functions, probability density functions, numerical integration. Limit at infinity and improper integrals, indeterminate forms, L'Hôpital's rule.

Applications involving use of computers will be stressed. A remedial tutorial period will be scheduled for use at the instructor's discretion.

3 - 1 - 6 Weight: 12

MAE101: Introductory Calculus
(MAF101: Introduction au calcul différentiel et intégral)

For students of the First Year taking Engineering and Science.

Introduction to real numbers. Real convergent sequences. Functions, rational, exponential and trigonometric functions and their inverses. Limits, continuity and derivatives of functions. Rules for differentiation. L'Hôpital's rule. Main theorems of the differential Calculus. Applications.

Antidifferentiation: all basic methods. Definition of the integral, Riemann sums. Improper integrals. Applications of integration. Functions from R^2 to R partial derivatives. Introduction to ordinary differential equations.

Computer laboratory using MAPLE symbolic computation software to illustrate concepts and solve problems in calculus.

3 - 2 - 5 Weight: 16

MAE109: Linear Algebra
(MAF109: Algèbre linéaire)

For students of the First Year taking Engineering and Science.

Algebra: Introduction to sets, logic, proofs and the formal structure of modern mathematics. Number systems, rational, real and complex numbers. Polynomials. Vectors in R^2, R^3 and R^4. Linear systems of equations. Matrix algebra, applications to linear systems.

Introduction to linear differential equations. Introduction to vector spaces. Subspaces, bases and dimension. Linear transformations and matrix representations. Eigenvectors and eigenvalues. Systems of linear DEs.

3 - 1 - 4 Weight: 14

MAE200A: Probability and Statistics
(MAF200A: Probabilité et statistiques)

An elective course for students of the Second Year taking Arts.

Descriptive and inferential statistics, populations, random samples, parameters and statistics. Sample spaces, events, probability, conditional probabilities. Distributions and functions of random variables, joint distributions, expectations: mean, variance. Discrete probability distributions: examples. Continuous distributions, use of normal table. Sampling distributions: point estimators of mean and variance, confidence intervals. Computer statistics packages.

3 - 0 - 6 Weight: 6

MAE201: Intermediate Calculus
(MAF201: Calcul différentiel et intégral intermédiaire)

For students of the Second Year taking Engineering and Science. Normally required for entry into Third Year Honours Science.

Vector-valued functions; curves. Functions of several variables; partial derivatives, Taylor's formula, extreme value problems. Vector fields, gradient, divergence, curl. Multiple integrals. Line and surface integrals. Green's, divergence and Stokes' theorems.

Limit of sequences. Infinite series: tests for convergence, series of functions, uniform convergence, power series, Taylor series.

Ordinary differential equations: theory methods of solution and applications of certain higher order differential equations; numerical solutions.

3 - 1 - 4 Weight: 14

MAE203: Engineering Calculus
(MAF203: Calcul différentiel et intégral pour l'ingénieur)

For students of the Second Year taking Engineering and Science.

Vector-valued functions, curves. Functions of several variables. Partial derivatives. Extreme values. Scalar and vector fields. Gradient, divergence, curl. Line and surface integrals. Green's, divergence and Stokes' theorems.

Infinite series, tests for convergence. Taylor series. Taylor formula with remainder. Ordinary differential equations: First order and higher order linear differential equations with constant coefficients; method of undetermined coefficients, D-operator and variation of parameters; applications; numerical solutions.

2.5 - 1.5 - 4 Weight: 13

MAF209: Computer Programmeming; Probability and Statistics
(MAF209: Programmemation; probabilités et statistiques)

For students of the Second Year taking Engineering and Science (from 1996-97).

Part I: Introduction to Computer Programmeming.

Introduction to programmeming using a structured high-level language (e.g. Pascal). Study of syntax, data types and control structures. Principles of programme design and modularity. Algorithm for selected numeric and non-numeric computations.

Part II: Foundations of Probability and Statistics.

Brief review of set operations. Definitions and examples of sample space and probability space. Random variables, various discrete and continuous distributions. Mean, variance and general expectations. Sampling, tests of hypothesis for mean and variance, power of tests.

3 - 1 - 4 Weight: 14

MAE220B: Introductory Logic
(MAF220B: Introduction à la logique)

For students of the Second Year taking Business Administration.

An elective course for other Second Year Arts students.

The aim of this course is to introduce the student to logic and its relations to other disciplines. This course will study among other things the propositional calculus, predicate calculus and some of their generalizations and applications.

3 - 0 - 6 Weight: 6

MAE302: Differential Equations and Complex Analysis
(MAF302: Équations différentielles et analyse complexe)

For students of the Third Year taking Honours Science.

Ordinary differential equations: Sturm-Liouville problem, orthogonal functions, Green's function, stability. Partial differential equations: classification, boundary value problems in cartesian, cylindrical and spherical coordinates. Complex analysis: analyticity, elementary complex functions, integration, residues, Laurent series. Calculus of variations, Lagrangian and Hamiltonian formulations of mechanics.

3 - 0 - 4 Weight: 12

MAE304A: Modern Algebra and Graph Theory
(MAF304A: Algèbre moderne et théorie des graphes)

For students of the Third Year taking Honours Science.

Algebraic Structures: review of algebra of sets, functions on sets; monoids, semi-groups, rings, fields, algebras, infinite dimensional vector spaces, groups, applications of symmetry groups. Graph Theory: graphs, hypergraphs digraphs, paths, shortest path problem, path algebras, non-polynomial problems.

3 - 0 - 4 Weight: 6

MAE305: Complex Variables, Differential Equations and Boundary Value Problems
(MAF305: Variables complexes, équations différentielles et problèmes de conditions aux limites)

For students of the Third Year taking Computer Engineering or Electrical Engineering.

Laplace transform.

Fourier series and transforms.

Method of Frobenius in solving linear, ordinary differential equations. Bessel's equation and functions.

Solution of partial differential equations by separation of variables, examples of wave and Laplace equations.

Functions of complex variable, applications to integration and inverse Laplace transform.

3 - 1 - 4 Weight: 14

MAE315: Applied Mathematics for Chemical and Materials Engineers
(MAF315: Mathématiques appliquées au génie chimique et des matériaux)

For students of the Third Year taking Chemical and Materials Engineering.

This course develops the mathematical background required to formulate and solve the ordinary and partial differential equations arising from the study of heat and mass transfer, fluid flow, chemical reaction kinetics, reaction engineering, and neutron flux behaviour in nuclear reactors. Topics include the Fourier series and orthogonal functions. Solution of ordinary differential equations is by analytical and numerical methods including Laplace transforms, Method of Frobenius using Bessel equations and Legendre equations. The solution of partial differential equations is also by analytical and numerical methods but include separation of variables, finite differences, numerical derivatives and integrals. Techniques for analysing experimental results and for optimization are developed.

3 - 0 - 3 Weight: 12

MAE327A: Differential Equations, Boundary Value Problems and Complex Variables
(MAF327A: Equations différentielles, variables complexes et problèmes de conditions aux limites)

For students of the Third Year taking Mechanical Engineering.

Laplace transform. Fourier series. Complex variable theory, analytic functions. Conformal mapping. Partial differential equations. The method of separation of variables. The solution of boundary value problems.

4 - 1 - 5 Weight: 9

MAE330: Mathematics of Signal Processing
(MAE330: Mathématiques pour le traitement des signaux)

For students of the Third Year taking Space Science or Materials Science.

Laplace transform, application to LCR circuits. Fourier series and transforms. Solutions of partial differential equations using separation of variables, examples of wave and Laplace equations. Discrete sampling of continuous functions. Z-transforms, difference equations, digital filters. Analog and digital systems, point spread function, transfer function, frequency response function.

3 - 0 - 4 Weight: 12

MAE362A/B: Evolution of Mathematical Ideas
(MAE362A/B: Évolution de la pensée mathématique)

An elective science course for students of the Third or Fourth Year Arts.

A survey of selected key periods in the development of scientific thinking. This course will study the advances in their spatio-temporal context. Topics selected from:

Beginnings: Birth of science and technology in the Near-East and Egypt. Classical Greek science. Technical achievements of Antiquity. Arab science in the Middle-Ages.

Coming of Age: Renaissance: from Mechanics to Classical Mathematics. From Alchemy to Chemistry. Theory of Light.

Modern Science: Crisis in the Foundations of Mathematics. Triumph and Demise of Classical Physics. Rise of Relativity and Quantum Mechanics. Ubiquity of Chaos.

3 - 0 - 6 Weight: 6

MAE402: Applied Mathematics
(MAE402: Mathématiques appliquées)

For students of the Fourth Year taking Honours Science.

A selection from the following topics in applied mathematics: integral equations, special functions, Hilbert space theory and formal quantum mechanics, differential geometry and relativity, nonlinear dynamics, chaos.

3 - 0 - 4 Weight: 12

MAE408A/B: Numerical Analysis
(MAF408A/B: Analyse numérique)

An elective course for students of the Fourth Year taking Science.

Solutions of partial differential equations using implicit difference methods for parabolic, elliptic and hyperbolic equations, and methods for gradient boundary conditions; introduction to finite element methods; root finding and optimisation; modern simulation techniques including Monte Carlo, pseudo-random number generation, and simplex applications; other advanced topics as appropriate.

3 - 0 - 3 Weight: 6

MAE413A/B: Mathematical Physics
(MAF413A/B: Physique mathématique)

An elective course for students of the Fourth Year taking Science.

Integral representation of functions. Green's functions in one and higher dimensions. Solutions of integral equations. Additional topics in mathematical physics as time permits.

Software packages for symbolic and numerical computation will be used wherever possible.

3 - 0 - 3 Weight: 6

MAE425B: Mathematical Modelling in Medicine and Biology
(MAF425B: Modèles mathématiques en médecine et biologie)

An elective course for students of the Fourth Year taking Science, Computer Engineering or Electrical Engineering.

The course illustrates the application of advanced mathematical concepts such as differential equations, fluid dynamics and optimal control theory and electrical circuit analog to biological phenomena taking place in living organisms and cells, as well as to bioengineering problems. Topics include: excitation and conduction in nerves, brain function, optics of the eye, auditory

system, mechanism of muscle contraction, fluid dynamics in arteries, cardiovascular system and electromagnetism of the heart, gas exchange in the lungs, modelling and control of metabolism in blood, stress strain analysis in tissues, membranes and bones, transport phenomena and diffusion in cells, kidney function as an optimal control problem, peristaltic contraction of gastro-intestinal system, ultrasounds, tomography, mathemarical basis of non-invasive diagnosric techniques. Compurer simulation of selected problems is included with emphasis on application of signal analysis to treatment of biological signals.

3 - 2 - 3 Weight: 8

MAE430: Signal and Image Processing
(MAF430: Traitement des signaux et des images)

For students of the Fourth Year taking Space Science or Materials Science.

Statisrics of random and non-random noise. FFT techniques for noise identification and removal. Histograms, removal of image distortion, image restoration and enhancement through filrers. Database organization and computer implementation of images.

2 - 2 - 5 Weight: 12

MAE440: Special Topics
(MAF440: Sujets choisis)

An elecrive course for students of the Fourth Year taking Science.

This course will consist of one or two topics selected from:
(a) analysis, (b) advanced quanrum mechanics, (c) computer science, (d) discrete mathematical structures, (e) electromagnetic rheory, (f) probability and statistics, (g) relativity, and possibly orhers.

3 - 0 - 3 Weight: 12

MAE456A: Mathematical Modelling with Application to Space Science
(MAF456A: Modèles mathématiques avec applications aux sciences spatiales)

For students of rhe Fourth Year taking Space Science.

Principles of mathematical modelling. Continuous models based on ordinary differential equations, partial differential equations, and on inregral equarions. Models based on optimizarion and variational calculus will also be considered. Each model type will be illusrrated by concrere examples and numerical methods appropriate to rhese equations will be investigated. Finally, a qualirarive study will be carried our for each model.

3 - 0 - 4 Weight: 6

CSE250B: Data Structure and Algorithms
(INF250B: Structure de données et algorithmes)

For students of the Second Year taking Science.

Students will be exposed to basic data structure and to some analysis of algorithms. Examples from science and engineering will be used throughout the course.

Programmeming principles. Big-Oh analysis and running rime of programmes. Data Types: lists, trees and graphs.

3 - 1 - 4 Weight: 7

CSE321A: Algorithm Analysis
(INF321A: Analyse d'algorithmes)

For students of the Third Year taking Honours Science.

Recursive algorithms and recursive function theory; inrroduction to complexity analysis and complexity classes; computability and undecidability. Problems solving strategies. Relationship between data structures and algorithm design. Data structures and algorithms will be covered in some depth.

3 - 2 - 4 Weight: 8

CSE323B: Formal Languages and Automata
(INF323B: Langages formels et automates)

For students of the Third Year taking Honours Science.

Introduction to the theory of automata and formal languages with application to the theory of computation. Deterministic finite automata, regular languages, pushdown automata, conrext free grammars, Turing machines (TM), unsolvable problems about TM and grammars, P and NP classes, NP completeness.

3 - 2 - 4 Weight: 8

CSE352B: Applications in Computer Science
(INF352B: Applications informatiques)

For students of the Third Year raking Space Science or Honours Science.

Topics in Numerical Analysis: Solutions of Ordinary and Partial Differential equations, Fasr Fourier Transforms, Design and implementation of convolution filters, Recovery of signal from noise. The student will be introduced to the UNIX environment and ro the use of such applicarions software as spreadsheet, MATLAB.

3 - 1 - 4 Weight: 7

CSE360A/B: Introduction to Computer Concepts
(INF360A/B: Introduction aux systèmes informatiques)

An elective science course for students of the Third or Fourth Year Arts.

This course is designed to introduce students to the terminology and concepts of computer systems so that they are able to apply them in their profession.

Files and file system structures. Basic operating system concepts; file-related commands. Disks, tapes, printers, display screens, and other devices. Programmes and the programmeming process. The function of word, text, and composition processors and spreadsheets. Transaction and file processing systems. Security considerations. Data structures for storage and access. The concept of a database system. Networks. Other frontiers.

3 - 0 - 6 Weight: 6

CSE365A: Computer Programme Design
(INF365A: Conception de logiciels)

For students of the Third Year taking Computer Engineering or Honours Science (Information Science).

Introduction to ADA. Structured Programmeming. Compilation units, separate compilation, libraries. Pre-defined data types: integers, reals, enumeration types, arrays, records, pointers, files. User-defined types. Objects. Control structures. Modules, functions and procedures. Abstract data types. Overloading. Basic data structures, including linear lists, queues, stacks, linked lists. Linear and Binary search. Binary tree search. Insertion sort, binaty sort, mergesort, quicksort. Hashing. Relative efficiency of algorithms.

3 - 2 - 5 Weight: 8

CSE439: Computing Applications II
(INF439: Applications informatiques II)

An elective course for students of the Fourth Year taking Science.

Fall Term: Design, development and implementation of computer programmes using a structured high level language (C). Programmeming methodology. Introduction to files and file processing techniques. Applications of non-numeric computing and use of scientific programmes.

Winter Term: Modelling of continuous and discrete systems, model selection and analysis, validation of results. Design of simulations experiments. Selected applications from physics, stress analysis, finite element analysis and operations research.

2 - 3 - 3 Weight: 14

CSE444A/B: Computer Applications Laboratory
(INF444A/B: Laboratoire d'informatique appliquée)

For students of the Fourth Year taking Honours Science: Option Information Science.

A series of self-directed laboratory exercises using various DOS and UNIX platforms, designed to introduce the student to a variety of high-level simulation languages (Prolog, Eclipse) and application packages presently being used and developed by research staff and graduate students in the Department.

0 - 4 - 4 Weight: 6

CSE472A/ B: Knowledge-Based Systems
(INF472A/B: Systèmes à base de connaissances)

An elective course for students taking Science.

This course introduces the student to knowledge-based technology. A brief introduction to "expert systems" will be given. The different components of a knowledge-base system will be described. A methodology of development will be discussed and illustrated with examples. Throughout the course the student will be exposed to different tools to develop KBS. The development of a small knowledge-base system will be part of the course.

2.5 - 1.5 - 4 Weight: 7

CSE483B: Database Management Systems
(INF483B: Systèmes de gestion de base de données)

An elective course for students of the Fourth Year taking Honours Science or Computer Engineering.

Concepts, approaches and techniques in Database Management Systems (DBMS): data as a model of reality; logical models of databases. Network models, hierarchical models, relational models and object models of data; relational calculus, relational algebra, normalization; data independence, security, database integrity, DDL and DML.

3 - 2 - 5 Weight: 8

GRADUATE STUDIES AND RESEARCH

For graduate courses, see the Calendar of the Graduate Studies and Research Division.

DEPARTMENT OF PHYSICS

Professor Emeritus - D.H. Rogers, BSc, MSc, PhD.
Professor Emeritus - D.E. Tilley, BSc, PhD.
Professor and Head of the Department - P.L. Rochon, BSc, PhD, PEng.
Professor - N. Gauthier, BA, BSc, MSc, PhD.
Professor - A.R. Lachaîne, BSc, MSc, PhD.
Professor - R.F. Marsden, BSc, PhD.
Professor - B.K. Mukherjee, BSc, PhD.
Professor - T.J. Racey, BSc, BEd, MSc, PhD.
Professor - S. Ranganathan, ndc, BSc, MSc, MTech, PhD.
Professor - P.J. Schurer, BSc, MSc, PhD.
Professor - L.S. Wright, BSc, PhD, PEng.
Associate Professor and Coordinator of Space Science Programme - E. Baralla, BSc, MSc, PhD.
Associare Professor - J.R. Buckley, BSc, PhD.
Associate Professor - J.R. Gosselin, BScA, PhD, PEng.
Associate Professor - M.W. Stacey, BSc, PhD.
Assistant Professor - Captain S. Dubois, rmc, BEng, MSc, PhD.
Assistant Professor - Captain H. Kenny, CD, rmc, BEng, MSc, PhD.
Lecturer - Captain J.D. de Boer, BEng, MEng.
Research Assistant - C. Barrett, MSc.
Research Assistant - S. Freiburg, BSc.
Research Assistant - D. Hore, BSc.
Research Assistant - R.S. Noel, BSc, MSc.
Research Assistant - B.G. Scully, BSc, MSc.
Research Assistant - S. Sherrit, BSc, MSc.
Research Assistant - V. Singh, BSc, MSc, MS, PhD, PGeo.
Research Assistant - Lieutenant-Colonel (Retired) P.W. Somers, BSc, MSc.
Research Assistant - R. Stimpson, CET.
Research Assistant - R. Wintle, MA.

LABORATORIES

The teaching laboratories of the Physics Department are equipped to provide training in methods of measurement and in experiment design. The First and Second Year laboratories together provide an inregrated course in the principles of experimenting. Laboratory courses in the Third and Fourth Years are designed to familiarize the studenr more specifically with the rechniques of physics laboratory work.

The research of the Department includes studies in both pure and applied physics in the areas of optics (non linear optics, light scattering and photoacoustics), oceanography (remote sensing and modelling), space science (sarellire tracking and image processing), development of explosion models, and materials science (acoustic properties of solids, materials failure analysis, properties of ferroics and piezoelectrics, metallurgy, superconductivity and Mossbauer effect).

COURSE DESCRIPTIONS

SCE100A: Fundamentals of Science
(SCF100A: Principes fondamentaux en sciences)

For students of the First Year taking Arts.

The student is introduced to scientific practice and methodology. Topics include the scientific method, ethics, the scientific press, the scientific community and current issues in science and technology, atomic theory and models, electronic configuration, air, water and the environment, sources and utilization of energy.

Students without a Secondary School credit in Chemistry or Physics will be introduced to concepts of scientific measurement: precision and accuracy, uncertainty and error, quantities and units, elementary statistical analysis and graphs.

The course includes selected laboratory experiments and the student will be expected to formulate and solve simple problems.

The course includes a computer applications laboratory designed to familiarize the student with selected software packages, to include e-mail and Internet, word processing, spreadsheets and symbolic mathematics.

3 - 0 - 6 Weight: 12

SCE420: Senior Project
(SCF420: Projet de fin d'étude)

For students of the Fourth Year taking Honours Science.

The purpose of this course is to offer the possibility of doing an in-depth study of a scientific topic in which the student is particularly interested. The format is flexible and depends on the topic area. At one end of the spectrum, the student could be associated with a research team in either Physics, Chemistry or Mathematics, and be given responsibility for part of a research project. At the other end, the student may choose a programme of independenr study under the supervision of a member of the faculry. In all cases, the student's progress would be regularly monitored and an interim reporr would be submitted by the student at the end of the Fall term. The final mark would be based on a combination of assessment by the faculty supervisor(s) and an oral presentation to the Honours Science students and a faculty assessment committee.

0 - 4 - 4 Weight: 12

PHE105: Mechanics
(PHF105: Mécanique)

For all students of the First Year General Course.

An introduction to the principles of physics through the study of mechanics. The course covers the following topics: Vectors, kinematics, motion in one and two dimensions, displacement, velocity, acceleration, curvilinear motion, relative velocities. Newton's laws of motion, free-body diagrams, friction, circular motion. Work done by a force, kinetic energy, conservative and non-conservative forces, potential energy, work-energy theorem, conservation of energy. Linear momentum and collisions in one and two dimensions. Rotational motion of rigid bodies, angular velocity, angular acceleration, rotational kinetic energy, moments of inertia, torque, angular momentum, rolling motion. Conditions of static equilibrium of rigid bodies. Simple harmonic motion, Hooke's law, harmonic oscillators, energy. Law of universal gravitation, the motion of planets and satellites, gravitational potential energy. Introduction to hydrostatics and hydrodynamics. Relative motion in a plane. Translating and rotating reference axis, Corioles' effect.

Serway, *Physics for Scientists and Engineers, 3rd ed.*

2 - 0.5 - 2.5 (Fall Term)
2 - 1 - 3 (Winter Term) Weight: 12

PHE107: Optics and Electricity
(PHF107: Optique et électricité)

For all students of the First Year General Course.

An introduction to the principles of physics through the study of optics and electricity. Nature and speed of light, reflection and refraction, spherical mirrors, single refracting surfaces, lenses and optical instruments. Electric charge, electric current, Ohm's Law, D.C., electrical circuits, Kirchhoff's rules. Coulomb's Law, electric field, electric potential, capacitance. Magnetic field, Lorentz force, inductance, A.C. circuits.

Serway, *Physics for Scientists and Engineers, 3rd ed.*

2 - 0.5 - 2.5 (Fall Term)
2 - 1 - 3 (Winter Term) Weight: 12

Experimental Physics
(Physique expérimentale)

For all students of the First Year General Course.

Standing in this course will be included in the standing obtained in Physics 105 and Physics 107.

This course covers the basic principles of experimental investigation. In particular the following topics are considered: the nature of measurement and associated errors, experiment planning and execution, the analysis of data errors, and the writing of a scientific report.

Baird, *Experimentation*

0 - 2 - 0

PHE202B: Elementary Physics
(PHF202B: Eléments de physique)

For students of the Second Year taking Arts.

Topics in this introductory physics course will include light, geometrical and physical optics, interference and diffraction; Newtonian mechanics including projectile motion, satellite orbits, work and energy, impulse and momentum; special relativity.

3 - 0 - 6 Weight: 6

PHE205A: Waves and Vibrations
(PHF205A: Ondes et vibrations)

For students of the Second Year taking Engineering or Science.

Undamped and damped harmonic motion. Forced harmonic motion and resonance. Damped forced oscillations. Standing waves, wave groups, dispersion, interference and diffraction. Doppler effect. Waves in continuous media.

2 - 0 - 2 Weight: 5

PHE207A: Electricity and Magnetism
(PHF207A: Électricité et magnétisme

For students of the Second Year taking Engineering or Science.

Gauss' Flux Law and electric fields for arbitrary charge distributions. Electrical potential, work and energy in electrical systems. Ampère's Circuital Law and magnetic fields for arbitrary current distributions. Faraday's Law of Electromagnetic Induction and applications. Magnetic energy.

2 - 0 - 2 Weight: 6

PHE225B: Modern Physics
(PHF225B: Physique moderne)

For students of rhe Second Year taking Science.

Relativistic kinematics and dynamics: space and time; momentum and energy. Particle aspects of electromagnetic radiation. Wave aspects of parricles. Single- and many- electron atoms; molecules. Nuclear structure and energetics and reactions. Radioactivity: alpha and beta decay, gamma emission.

2 - 0 - 2 Weight: 6

PHE227B: Electromagnetism
(PHF227B: Électromagnétisme)

For students of the Second Year taking Science.

Electric dipole moments and electric fields in material media. Polarization and susceptibility. Inregral and point forms of Maxwell's equations for material media. Waves.

2 - 0 - 2 Weighr: 5

Experimental Physics A
(Physique expérimentale A)

For srudenrs of the Second Year raking Engineering and Science.

Standing in this course will be included in the standing obtained in PHE205A and PHE207A.

The laboratory is introduced by a short course on electrical instrumentation. Thereafter rhe srudents choose from a wide variety of experiments that have been selected to train them in the principles of experimental measuremenr. Much of the design and analysis of the experiments is done by the students independenrly.

0 - 3 - 3

Experimental Physics B
(Physique expérimentale B)

For srudenrs of rhe Second Year taking Science.

Standing in this course will be included in the sranding obrained in PHE225B and PHE227B.

The srudenrs choose from a wide variety of experiments thar have been selecred to train them in rhe principles of experimenral measurement and to illustrate some fundamenral physical concepts.

0 - 3 - 3

PHE300: Modern Physics
(PHF300: Physique moderne)

For students of the Third Year taking Space Science. An elective for students in the Third Year taking Science.

Introductory Quantum Mechanics: The Wave Function and the Schrodinger Equation. The Free Particle, Wave Packets and the Uncertainty Principle. Potential Wells and Potential Barriers. Measurements and Expectation Values. The Simple Harmonic Oscillator.

Atomic Structure and Spectra: The Hydrogen Atom. The Exclusion Principle. Elecrronic Srrucrure of Atoms. X-ray and Optical Spectra.

Molecules: Ionic Binding. The Hydrogen Ion. Molecular Orbitals. Covalent Binding. Molecular Spectra and Dissociation.

Assemblies of Particles: The Basic Principles of Statistical Physics. The Quantum and Classical Distribution Functions. The Ideal Classical Gas. Maxwell Distribution of Velociries. Quantum Gases. The Phonon, Photon and Electron Gases. Black Body Radiation. Specific Heats of Solids and Gases. Contacr Potential and Thermionic Emission. The Laser. The Laws of Thermodynamics. Phase Changes.

Applied Nuclear Physics: Nuclear Stability. Nuclear Fission. Nuclear Fusion.

2 - 0 - 3 Weighr: 8

PHE302: Electromagnetic Waves
(PHF302: Propagation des ondes électromagnétiques)

For srudenrs of the Third Year taking Space Science. An elective for other students taking Science.

This course commences wirh a jusrificarion of Maxwell's equations in point form. The plane wave solution is studied, including energy transfer and Poynting vecror. Boundary value problems are considered, including the topics of reflection and refraction at dielectric surfaces and metallic surfaces. Also, the propagation of microwaves through waveguides is examined. Sources of electromagnetic radiation are introduced in a treatmenr of the dipole antenna.

2 - 1 - 3 Weight: 10

PHE303A: Statistical and Thermal Physics
(PHF303A: Physique statistique et thermique)

For students of the Third Year taking Honours Science. An elective for other students in Science.

Principles of thermodynamics and statistical mechanics. First, second, and third laws of thermodynamics, equilibrium, entropy, and Kelvin temperature scale. Quantum and classical statistical ensembles. Boltzmann, Fermi and Bose distributions: ideal gases, phase transitions, fluctuations.

3 - 0 - 4 Weight: 6

PHE304: Quantum Physics
(PHF304: Physique quantique)

For students of the Third Year taking Honours Science. An elective for other students in Science.

Development of the Schrödinger equation, postulates of quantum mechanics. General solution of the time dependent Schrödinger equation, stationary states, operators, eigenfunctions and eigenvalues of the one dimensional square well. Harmonic oscillator. Perturbation theory. The hydrogen atom; energy levels, angular momentum, magnetic moment, electron spin, Stark effect, Zeeman effect, LS coupling, jj coupling. Time dependent perturbation, transition probabilities, selection rules. Many electron atoms: He, Hund's rule, periodic table; molecules.

2 - 0 - 3 Weight: 8

PHE331: Instrumentation
(PHF331: Instrumentation)

For students of the Third Year taking Space Science. An elective course for other students taking Science.

Part I: Sensors and Control of Electrical Quantities

Introduction to transducers, sensors and measurement systems; time and frequency domains; passive circuit elements and filters; amplifiers, including frequency response, dynamic range, noise, feedback, operational amplifiers, active filters, and frequency modulation and demodulation.

Laboratory

Use of common laboratory instruments; RC-circuit and filter networks; amplifier characteristics; operational amplifiers, feedback, analog computer, and automatic feedback control.

Part II: Sensors, Measurement and Data Acquisition

Assembly of measurement and data recording systems; physics and operation of electronic devices; transducers and sensors; signal enhancement including filtering, integration, correlation and heterodyning; A/D conversion and switching; digital sampling; Nyquist Theorem and data acquisition.

Laboratory

Familiarity with various electronic devices and sensors; applications of electronic devices; transducers and sensors (ultrasonics, eddy current strain gauges, etc); use of signal enhancement techniques; applications of sampling rate theory; multiparameter on-line and off-line data analysis by minicomputer.

Barnaal, *Analog and Digital Electronics for Scientific Applications*
Malmstadt, Enke and Crouch, *Instrumentation for Scientists, Module IV*

2 - 2 - 3 Weight: 12

PHE338B: Undergraduate Seminar
(PHF338B: Séminaire du premier cycle)

For students of the Third Year taking Science.

Each student to choose an undergraduate topic not otherwise covered in the syllabus from a list drawn up by the Science faculty. According to the topic chosen, the student will be assigned to a faculty supervisor who will assign readings and problem sets, and otherwise monitor the student's progress culminating in the presentation of a seminar to Honours Science students and a faculty assessment committee at term's end. The nominal assignment of 1+2 is intended as a guide to the amount of weekly contact time with the faculty supervisor. The weight of 6 reflects the intention that the total academic work should correspond to that of a conventional one semester course.

1 - 2 - 4 Weight: 6

PHE350A: Orbital Mechanics
(PHF350A: Mécanique orbitale)

For students of the Third Year taking Space Science.

Newton's laws. Two-body problem in a central force field, orbit calculations, perturbations. Non-inertial frames. Motion of an artificial satellite. Restricted three-body problem. Rigid body motion.

3 - 0 - 4 Weight: 6

PHE352B: Astronomy
(PHF352B: Astronomie)

For students of the Third Year taking Space Science. An elective for other students taking Science.

This course will introduce students to fundamental concepts of asttonomy and the application of astronomical techniques to space operations. Electromagnetic spectrum, measurements and distances. Earth, moon, solar system, stellar structure and evolution, and galactic structute.

Pasachoff, *Contemporary Astronomy, 4th ed.*

3 - 0 - 3 Weight: 6

PHE354A: Space Systems
(PHF354A: Systèmes spatiaux)

For students of the Third Year taking Space Science. An elective for other students in the Third Year taking Science.

Review of the history of space with emphasis on Canadian contributions typical satellite orbits: effects of the environment, satellite function considerations. Satellite systems and subsystems: structure, electrical power, thermal control, propulsion and altitude control. Systems: sensors, telemetry, surveillance, navigation, meteorology, and remote sensing. Military and scientific satellite systems, launch systems.

Air Universiry Space Handbook
Fundamentals of Astrodynamics, Bate, Meuller & White
Supplemental Material

2 - 1 - 2 Weight: 5

PHE360B: Astronomy and the Evolving Universe
(PHF360B: L'astronomie et l'évolution de l'univers)

(May be offered in Fall Term.)

An elective course for students of the Third or Fourth Yeas taking Arts.

The course will discuss an understanding of our place in the Universe. Topics to be covered will include: the solar system and its constituents, the basic properties and evolution of stars and star systems, the past, present and future structure of the Universe and topics of current interest.

Shu, *The Physical Universe: An Introduction to Astronomy*

3 - 0 - 6 Weight: 6

PHE362A: Ideas and Concepts of Modern Physics
(PHF362A: Concepts de physique moderne)

(Offered in 1995-96 and alternate years. May be offeted in Winter Term.)

An elective course for students of the Third or Fourth Year taking Arts.

This course gives an introduction to the conceptual structure of modern physics and will include the following topics: the concept of fields as introduced in electromagnetism, the evolution of the statistical description of matter, the ideas of relativity, the introduction of the quantum hypothesis and its development, the quantum interpretation of matter and rhe impact of the new concepts on contemporary thought.

3 - 0 - 6 Weight: 6

PHE364B: Physics Laboratory
(PHF364B: Laboratoire de physique)

For students of the Third Year taking Space Science and Honours Science. An elective for other students taking Science.

This laboratory course is designed to increase the familiarity of the students with physical experimentation. Students are expected to perform a variety of different experiments in solid state physics, optics, and space physics.

0 - 4 - 1 Weight: 4

PHE370A: Introductory Synoptic Oceanography
(PHF370A: Introduction à l'océonographie)

An elective for Third or Fourth year students in Science or in Arts.

This course gives a general introduction to the oceans. The principal topics covered are: a survey of the physical properties of sea water, the distribution of salinity, temperature, etc., and their seasonal variations; the circulation of the oceans; energy budgets; oceanographic instrumentation and measurement techniques; and underwater sound velocity distributions resulting from temperature and salinity variations.

3 - 0 - 6 Weight: 6

PHE380A: Physics of Armaments
(PHF380A: La physique des armements)

An elective for Third and Fourth year students in Science and Arts. Offered through Continuing Studies.

A brief history of the role of Physics in the development of weapons: ancient times, modern wars, nuclear times. Will receive special emphasis: ballistics, detonation, missiles, laser, radar; nuclear weapons receive special treatment, including nuclear principles, and the destructive and radiation effects of nuclear bombs. Certain aspects, such as ballistics and missiles, will be treated with the help of simulation computer programmes.

3 - 0 - 6 Weight: 6

PHE390A: The Physics of Music
(PHF390A: Physique de la musique)

An elective course for students of the Third or Fourth Year taking Arts or Science.

An introduction to the physics of music including: physical principles of vibrating systems, waves and resonance; the physics of perception and measurement of musical sounds; hearing, intensity, loudness levels, tone quality, frequency and pitch, combination tones and harmony; the physical acoustics of musical instruments; string, brass, woodwind, percussion and keyboard instruments; musical scales and temperament; auditorium and room acoustics.

3 - 0 - 6 Weight: 6

PHE403: Solid State Physics
(PHF403: Physique de l'état solide)

For Honours Science (Physics) students. An elective for students taking Science.

Structure of solids, lattice vibrations and specific heat, order-disorder changes, lattice energy, lattice imperfections, diamagnetism, paramagnetism, paramagnetic resonance, ferromagnetism, antiferromagnetism, band theory of solids, transport of heat and electricity. Cyclotron resonance, lasers.

Christman, *Fundamentals of Solid State Physics*
Kittel, *Introduction to Solid State Physics*

2 - 0 - 3 Weight: 8

PHE407: Applied Optics
(PHF407: Optique appliquée)

For students of the Fourth Year taking Space Science or Honours Science (Phys). An elective for other students taking Science.

The physical basis for the engineering applications of modern optics: optical systems; wave optics, reflection, refraction, polarization; propagation and optical activity coherence and interference; diffraction; fourier optics, image processing and enhancement; resolution; lasers; blackbody sources; detectors.

Hecht, *Optics, 2nd ed.*

2 - 1 - 4 Weight: 10

PHE413: Nuclear and Particle Physics
(PHF413: Physique nucléaire et particules élémentaires)

For Honours Science (Physics) students. An elective for students taking Science.

Nuclear constituents; Rutherford scattering; deuteron; strong force; semiempirical mass formula; single particle shell model; radioactive decay; nuclear transitions and electron capture; symmetric fission; simple reactor model; nuclear physics and cosmology; fusion in the sun; conservation laws and elementary particles; classification schemes; Feynman diagrams; quarks; leptons; gluons; photons; W and Z particles.

Griffiths, *Introduction to Elementary Particles*
Krane, *Introductory Nuclear Physics*

2 - 0 - 3 Weight: 8

PHE420: Senior Project
(PHF420: Projet)

For students of the Fourth Year taking Space Science.

The object of this course is to provide students with an opportunity to be involved in a project which requires them to assimilate knowledge gained from a variety of sources and apply it to a specific, well-defined problem. A formal report is required for presentation in the Winter Term, along with a prototype apparatus, if appropriate. Students are encouraged to seek out projects from any of the Science or Engineering Departments.

0 - 4 - 6 Weight: 12

PHE422: Spacecraft Design Course
(PHF422: Conception d'un véhicule spatial)

For students in Space Science and as an elective for Science or Engineering students.

This course in systems' design is offered by the University Space Network (USN), a consortium of several universities including RMC, and focuses on spacecraft design. In this multimedia course, students, working in a team, explore all the facets involved in preparing a preliminary report for the design of a space probe. Modules cover areas such as: a systems design approach to problem solving; propulsion systems; orbital mechanics; probes and satellites; mechanical systems - transport, launch, structural and thermal requirements; electrical systems - power and communication; ground segment - training and simulations; robotics assembly and maintenance; assembly integration and maintenance; safety/failure risk management and reliability/maintainability risk management. The final design of the team is encompassed in a report which meets the criteria of a preliminary design draft for a proposed space mission.

This is normally offered as a two term course. The proposed space mission is varied for each offering of the course.

0 - 4 - 4 Weight: 12

PHE440: Selected Topics in Physics
(PHF440: Sujets choisis en physique)

An elective course for students of the Fourth Year taking Science.

This course will consist of two topics selected annually by the class from among the following: the physics of plasmas, statistical physics, low temperature physics, applied acoustics, introductory astrophysics, optical properties of solids, and other topics.

2 - 0 - 3 Weight: 8

PHE442B: Introduction to Astrophysics
(PHF442B: Introduction à l'astrophysique)

For students of the Fourth Year taking Space Science. An elective for students taking Science.

The object of this course is to apply our knowledge of physics to obtain an understanding of stars. The topics to be covered will include: a brief review of observational astronomy and stellar parameters, stellar spectra and modelling the stellar atmosphere, energy production in stars, the death of stars, white dwarfs, neutron stars and black holes.

3 - 0 - 4 Weight: 6

PHE450A: Space Communications and Navigation
(PHF450A: Communications et navigation spatiale)

For students of the Fourth Year taking Space Science. An elective for students in Fourth Year taking Science.

Part I:

This part of the course is an introduction to communications between spacecraft and ground stations. Topics include RF power generation, modulation, transmission, propagation, reception and demodulation. Fundamentals of antennas, ionospheric effects, frequency bands, communications link equations, and telemetry.

Part II:

Space-based navigation systems are studied. Topics include positioning using RF doppler and GPS positioning. Precision navigation and surveying, American GPS, the Russian GLONASS and SATSAR.

2 - 0 - 3 Weight: 4

PHE451A: Senior Physics Laboratory
(PHF451A: Laboratoire de physique avancé)

For students of the Fourth Year taking Honours Science with a Physics concentration.

A continuation of PHE364B including experiments in magnetism, Mössbauer spectroscopy, applied optics and nuclear science.

0 - 4 - 2 Weight: 4

PHE452B: Remote Sensing
(PHF452B: Télédétection)

For students of the Fourth Year taking Space Science. An elective for students taking Science.

This course provides a foundation for the theory and applications of remote sensing from space. Electromagnetic radiation, refraction and reflection, scattering, polarization, black body radiation law, atmospheric absorption, spatial and spectral resolution, radiometric and temporal resolution, background radiation, solar constant, modelling, ground truth, calibration. Satellite versus aircraft remote sensing. Optical and radar techniques, multi-spectral techniques, film, filters, charge-coupled devices. Instrument design, detector noise, scanning techniques. Civilian and military applications, earth resources, cartography, reconnaissance, meteorology.

Slater, *Remote Sensing*

3 - 1 - 5 Weight: 7

GRADUATE STUDIES AND RESEARCH

For graduate courses see the Calendar of the Graduate Studies and Research Division.

SPACE SCIENCE

The programme is designed to give future officers a sound education in science, with particular attention paid to space oriented remote sensing. The programme is administered by the Head of the Physics Department.

ENTRY AND QUALIFICATIONS

Candidates for the degree in Space Science will have successfully completed the First Year General Programme and, in Second Year, either Honours Science or Space Science. Students who have met the Second Year requirements may apply to the programme coordinator for entry into an Honours programme and, if admitted, will be awarded a degree with Honours provided that an average of B- or better has been maintained in the Science courses of the programme.

COURSE OF STUDY

The prescribed course of study for Space Science is set out in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 10
Fourth Year	Table 19

DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING

Professor, Head of the Department, - J.P. Laplante, BSc, MSc, PhD.
Professor - J.C. Amphlett, BSc, PhD.
Professor - L.G.I. Bennett, CD, rmc, BEng, MASc, PhD, PEng.
Professor - H.W. Bonin, BA, BSc, BScA, MIng, PhD, Ing, PEng.
Professor - V.T. Bui, BScA, MScA, PhD.
Professor - M.J.B. Evans, BSc, PhD, CChem(UK), FRSC(UK).
Professor (Adjunct) - J.C. Kennedy, BA, MD, PhD.
Professor (Adjunct) - S.F.A. Kettle, BSc, PhD.
Professor and Professor-in-Charge of the Chemical and Materials Engineering Programme- B.J. Lewis, BSc, MEng, PhD, PEng.
Professor - R.H. Pottier, BSc, PhD, CChem.
Professor - K.J. Reimer, BSc, MSc, PhD, FCIC.
Professor - P.R. Roberge, BA, BSc, MChA, PhD.
Professor - W.T. Thompson, BASc, MASc, PhD, PEng.
Professor - G.M. Torrie, BSc, MSc, PhD.
Professor and Dean of Graduate Studies and Research - R.D. Weir, CD, BSc, DIC, PhD, FCIC, Cchem(UK), FRSC(UK), PEng.
Associate Professor - K.A.M. Creber, BSc, MSc, PhD.
Associate Professor - (Adjunct) L.J. Norrby, Fil mag, Fil lic, Fil dr.
Associate Professor (Adjunct) - D.F. Quinn, BSc, PhD.
Assistant Professor - W.S. Andrews, CD, rmc, BEng, MEng, PhD, PEng.
Assistant Professor - P.J. Bates, BSc, MEng, PhD.
Assistant Professor - C. Bordeleau, BSc, MSc, PhD, MICC, CChem, Chim.
Assistant Professor (Adjunct) - Major W.J. Lewis, CD, rmc, BEng, MEng, Bed, MEd, MBA.
Assistant Professor - G.L.P. Lord, BA, BSc, MSc, PhD.
Assistant Professor (Adjunct) - J.S. Poland, BSc, DPhil.
Lecturer - Captain M.K. Heppell-Masys, CD, rmc, BEng.
Lecturer - Captain J.-F. Legault, CD, rmc, BEng, MEng, PEng.
Lecturer - Lieutenant (N) J.R.M. Pierre, CD, rmc, BEng, MEng.
Technical Officer - B.A. Kelly, BSc, BEd, MSc.
Research Associate - E. Biron, BSc, PhD.
Research Associate - J.E. Callanan, BSc, MSc, PhD.
Research Associate - B.R. Davis, BSc, MSc, PhD.
Research Associate - E.F. Gudgin Dickson, BSc, PhD.
Research Associate - S.J. Duffy, BSc. MSc. PhD.
Research Associate - A.R. Green, BSc, PhD.
Research Associate - D.M. Hughes, BSc, PhD.
Research Associate - W.L. Ingham, BSc, HED, hD.
Research Associate - R.D. Klassen, BSc, BSc, PhD.
Research Associate - L.A. Morton, BSc, PhD.
Research Associate - S.M. Nevill, BSc, MSc, PhD.
Research Associate - E.A. Ough, BSc, PhD.
Research Associate - J.A. Page, BSc, MSc, PhD.
Research Associate - Y.S. Park, BSc, MSc, MSc, PhD.
Research Associate - A. Rutter, BSc, MSc, PhD.
Research Associate - K.A. Sosin, PhD.
Research Associate - M.J. Tullmin, BScE, MscE, PhD.
Research Associate - P. Tume, BSc, MSc, PhD.
Research Associate - G.E. Weagle, HBSc, MSc, PhD.
Research Associate - B.A. Zeeb, BSc, PhD.

ACCREDITATION

The baccalaureate degree programme in Chemical and Materials Engineering is accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers, and is recognized by the Chemical Institute of Canada and the Canadian Society for Chemical Engineering as qualifying its graduates for full membership status.

ENTRY AND QUALIFICATIONS

The Department of Chemistry and Chemical Engineering offers courses of study leading to the degrees of Bachelor of Engineering in Chemical and Materials Engineering, and Bachelor of Science (Honours Science) with a concentration in Chemistry.

To enter the Third Year Honours programme with a concentration in Chemistry, a Second Class (B-) combined average in Chemistry, Mathematics and Physics in the Second Year Honours Science programme is normally required. To enter the Third Year programme in Chemical and Materials Engineering, students must have completed successfully the Second Year Engineering or Honours Science programme, normally with a minimum D+ combined average in Chemistry, Mathematics and Physics and have the approval of the Department of Chemistry and Chemical Engineering.

COURSES OF STUDY

Requirements:

For students taking Arts:
1. Science 100A
2. Chemical and Materials Engineering 200A or 101
3. Chemical and Materials Engineering 200A, 360, 362, 364, 366 (Electives).

For students taking Honours Science (Chemistry concentration):
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223, 289B (Elective)
3. Chemical and Materials Engineering 302A, 311, 317A, 341, 353
4. Chemical and Materials Engineering 441A
5. Science 320B, 338B, 420

6. Chemical and Materials Engineering 385B, 407A, 413B, 425, 427, 452 (all Electives)
7. Nuclear Engineering 401(Elective)

For students taking Materials Science:
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223
3. General Engineering 223, 289B (Elective)
4. Chemical and Materials Engineering 349, 353
5. Chemical and Materials Engineering 449 (Elective)
6. Science 415, 440A

For students taking Space Science:
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223
3. General Engineering 223, 289B (Elective)
4. Chemical and Materials Engineering 452 (Elective)

For students taking General Science:
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223, 289B, (Elective)
3. Chemical and Materials Engineering 317B, 349, 353, 381, 385B (all as electives)
4. Chemical and Materials Engineering 407A, 449, 452 (all as electives)
5. Nuclear Engineering 401 (Elective)
6. Science 415, 440A (both Electives)

For students taking Engineering:
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223
3. General Engineering 223, 289B (Elective)

For students taking Chemical and Materials Engineering:
1. Chemical and Materials Engineering 101
2. Chemical and Materials Engineering 223
3. General Engineering 223, 289B (Elective)
4. Chemical and Materials Engineering 301, 303A, 311, 317B, 321, 337B, 341, 345A, 353, 385B
5. Chemical and Materials Engineering 405, 407A, 409B (Elective), 413B, 415B, 417, 421, 425, 427, 437B, 441A, 485B (Elective)

Nuclear Engineering 401

For students taking Computing and Electrical Engineering
1. Chemical and Materials Engineering 289B

For students taking Mechanical Engineering
1. Chemical and Materials Engineering 289B

The prescribed course of study for students taking Chemical and Materials Engineering is set out in the tables in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 11
Fourth Year	Table 20

The prescribed course of study for students taking Honours Science with a concentration in Chemistry is set out in the tables in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 9
Fourth Year	Table 18

LABORATORIES AND EQUIPMENT

The departmental laboratories are located in the Sawyer Building, Modules 4 and 5. They are equipped for teaching and research in the areas of chemistry, materials science, environmental sciences, chemical and materials engineering, environmental engineering as well as nuclear engineering relevant to the course of study and to defence interests. More specifically, they include the following:

Materials Science and Engineering

Materials selection for engineering applications and determination of the chemical, physical and mechanical properties are the foci of study. High temperature furnaces are used in the preparation and treatment of metals, alloys and ceramics while an injection molder is among the tools employed in the area of polymer blends and with composites. Atomic absorption, IR, FTIR, and NMR spectrometers together with gas and liquid chromatography, gel permeation chromatography and viscometry are used in chemical analysis. X-ray diffraction, scanning electron microscopy, metallurgical and polarised-light microscopy, hardness, shear and tensile testing are used to determine physical properties. The various materials are also characterized by thermal gravimetry, by adiabatic and differential scanning calorimetry, by differential thermal analyses, by polarography and Karl Fischer titration.

Chemical Engineering

The chemical conversion of natural or synthetic materials into useful engineering products together with their management and maintenance are the foci of these studies. Various experiments, some of which are computer controlled, are performed in heat and mass transfer, which include the use of a bubble cap distillation tower, ion exchange and gas absorption columns, flame propagation and stability apparatus. Chemical reactions are studied using flow tank reactors, and a continuous combustion furnace, which also serves to characterize gaseous and liquid fuels. Rates of corrosion are determined under various environmental conditions. A bench-scale heat pump provides a study in applied thermodynamics.

Nuclear Science and Engineering

The main tool for nuclear studies is the SLOWPOKE-2 research reactor, which is operated by this Department for the Department of National Defence. Experiments include neutron activation analysis, neutron radiography and isotope production applied to various military problems. Related experiments deal with health physics, radiation protection, liquid scintillation counting, reactor physics and thermal hydraulic studies. The SLOWPOKE-2 Facility serves professors, students, researchers and technical trainees, and provides other capabilities such as radiation detection and low-level counting.

Computer Resources

A variety of IBM compatible microcomputers is available within the Department to support our students. Various software packages including FORTRAN, HYSIM, DIRA, LABVIEW and CODAS are used to automate and simulate chemical processes.

COURSE DESCRIPTIONS

SCE320B: Physical Science Laboratory
(SCF320B: Laboratoire de sciences physiques)

For students of the Third Year taking Honours Science.

A laboratory course, jointly administered by the Departments of Chemistry and Chemical Engineering and Physics, designed to illustrate and augment material covered in CHE311, CME317B, PHE302. Experiments will include x-ray techniques, spectroscopy, surface chemistry, chemical dynamics, and applied optics.

0 - 4 - 3 Weight: 6

SCE338B: Undergraduate Seminar
(SCF338B: Séminaire du premier cycle)

For students of the Third Year taking Honours Science.

Each student will choose a topic, not otherwise covered in the undergraduate syllabus, from a list drawn up by the faculty. According to the topic chosen, the student will be assigned to a supervisor who will assign readings and problem sets, and monitor progress culminating in the presentation of a seminar.

1 - 2 - 4 Weight: 6

SCE420: Senior Project
(SCF420: Projet de fin d'étude)

For students of the Fourth Year taking Honours Science.

The purpose of this course is to offer the possibility of doing an in-depth study of a scientific topic in which the student is particularly interested. The format is flexible and depends on the topic area. At one end of the spectrum, the student could be associated with a research team in either Physics, Chemistry or Mathematics, and be given responsibility for part of a research project. At the other end, the student may choose a programme of independent study under the supervision of a member of the faculty. In all cases, the student's progress would be regularly monitored and an interim report would be submitted by the student at the end of the Fall term. The final mark would be based on a combination of assessment by the faculty supervisor(s) and an oral presentation to the Honours Science students and a faculty assessment committee.

0 - 4 - 4 Weight: 12

SCE440A: Special Topics in Materials Science
(SCF440A: Sujets choisis en sciences des matériaux)

For students of the Fourth Year taking Materials Science. An elective course for other students taking General Science.

This course will consist of a topic selected annually by the class. Topics may include the following: biological materials, advanced thermodynamics, catalysts, electro-optics, surface analysis.

3 - 0 - 6 Weight: 6

CME101: Engineering Chemistry I
(CMF101: Chimie et ingénierie I)

For students of the First Year General Course.

The course is designed to present the fundamental principles of chemistry with strong emphasis on application in engineering, the importance of chemistry in the modern world, and the problems created by various chemical processes.

The first term is devoted to gases, chemical kinetics, acid-base and precipitation equilibria. Among the topics covered are the ideal gas law, the kinetic theory of gases, real gases, properties of acids and bases, solubilities and selective precipitation. The second term is primarily focussed on thermodynamics. The laws of thermodynamics are applied to chemical and physical changes, using combustion processes and explosions as examples. Among the topics covered are the concepts of energy, work and heat, enthalpies of reaction, the Carnot cycle, entropy changes in simple

physical and chemical processes, equilibrium and Gibbs free energy. Electrochemistry is the final topic of the term.

Laboratory experiments and tutorials reinforce and supplement lecture material.

Oxtoby and Nachtrieb, Principles of Modern Chemistry

3 - 2 - 5 Weight: 16

CME200A: Contemporary Chemistry
(CMF200A: Chimie contemporaine)

An elective course for students of the Second Year taking Arts, and other students with the permission of the Department. Required for students of the Second Year taking Arts who are without OAC or equivalent credit in Chemistry.

This course is designed to familiarize the student with a variety of current topics which are primarily chemical in nature. Some basic chemistry will be introduced at the beginning of the course to enable the student to comprehend the chemical systems that will be examined. The main topics to be covered include: the chemistry of water, water pollution, air pollution, modern energy sources, plastics and polymers and their environmental impact, food chemistry, agricultural chemistry, and pharmaceuticals and drugs.

Sherman and Sherman, *Chemistry and Our Changing World*

3 - 0 - 6 Weight: 6

CME223: Physical and Inorganic Chemistry
(CMF223: Chimie - Physique et Inorganique)

A. For students of the Second Year taking Engineering or Science.

The course is a continuation of CME 101 and deals primarily with phase equilibrium in one, two, and many component systems. Fundamental principles are presented, and their applications in Engineering are emphasized. The behaviour of real gases is studied, and students are instructed in the use of steam tables. The notion of chemical potential is introduced, and applied to phase diagrams. Among the equilibria covered are binary liquid mixtures, two component systems consisting of solid and liquid phases, and phase diagrams for steels and other important alloys.

Atkins, *The Elements of Physical Chemistry*

2 - 1 - 3 Weighr: 12

B. For students of the Second Year taking Science.

This course will begin with a review of atomic structure, the periodic table and bonding, followed by an examination of ionic solids and metallic structures. A brief overview of some main group chemistry will be studied. An introduction to transition metal chemistry with particular emphasis on coordination compounds, ligands, bonding, magnetism, stereochemistry and electronic spectra. Organometallic and bioinorganic chemistry will be introduced as well as homogeneous and heterogeneous catalysis.

Cotton, Wilkinson, Gaus, *Basic Inorganic Chemistry, 3rd ed.*

3 - 1 - 4 Weight: 7

GEE223: Engineering Chemistry and Materials
(IGF223: Chimie - Physique et des Matériaux)

For students of the Second Year taking Engineering or Science.

The course is a continuation of CME 101 and deals primarily with phase equilibrium in one, two, and many component systems. Fundamental principles are presented, and their applications in Engineering are emphasized. The behaviour of real gases is studied, and students are instructed in the use of steam tables. The notion of chemical potential is introduced, and applied to phase diagrams. Among the equilibria covered are binary liquid mixtures, two component systems consisting of solid and liquid phases, and phase diagrams for steels and other important alloys.

Atkins, *The Elements of Physical Chemistry*

2 - 1 - 3 Weight: 11

This course deals with the properties of a wide range of materials particularly metals and alloys used in modern technology.

Askeland, *The Science and Engineering of Materials*

3 - 0 - 3 Weight: 6

GEE289B/CME289B: Environmental Sciences: Impact of Science and Technology on the Environment
(IGF289B/CMF289B: Sciences de l'environnement: technologie et impact sur l'environnement)

An alternate course offered concurrently with HIE289B for students of the Second Year taking Engineering or Science.

The relationship between humanity and the environment is first discussed and the biogeochemical cycles (carbon, nitrogen, sulphur and phosphorus) and the concepts of ecology and

ecosystems ate coveted. Atmosphetic processes are then studied, including the ozone layer, greenhouse effect, pollutants and the role of the atmosphere as a filter. Water pollution is also covered, focussing on quality parameters and guidelines and, specifically, the Great Lakes. Humanity's impact is covered by studying population growth, energy (sources, cutrencies, forecasts and conservation) and environmental legislation, including the concept of due diligence.

Nisbet, *Leaving Eden to Protect and Manage the Earth*

3 - 0 - 3 Weight: 6

CME30l: Fluid Mechanics and Heat Transfer
(CMF301: Mécanique des fluides et transfert de chaleur)

For students of the Third Year taking Chemical and Materials Engineering.

Part I: Fluid Mechanics

This part of the course emphasizes the basic concepts of fluid mechanics and includes a study of the following: fluid and flow properties, fluid statics, fundamental equations of fluid motion, control volume concept applied to the continuity, momentum and energy equations; flow measuring devices; shear stress in laminar and turbulent flow, viscous and in viscid flow; introduction to the concepts of boundary layer and drag; engineering applications of flow in closed conduits. Special mathematical techniques, industrial and military applications are included.

Part II: Heat Transfer

The fundamental concepts and mechanisms of heat transfer processes are studied. The following topics in heat ttansfer are covered: differential equations of heat transfer, steady and unsteady state conduction in one, two and three dimensions using analytical, numerical, graphical and analogue methods; heat transfer with free and forced convection in laminar and turbulent flow; boiling and condensation heat transfer; heat transfer equipment; radiation heat transfer.

Munson, Young and Okiishi, *Fundamentals of Fluid Mechanics*
Welty, Wicks and Wilson, *Fundamentals of Momentum, Heat and Mass Transfer*

2.5 - 0 - 2.5 (Fall Term)
2 - 0 - 2 (Winter Term) Weight: 9

CME302A: Molecular Structure and Spectroscopy
(CMF302A: Spectroscopie et structure moléculaire)

For students of the Third Year taking Honours Science.

Bonding in molecules, ionic and covalent bonds, valence theory, hybridization, molecular orbitals, simple homo- and heteto nuclear diatomic molecules, polarization, correlation diagrams, delocalization, resonance, the benzene ring. Absorption and emission of radiation in molecules, radiative and non-radiative ptocesses, selection rules, rotational, vibrational and electronic spectroscopy of small molecules, Raman spectroscopy, spectroscopy of large molecules.

3 - 0 - 4 Weight: 6

CME303A: Energy and Fuels Engineering
(CMF303A: Génie de l'énergie et des combustibles)

For students of the Third Year taking Chemical and Materials Engineering.

An investigation is undertaken of energy sources and energy conversion techniques, both present and potential. The energy crisis and its probable effects on the future energy sources, fuels and opetations of the Canadian Forces are examined.

A concentrated study is made of conventional and substitute fuels, including their sources, supply, structure, composition, properties, production, treatment, utilization, and environmental impact. Fuel performance in sea, land, and air environments is studied and related to chemical and physical properties, structure, and composition.

The analysis of combustion processes by mass and enetgy balances is studied through an intensive problems series.

Shreve and Brink, *Chemical Process Industries (4th ed.)*

3 - 0 - 3 Weight: 6

CME307B: Physical and Inorganic Chemistry II
(CMF307B: Chimie pbysique et inorganique II)

Classical thermodynamics: srandard states, chemical potential, activity coefficients; application to real gases, solutions and mixtures, critical phenomena, electrolyte solutions, surface phenomena.

Introduction to statistical thermodynamics of ideal gases, microscopic interpretation of entropy, equilibrium constants for ideal gas reactions, brief introduction to intermolecular forces; transport processes: diffusion, conductivity, viscosity.

Electrochemistry: ionic equilibria, electrochemical cells, types of electrodes, thermodynamics and kinetics of electrode reactions, electrochemical transference.

3 - 0 - 4 Weight: 6

CME311: Applied Thermodynamics
(CMF311: Thermodynamique appliquée)

For students of the Third Year taking Chemical and Materials Engineering or Honours Science (Chemistry concentration).

This course is a continuation and extension of the thermodynamics taught in CME221 and GEE221. The fundamentals are developed and applied to engineering problems in the following topics: First law in open and closed systems; volumetric properties of fluids to include compressibility and Pitzet acentric factors and applications to isothermal, adiabatic and polytrophic changes in open and closed systems; Second law and entropy applied to Carnot and Rankine cycles and the concept of lost work; Third law, heat capacity, Debye temperature and order-disorder transitions in solids; free enetgy functions, Maxwell's equations and chemical potential; homogeneous mixtures to include partial molar properties; fugacities, activities, Lewis-Randall relations and excess properties; nonelectrolytes to include vapour-liquid equilibria, upper and lower critical solution temperatures, Van Laar and Gibbs-Duhem equations; chemical reaction equilibria, teaction coordinate, equilibrium constant; power cycles; reftigeration and liquefaction.

Keenan, Keyes et al., *Steam Tables, (SI)*
Smith and Van Ness, *Introduction to Chemical Engineering Thermodynamics*
CRC, *Handbook of Chemistry and Physics*

2 - 0 - 2 (Fall Term)
3 - 0 - 3 (Winter Term) Weight: 10

CME317B: Kinetics and Surface Science
(CMF317B: Cinétique et sciences des surfaces)

For students of the Third Year taking Chemical and Materials Engineering and Honours Science (Chemistry concenttation). An elective course for students taking General Science.

Empirical treatment of the rate laws and orders of reaction, complex reactions, theories of reaction rates, the Arrhenius relationship and experimental methods. Introduction to combustion and explosions including chain reactions, free radicals, thermal and branched-chain explosions, delayed branching and degenerate explosions. Nature and properties of sutfaces of solids, physical adsorption and chemisorption. Development of Langmuir - Hinshelwood equations, the linking of kinetics and chemisorption, and heterogeneous catalysis.

Laidler, Chemical Kinetics

4 - 0 - 4 Weight: 8

CME320B: Chemistry Laboratory
(CMF320B: Laboratoire de chimie)

For students of the Third year taking Honours Science.

This course is composed of a number of analytical laboratory experiments for science students studying chemistry. The experiments cover a wide range of analyses using techniques such as scanning electron microscopy, Fourier Transform infrared spectrometry and nuclear magnetic resonance spectroscopy. Modern, computerized methods are emphasized in the collection and treatment of data.

0 - 4 - 4 Weight: 4

CME321: Engineering Laboratory
(CMF321: Laboratoire de génie)

For students of the Third Year taking Chemical and Materials Engineering.

Part I: Microcomputers and Instrumentation

Introduction to the microcomputer, digital logic, data acquisition, IEEE bus, multiplexers, applications to measurement and control of temperature.

Joseph, *Real-Time Personal Computing for Data Acquisition and Control*

Part II: Engineering Laboratory

Experiments to illusttate and complement the engineering lecture courses of the Third Year. The experiments are designed to teach students to analyse a technical situation, to reach logical conclusions from observations and to communicate findings in the form of a technical report. Two hours per week during winter are for MEE321B Heat Engines Laboratory.

Perry and Green, *Chemical Engineer's Handbook (6th ed.)*
Taylor, *An Introduction to Error Analysis*

0 - 3 - 3 (Fall Term)
0 - 5 - 5 (Winter Term) Weight: 7

CME337B: Seminar
(CMF337B: Séminaire)

For students of the Third Year taking Chemical and Materials Engineering.

Technical, ethical, legal, environmental, and safety topics are covered by seminars given by staff and invited speakers. Topics will be chosen to encompass and extend the technical subjects of

the other courses so as to be useful to the working graduate engineer in the military.

0 - 0.5 - 0 (one seminar every second week) Weight: 0

CME341: Organic Chemistry
(CMF341: Chimie organique)

For students of the Third Year taking Chemical and Materials Engineering or Honours Science (Chemistry concentration).

An introductory course in organic chemistry chiefly concerned with the structure, properties, reactions and synthesis of mono-functional aliphatic and aromatic compounds. Stereochemistry and reaction mechanism theory are integral parts of the course. A brief study is also made of infrared, nuclear magnetic resonance and mass spectroscopy, including the interpretation of spectra.

Simple preparations are performed in the laboratory. Methods of characterizarion and identification of organic compounds as well as spectroscopic methods of analysis are included in laboratory assignments.

The laboratory experiments are scheduled in the timetable as a three period block made up by adding together one lecture and two laboratory periods.

Solomons, *Organic Chemistry*
Roberts, Gilbert et al., *Modern Experimental Organic Chemistry*
Silverstein, Bassler and Morrill, *Spectrophotometric Identification of Organic Compounds*

3 - 2 - 5 (Fall Term)
2 - 2 - 4 (Winter Term) Weight: 14

CME345A: Materials Science: Metallurgical Laboratory
(CMF345A: Sciences des matériaux: laboratoire de métallurgie)

For srudents of the Third Year taking Chemical and Materials Engineering.

A laboratory course designed to illustrate and augment subject matter covered in CME353A including heat treatmenr, mechanical resting, casting, metallography, X-ray diffraction, phase diagrams and chemical analysis.

0 - 3 - 3 Weight: 3

CME353A: Materials Science: Metallurgy
(CMF353A: Sciences des matériaux: Métallurgie)

For students of the Third Year taking Chemical and Materials Engineering or Honours Science (Chemistry concentration).

Topics included are mechanical testing, binary and ternary phase equilibrium (thermodynamic background and graphics), metallography and optical microscopy, X-ray diffraction of single crystals and polycrystalline metals, solidification and grain growth, dislocation theory and plastic deformation, recovery, recrystallization and grain growth, commercial heat treatment practices, carburization and nitriding of steel. Particular reference is made to the metallurgy of iron and carbon steel, stainless steels, aluminum, magnesium and copper-based alloys as well as superalloys inrended for high temperature service in gas turbines. Common metal fabrication techniques and repair processes such as welding and brazing are presented. Important non-destructive testing techniques are covered and the principles of fracture mechanics are introduced.

Askeland, The Science and Engineering of Materials

3 - 0 - 3 (Fall Term) Weight: 6

CME360A: Environmental Sciences: Hazardous Materials
(CMF360A: Sciences de l'environnement: matériaux dangereux)

(Offered in alternate years).

An elective course for students of the Third or Fourth Year taking Arts.

The course is designed to assist the young officer in the role of Base Environmental Officer or Unit General Safety Officer, roles that the officer must fill regardless of Classification. Topics include the properties of flammable, corrosive, reactive, toxic and radioactive materials; handling and storage techniques; safe disposal methods of radioactive and non-radioactive wastes. The impact of various materials on living systems and the environment will be explored.

3 - 0 - 6 Weight: 6

CME362A: Environmental Sciences: Energy
(CMF362A: Sciences de l'environnement: énergie)

(Offered in alrernate years).

An elective course for students of the Third or Fourth Year taking Arts.

Traditional energy sources and the associated technology are reviewed including those of fossil resources, hydroelectric power, and nuclear fission. The required raw materials, their world-wide occurrence and distribution will be examined in a political, srraregic and economic context. Merhods ro derermine rhe Total Unit Energy Costs will be outlined and the various sources of energy compared economically. Novel energy sources including

solar, wind, geothermal, hydrogen and fusion are studied. Various aspects of the hydrogen economy will be explored. The environmental risks and social impact of large scale energy production are discussed.

3 - 0 - 6 Weight: 6

CME364B: Military Chemistry: Munitions and Chemical Defence
(CMF364B: Chimie militaire: munitions et protection chimique)

(Offered in alternate years).

An elective course for students of the Second, Third or Fourth Year taking Arts.

The course will deal, in a largely qualitative manner, with either ballistics and ammunition or nuclear, biological and chemical (NBC) defence.

Topics to be covered in ballistics and ammunition will be ammunition design including initiation and propulsion and warheads for the attack of armour, aircraft structures and personnel. Protection in the form of vehicle and personal armour will also be discussed.

Topics to be covered in NBC will be the nature, physiology and pathology, prophylaxis, detection and decontamination of chemical and biological agents, as well as the effects of nuclear weapons on vehicles, structures and personnel. Protective measures to counter NBC agents will also be discussed.

3 - 0 - 6 Weight: 6

CMF366B: Environmental Sciences: Impact of Technology on the Environment
(CMF366B: Sciences de l'environnement: technologie et son impact sur l'environnement)

(Offered in alternate years).

An elective course for students of the Third or Fourth Year taking Arts.

The concept of energy is introduced by discussing the definition, terms, units, use, resources, conversion and conservation. The laws of thermodynamics, temperature, heat transfer, heat engines and heat pumps are briefly covered. Conventional energy sources (fossil, hydroelectric, fission) are studied as well as alternate sources (solar, wind) and currencies (electricity, hydrogen). The environmental impact of these sources is included. Group seminars on specific topics, such as energy sources and uses of interest to DND, are presented.

3 - 0 - 6 Weight: 6

CME381: Applied Thermodynamics and Heat Transfer
(CMF381: Thermodynamique appliquée et transfert de chaleur)

For students of the Third Year taking General Science.

Fall Term portion similar to that of CME311; Winter Term portion similar to Part II of CME301.

2_ - 0 - 3 (Fall Term)
2 - 0 - 3 (Winter Term) Weight: 9

CME385B: Biochemistry and Microbiology for Environmental Science and Engineering
(CMF385B: Biochimie et microbiologie de l'environnement)

For students of the Third Year taking Chemical and Materials Engineering. An elective course for students taking Honours Science or Genetal Science.

This course involves the basic principles of chemistry, biochemistry and microbiology applied to environmental systems and problems. The fundamentals and principles of biochemistry, including importanr biomolecules, bioenergetics and kinetics are discussed. A systematic and quantitative description is given for the necessary inorganic and organic reactions in aerobic and anaerobic media, biokinetics, medium formularion, growth rates and population dynamics, sterilization and genetic engineering. Applications include waste water treatment, bioremediation, fermentation processes and the design and analysis of bioreactors.

Bailley & Ollis, 1986 *Biochemical Engineering Fundamentals*
Brock, Madigan, Martinko & Barker, *Biology of Microorganisms*
Lehninget, Nelson & Cox, *Principles of Biochemistry.*

3 - 0 - 3 Weight: 6

CME405: Mass Transfer Operations
(CMF405: Opérations de transfert de matière)

For students of the Fourth Year taking Chemical and Materials Engineering.

This course in unit operation design concentrates primarily on materials separation and purification in fluid systems. Military applications are found in fuels processing, pollution abatement, undersea and space life support systems, chemical and biological defence, and other areas of ultimate defence significance. Environmental applications are found in air pollution abatement.

The following topics in mass transfer are included: molecular and eddy diffusion, mass transfer coefficients, interphase mass transfer, and mixing.

Phase equilibrium behaviour and correlations are reviewed and exrended from an engineering poinr of view. Equipmenr design, performance, and efficiency are examined in both stagewise and conrinuous conracting. Generalized design equations are derived and applied. Individual separation techniques are studied, with gas absorption and fractional distillation emphasized because of rheir prime imporrance in fluid system separations. Orher separarion rechniques, including adsorption, liquid-liquid and solvent extraction, and membrane separarions are also covered.

Treybal, *Mass Transfer Operations (3rd ed.)*

2 - 0 - 2 (fall term)
2 - 0 - 2 (winter term) Weight: 8

CME407A: Reaction Engineering
(CMF407A: Génie des réactions)

For students of the Fourth Year taking Chemical and Marerials Engineering. An elective course for students taking Honours Science or General Science.

This course builds on the material of CME317B and introduces students to the analysis and design of chemical reactors as employed in materials conversion and purification systems.

Homogeneous and heterogeneous reactions in single ideal batch and flow reacrors, and in reactor combinations, are studied. The analysis of real reactors is introduced. As part of the design function, optimization of reactor performance is introduced.

Levenspiel, *Chemical Reaction Engineering*

3 - 0 - 3 Weight: 6

CME409B: Combustion and Explosion Engineering
(CMF409B: Génie de la combustion et d'explosion)

Elecrive for srudents of the Fourth Year taking Chemical and Materials Engineering.

The study of the physical and chemical processes associated wirh applied combustion science rhat include concepts from thermodynamics, chemical kinetics, fluid mechanics, mass transfer and hear transfer. Also studied are pre-mixed and diffusion flames, combustion suppression and combustion pollutants.

An inrroducrion is given ro energeric materials, explosions and gun propellanrs.

Kanury, *Introduction to Combustion Phenomena*

3 - 0 - 3 Weight: 6

CME413B: Systems Analysis: Modelling and Optimization
(CMF413B: Analyse des systèmes: simulation et optimisation)

For students of the Fourth Year taking Chemical and Materials Engineering. An elective course for students taking Honours Science.

The formulation of mathemarical models from word statements of engineering problems and digital computer simulation are emphasized in this course. The studenrs are inrroduced ro the methods of computer simulation of engineering sysrems as used wirhin rhe industry, for rhe prediction of the (steady-srare) behaviour and performance of various processes and sysrems of contemporary and future significance to the Canadian Forces. Several modern optimization techniques are studied and applied to solve oprimization problems by numerical methods on computers. Economic models are examined for process systems in terms of the relationships between physical and economic parameters.

Mickley, Sherwood and Reed, *Applied Mathematics in Chemical Engineering*
Riggs, *Introduction to Numerical Methods*

3 - 0 - 3 Weight: 6

CME415A: Control Systems and Instrumentation
(CMF415A: Systèmes asservis et appareils de mesure)

For students of the Fourth Year taking Chemical and Materials Engineering.

This course emphasizes rhe basic concepts of conrrol sysrem analysis. Topics include: review of the Laplace transforms; transfer functions and responses of open-loop systems; measurement rechniques; analysis of linear closed-loop sysrems including control system, closed-loop rransfer funcrions, rransient response and stability; frequency-response methods; direct digital control (DDC) covering the functions of digiral compurers for control of indusrrial processes, analysis of sampled data with z-transform and modified z-transforms, pulse transfer function, sampling period, response and stability of open and closed-loop sampled systems.

Practical examples are selected from various courses in the programme.

Coughanour and Koppel, *Process Systems Analysis and Control*
Stephanopoulos, *Chemical Process Control*

3 - 0 - 3 Weight: 6

CME417: Design Project
(CMF417: Projet de fin d'études)

For students of the Fourth Year taking Chemical and Materials Engineering.

The purpose of this course is to permit each engineering student, normally working as one of a group, to participate in the engineering design of a process or system. Emphasis is placed on design techniques, on the integration of material taught in previous science and engineering courses, on design project organization and administration, and on economic evaluation of the system being designed. Ethical concerns such as safety, environmental and societal impact of engineered systems are also integral parts of the projects. The course includes two oral presentations as well as a written technical report that develop the student's skill in oral and written communication.

Design projects are selected, where possible, based on current and foreseen engineering applications in the Canadian Forces which fall within the scope of the programme, and may involve direct liaison with DND technical establishments and directorates.

Peters and Timmerhaus, *Plant Design and Economics for Chemical Engineers (3rd ed.)*
R.A. Day, *How to Write and Publish a Scientific Paper, ISI Press 1979.*

0 - 2 - 2 (Fall Term)
0 - 4 - 4 (Winter Term) Weight: 9

CME421: Engineering Laboratory
(CMF421: Laboratoire de génie)

For students of the Fourth Yeat taking Chemical and Materials Engineering.

Experiments to illustrate and complement the engineering lecture courses of the Fourth Year. The experiments are designed to teach students to analyse a technical situation, to reach logical conclusions from observations and to communicate findings in the form of a technical report.

Perry and Green, *Chemical Engineer's Handbook (6th ed.)*
Taylor, *An Introduction to Error Analysis*

0 - 3 - 3 (Fall Term)
0 - 3 - 3 (Both Terms) Weight: 6

CME425: Materials Engineering: Polymers and Materials Selection
(CMF425: Génie des matériaux: polymères et choix des roatériaux)

For students of the Fourth Year taking Chemical and Materials Engineering. An elective course for students taking Honours Science.

Part I: Polymers

A course in polymer science, technology and engineering, including the chemistry and kinetics of polymerization, polymetization processes, characterization of polymers, mechanical properties of polymers, and fabrication processes. Selected topics in industrial and engineering plastics include reinforced plastics and composites as well as elastomers.

Rodtiguez, *Principles of Polymer Science (3rd ed.)*

Part II: Materials Seminar

Students and staff will participate in seminars on metallic, ceramic, composite and polymeric materials. Students will be expected to ptepare and present a seminat on a selected topic and participate in post presentation discussions. The intent is to synthesize topics covered in foregoing courses with a view to developing an ability to make rational choices in materials selection.

3 - 0 - 3 (Fall Term)
1 - 1 - 2 (Winter Term) Weight: 9

CME427: Corrosion and Electrochemical Power Sources
(CMF427: La corrosion et sources d'énergie électrochimique)

For students of the Fourth Year taking Chemical and Materials Engineering. An elective course for students taking Honours Science.

The course covers the fundamentals of electrochemistry and considets their application in corrosion control as well as in the understanding of electrochemical energy storage systems. Fundamental topics include: electrochemical transference, ionic mobility, conductivity; thermodynamics of ions and electrochemical reactions as well as Pourbaix diagrams; polarization and electrochemical kinetics influenced by charge transfet and mass transpott; mixed potential diagrams in the understanding of competing electrochemical reactions.

Practical material in relation to corrosion is introduced where appropriate to illustrate the foregoing principles and includes cathodic and anodic protection, passivity, use of inhibitors and coatings; kinetics of scale growth in high temperature corrosion, and materials selection in relation to economic factors.

Engineering materials in relation to power sources include construction of important primary and secondary cells as well as fuel cells. Specific reference is made to energy and power density, maintenance, service life as well as cost considerations.

Prentice, *Electrochemical Engineering Principles*
Trethewey & Chamberlain, *Corrosion for Science and Engineering*
Bagotsky and Skundin, *Chemical Power Sources*

3 - 0 - 3 (Fall Term)
2 - 0 - 2 (Winter Term) Weight: 10

CME437B: Seminar
(CMF437B: Séminaire)

For students of the Fourth Year taking Chemical and Materials Engineering.

Technical, ethical, legal, environmental and safety topics are covered by seminars given by staff and invited speakers. Topics will be chosen to encompass and extend the technical subjects of the other courses so as to be useful to the working graduate engineer in the military.

0 - 0.5 - 0 (one seminar every second week) Weight: 0

CME440: Special Topics
(CMF440: Étude de sujets spécialisés)

An elective for students in the Fourth Year taking Materials Science, and General Science.

This course will consist of topics selected from the subject areas of inorganic materials, polymeric materials, organometallic chemistry, molecular spectroscopy, electrochemistry and corrosion, adsorption among others.

3 - 0 - 6 Weight: 12

CME441A: Materials Engineering: Laboratory
(CMF441A: Génie des matériaux: laboratoire)

For students of the Fourth Year taking Chemical and Materials Engineering or Honours Science (Chemistry concentration).

A laboratory course in which the emphasis is on the use of instrumental methods for the analysis and characterization of materials.

1 - 3 - 5 Weight: 5

CME452: Materials Science: Materials and Physics of the Space Environment
(CMF452: Sciences des matériaux: matériaux et physique de l'environnement spatial)

For students of the Fourth Year taking Space Science. An elective for students in the Fourth Year taking Honours Science or General Science.

Part 1: Space Environment

An introduction to the physics of the space environment is presented that includes basic plasma physics, formation and dynamics of the solar wind and interplanetary magnetic field, structure and origin of the geomagnetic field, structure and chemistry of the neutral atmosphere, dynamics of the ionosphere, and effects of the environment on spacecraft operations. The environmental factors of vacuum, temperature extremes, radiation, atomic oxygen, micrometeoroids and space debris that affect the performance of materials are discussed.

Part 2: Performance of Materials

The effects of the space environment on properties of various materials are studied. The impact of the space environment on metals, ceramics, polymers and composites is considered to include an examination of the design and performance requirements. Comparisons of the effectiveness of the various materials in space are reviewed.

2 - 0 - 2 (fall term)
2 - 0 - 2 (winter term) Weight: 8

CME485B: Waste Treatment Processes
(CMF485B: Traitement des rejets)

An Elective course for students of the Fourth Year taking Chemical and Materials Engineering, Honours Science, and General Science.

This course begins with characterization of the sources, properties and volumes of solid, liquid and gaseous wastes originating from industrial and domestic sources. Studied are their treatment and associated costs by means of individual unit operations as well as by integrated systems of physical, chemical and biological processes. Among the topics studied are waste gases to include atmospheric contamination, dispersal and treatment; waste solids and their degree of toxicity; technological methods to manage industrial and municipal waste to include recycling, incineration, pyrolysis, biological treatment, chemical stabilisation, encapsulation, and long term storage of radioactive materials. An introduction is given to the protocol of contaminated site investigation and remediation, and to Canadian legislation, regulations and guidelines for dealing with hazardous and non-hazardous wastes. Case studies are presented.

Vesilind et al., 1990 *Environmental Pollution & Control*
Droste, 1997, *Theory and Practice of Water and Wastewater Treatment*

3 - 0 - 3 Weight: 6

NEE401: Nuclear Science and Engineering
(GNF401: Sciences et génie nucléaires)

For students of the Fourth Year taking Chemical and Materials Engineering. An elective course for students of the Fourth Year taking Honours Science or General Science.

Atomic structure, radioactive decay and nuclear reactions, including the fission process, are discussed. The interaction of radiation with matter, radiation detection and measurement, shielding, health physics and safety are studied. Nuclear reactors are covered under the topics of reactor types and components, neutron behaviour, criticality and steady-state operation, and reactor kinetics and control. A survey of the nuclear fuel cycle, reactor safety and energy conversion, electricity production, thermonuclear fusion and military applications completes the course.

Friedlander, Kennedy, Macias and Miller, *Nuclear and Radiochemistry, 3rd Ed.,* Wiley 1981
Glasstone and Sesonske, *Nuclear Reaction Engineering*
H.W. Bonin, *Health Physics and Radiation Protection,* RMC-CMR 1990.

2 - 0 - 2 (fall term)
2 - 0 - 2 (winter term) Weight: 8

GRADUATE STUDIES AND RESEARCH

For graduate courses see the Calendar of the Graduate Studies and Research Division.

CHEMICAL AND MATERIALS ENGINEERING

Chemical and Materials Engineering is a chemically-oriented engineering programme emphasizing energy and materials, leading to the degree Bachelor of Engineering in Chemical and Materials Engineering. The main emphasis is on all energy sources, including nuclear, and their utilization; on materials, including plastics, polymers, metals, and composites; and on related topics, such as electrochemical power sources and corrosion engineering.

The Chemical and Materials Engineering degree programme is headed by a Professor-in-Charge, who reports directly to the Dean of Engineering. The programme is administered by the Chemical and Materials Engineering Committee, of which the Professor-in-Charge is Chair.

CHEMICAL AND MATERIALS ENGINEERING COMMITTEE

CHAIR - B.J. Lewis, BSc, MEng, PhD, PEng, Professor, Professor-in-Charge, Chemical and Materials Engineering.

MEMBERS - W.S. Andrews, CD, rmc, BEng, MEng, PhD, PEng, Assistant Professor.

L.G.I. Bennett, CD, rmc, BEng, MASc, PhD, PEng, Professor

M.J.B. Evans, BSc, PhD, CChem(UK), FRSC(UK), Professor.

J.P. Laplante, BSc, PhD, Professor and Head.

R.E. Mann, rmc, BSc, MSc,PhD, FCIC, PEng, Professor.

W.T. Thompson, BASc, MASc, PhD, PEng, Professor.

R.D. Weir, CD, BSc, DIC, PhD, FCIC, CChem(UK), FRSC(UK), Peng, Professor.

The Chemical and Materials Engineering Committee is responsible to the Dean of Engineering for the curriculum of the Chemical and Materials Engineering programme, for its engineering accreditation, and for representing and protecting the interests of the students enroled in the programme. It reports, through its Chair, directly to the Dean of Engineering.

ACCREDITATION

The baccalaureate degree programme in Chemical and Materials Engineering is accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers, and is recognized by the Chemical Institute of Canada and the Canadian Society for Chemical Engineering as qualifying its graduates for full membership status.

COURSE OF STUDY

The prescribed course of study for students taking Chemical and Materials Engineering is set out in the tables under "Course Outlines" as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 11
Fourth Year	Table 20

COURSE DESCRIPTIONS

Course descriptions for the individual courses comprising the programme are listed in the calendar under the departments concerned. In the case of courses carrying a CME or NEE designation, the listing is under the Department of Chemistry and Chemical Engineering, which is the major department associated with the programme.

DEPARTMENT OF CIVIL ENGINEERING

Professor Emeritus - J.S. Ellis, BSc, MEng, PhD, PEng.
Ptofessot Emetitus - D.W. Kirk, CD, ndc, BSc, MSc, PhD, PEng.
Professot and Head of the Department - M.A. Erki, BASc, MASc, PhD, PEng.
Professor - G. Akhras, DipIng, MScA, PhD, PEng.
Professor - R.J. Bathurst, BSc, MSc, PhD, PEng.
Associate Professot - A.N.S. Beaty, BSc, PhD, CEng, MICE, PEng.
Associate Professot - J.H.P. Quenneville, rmc, BEng, MEng, PhD, PEng.
Associate Professor - J.A. Stewart, CD, rmc, BEng, MASc, PhD, PEng.
Assistant Professor - Major J.L.C. Bellerose, CD, rmc, BEng, MEng, PEng.
Assistant Professot - J.A. Héroux, BEng, MIng, PEng.
Assistant Professor - P. Lamarche, BASc, MASc, PhD, PEng.
Assistant Professor - M. Tétreault, BIng, MScA, PhD, PEng.
Lecturer - Captain G. Sauvé, BEng, MEng.
Technical Officet - D.A. Young, CET.
Reseatch Associate - M. Knight, BSc, MSc, PhD
Research Associate - R. Tanovic, BSc, MSc, PhD

ACCREDITATION

The baccalaureate degree programme in Civil Engineering is acctedited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers.

COURSES OF STUDY

The ptesctibed coutse of study for students taking Civil Engineering is set out in the tables undet "Course Outlines" as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 12
Fourth Year	Table 21

LABORATORIES AND EQUIPMENT

The laboratory experiments and exercises are designed to ptovide the students with ptactical experience in handling field, office and laboratory equipment used in the civil engineering profession.

The teaching laboratoties ptovide equipment to permit groups of three or four students to conduct experiments in structural engineeting, soil mechanics, pavement matetials, asphalt technology, hydrology, water supply, wastewater treatment, and envitonmental engineering and to conduct exercises in surveying, photogrammetry and traffic engineering.

The Department's equipment includes:

Structural Engineering

Six electronic data acquisition systems with PC's; MTS loading system with 1000 kN, 500 kN, 2 @ 250 kN and one 50 kN capacity pistons; numerous universal testing machines of 900 kN, 550 kN, 275 kN and 135 kN capacities; one impact testet, four bench torsion testing instruments; three bench tension testing instruments; two electric concrete mixer; one screening plant; one vibrating table; one 1350 kN concrete cylinder testing machine; one freeze-thaw apparatus; two envitonment-controlled rooms.

Geotechnical Engineering

Soil testing drive tods and sampling spoons; Atterberg limit testing devices; sieves, hydrometers, and specific gravity apparatus; standard and modified Proctor compaction apparatus; Harvard miniature compaction appatatus; CBR equipment; consolidometers; unconfined, ditect shear and triaxial test apparatus; seismic tefraction surveying apparatus; computetized electronic data acquisition system; temperature & humidity controlled chamber; rigid and flexible wall permeaters; pressure plate and pressute membrane extractots; 10,000 kg shaking table.

Transportation Engineering

Apparatus for solubility, specific gravity, flash point, penetration, distillation, viscosity and ductility tests for bituminous materials, Marshall asphalt test equipment. Los Angeles abrasion machine, polished stone value machine, portable skid-tesistance tester and extensive equipment for testing road aggregates. Traffic counters and associated equipment.

Environmental Engineering

Instruments to determine water pH, turbidity, colour, specific ion concentration and bacteriological quality; balances; instruments for pollution studies including colorimetric and spectrophotometric devices; apparatus for wastewater analysis including BOD, COD, nutrient enrichment and toxicity, temperature contrlled tooms; atomic absorption spectrophotometet with flame and furnace for trace metals analysis; TOC analyser; ion chtomatograph; gas chromatographs, mass selective detector, to scan samples for organic contamination; neutron activation for metal analysis. Instruments to study pipe flow, open channel flow, ground water flow and hydrological phenomena. Laboratory and field equipment for vadose zone and groundwater investigations. Laboratory and field equipment for surface watet quality and ecological studies. A mobile laboratory equipped with a gas chromatograph with mass selective detector,

a drying oven, a centrifuge, class "A" fume hoods and various field testing equipment.
A remotely operated underwater vehicle for environmental investigation.

Surveying and Photogrammetry

Real-time and post-analytical differential GPS receiver equipment; total station, electronic and optical surveying equipment; Loran C radio navigation equipment; photogrammetric stereoscopes and parallax measurement equipment.

COURSE DESCRIPTIONS

GEE231B: Introduction to Mechanics of Materials
(IGF231B: Introduction à la résistance des matériaux)

For students of the Second Year taking Engineering.

Topics include a review of statics; stress and strain in axially loaded members; elastic torsion of circular members; bending stresses in beams; axial force, shear and bending moment diagrams; shearing stresses in beams; compound stresses; principal stresses; Mohr's circle for plane stress; combined loading.

Laboratory exercises include: tension, torsion, and bending tests.

2 - 2 - 4 Weight: 6

GEE235B: Introduction to Earth Sciences
(IGF235B: Introduction aux sciences de la terre)

For students of the Second Year taking Engineering.

Fundamentals of physical and structural geology. Mineral and rock identification and classification. Introduction to hydrogeology (occurrence, flow and quality of groundwater). Geological and Engineering aspects of soils in cold regions. Introduction to remote sensing techniques related to Earth resources management.

4 - 2 - 6 Weight: 8

GEE289B: Environmental Sciences: Impact of Science and Technology on the Environment
(IGF289B: Sciences de l'environnement: technologie et impact sur l'environnement)

An alternate course offered concurrently with HIE289B for students of the Second Year taking Engineering Science.

The natural biosphere of the Earth is first studied included in which are various cycles such as hydrological, sedimentary and gaseous. The impact of humanity on the environment is then examined, specifically the effect of atmospheric gases that lead to the greenhouse effect. The amelioration of the impact by humanity is discussed with emphasis on the generation and conservation of energy. Specific case studies involving environmental problems and impacts associated with engineering development are considered along with possible solutions.

Nisbet, *Leaving Eden to Protect and Manage the Earth*

3 - 0 - 3 Weight: 6

CEE303A: Strength of Materials
(GCF303A: Résistance des matériaux)

For students of the Third Year taking Civil Engineering.

Review of statics; two and three-dimensional linear elasticity; work and energy; bar and beam equations; various beam equations and analysis of beam-columns; nomographs; introduction to plasticity; yield criteria.

Laboratory exercises: compound bar, elastic deflections.

3 - 2 - 5 Weight: 8

CEE305B: Structural Theory
(GCF305B: Théorie des structures)

For students of the Third Year taking Civil Engineering.

Superposition principle; work and energy; Maxwell-Betti's theorem; column theory, virtual work, unit load method, Castigliano's theorem; influence lines; slope deflection method and matrix approach; moment distribution; and approximate methods for lateral and gravity loads.

Laboratory exercises: influence line, column buckling.

3 - 2 - 5 Weight: 7

CEE311B: Engineering Materials and Introduction to Steel and Timber Design
(GCF311B: Comportement des matériaux et introduction au dimensionnement en acier et en bois)

For students of the Third Year taking Civil Engineering.

Topics include: mechanical properties of steel, fatigue, brittle fracture, residual stresses, welding and flame-cutting, effect of residual stresses on column strength.

Steel design is introduced by topics such as limit state design; design of tension members, beams, and compression members, types of steel construction and the design of beam columns.

Timber design includes the property, use and preservation of timber; design of tension members, beams, columns, and connections.

Laboratory exercise include: lateral-torsional buckling of beams.

3 - 2 - 5 Weight: 7

CEE317A: Civil Engineering Analysis I
(GCF317A: Analyse de problèmes de génie civil I)

For students of the Third Year taking Civil Engineering.

Ordinary and partial differential equations that apply to Civil Engineering problems are derived. Analytical and numerical solutions of specific problems are developed. Problems studied include: structural vibration, beam deformation, groundwater flow, consolidation of soil and others developed in coordination with the needs of departmental courses.

Statistical analysis of data will also be studied.

The course is intended to develop the students' abilities in structured computer programmeming and in the application of the computer to Civil Engineering problems. A significant proportion of the course will entail computer use.

2 - 2 - 4 Weight: 6

CEE319B: Civil Engineering Analysis II
(GCF319B: Analyse de problèmes de génie civil II)

For students of the Third Year taking Civil Engineering.

This course represents a direct continuation of course CEE/GCF317A and simply extends the range of problems considered, whilst following the same approach of mathematical formulation, numerical solution and computer applications.

2 - 1 - 3 Weight: 5

CEE355B: Soil Mechanics
(GCF355B: Mécanique des sols)

For students of the Third Year taking Civil Engineering.

Physical properties of soils, classification, plasticity, mass-volume relationships, compaction.

Seepage, in-situ stresses and effective stresses, stress distribution.

Consolidation, shear strength.

Site investigation.

3.5 - 2.5 - 6 Weight: 8

CEE361: Geomatics
(GCF361: La géomatique)

For students of the Third Year taking Civil Engineering

Geomatics is the field of scientific and technical activities which, using a systematic approach, integrates all means used to acquire and manage spatially referenced data for help in decision-making. Topics include: exploitation of measurement equipment (DGPS, total stations, levels, stereoscopes, parallax bars, etc); assessment of measurement accuracies; analysis of coordinate control networks (least squares, intersection, resection, transformations, etc); remote sensing, digital map production and GIS; route construction surveys, volume (cut/fill) computations, and construction layout.

3 - 1 - 4 Weight: 13

CEE363B: Survey Field School
(GCF363B: Camp d'arpentage)

For students of the Third Year taking Civil Engineering.

Practical field work is an integral component of any survey course. The surveying field work provides the student with an opportunity to obtain a sound working knowledge of the various field methods and associated instruments, and of the field procedures used to meet widely varying accuracy requirements. Field practice promotes systematic habits of work, develops skill and speed in instrument manipulation and generally instills in the student the need to ensure that field execution is logically, expeditiously, methodically and accurately carried out.

This practical phase of the survey course includes exercises related to route surveys, the establishment of simple horizontal and vertical control networks, and culminates in the production of a topographical map. Following each exercise the students are required to produce all field notes, submit the necessary computations and adjustments, and prepare drawings.

Two weeks duration, following Winter Term examinations. Weight: 6

CEE385B: Introduction to Environmental Engineering
(GCF385B: Introduction au génie de l'environnement)

For students of the Third Year taking Civil Engineering.

The aims of this course are to introduce the students to the impact of man's activities on rhe environment, and to present ways to assess and limit such impacts.

Topics covered include basic environmental microbiology and chemistry, ecology and ecosystems, sources and control of water and air pollution, solid and toxic waste management, ground water pollurion, soil degradation, and environmental impact assessment of engineering projects.

Case studies and design problems will be assigned to give the students additional insight on some of the topics covered.

3 - 1 - 4 Weight: 7

CEE387A: Highway Design
(GCF387A: Routes)

For students of rhe third Year raking Civil Engineering.

Classification of soils as pavement subgrades, compaction, drainage, frost susceptibility and frost action. Introduction to analysis of stresses and strains in layered systems.

Concept of pavement failure, road materials - aggregates, binders, bituminous mixtures. Function and composition of pavement layers. Stabilization. Introduction to methods of design of rigid and flexible pavements.

Geomerric design of roads and intersections.

3 - 2 - 5 Weight: 8

CEE403A: Introduction to Concrete and Reinforced Concrete Design
(GCF403A: Introduction au dimensionnement en béton et béton armé)

For students of the Fourth Year taking Civil Engineering.

Topics include: concrete technology, introduction to limit states design for reinforced concrete structures, analysis and design of rectangular and T-beams; shear; torsion, bond srress and development of reinforcement.

Laboratory exercises include: mixing, admixtures, curing, aggregate tests, strength resrs for concrere; fabrication and testing of a reinforced concrete beam.

2 - 2 - 4 Weight: 6

CEE405A: Structural Analysis
(GCF405A: Analyse des structures)

For students of the Fourth Year taking Civil Engineering.

Stiffness method: plane and space rrusses; beams and generalized functions; plane and space frames; grids.

Finite element method: beams; triangular and quadrilateral elements for plane stress, plane strain and plares; plate buckling.

Programmeming exercises.

3 - 2 - 5 Weighr: 8

CEE415B: Reinforced Concrete Design
(GCF415B: Dimensionnement des structures en béton armé)

For students of the Fourth Year taking Civil Engineering.

Topics include: Building design. Loads, wind and earthquake effects, continuity in structures, continuous beams and girders; design of one-way, two-way and flat slabs; columns, footings; deflection and cracking of reinforced concrete members; seismic design. Bridge design; introduction to prestressed concrete.

A major assignment will be an integrated complete design of a 10-storey office building.

3 - 2 - 5 Weight: 8

CEE417A: Steel Design
(GCF417A: Construction en acier)

For studenrs of the Fourth Year taking Civil Engineering.

Topics include: connections; plate girders, composite construcrion, seismic design, multi-srorey buildings, steel bridges and failures.

3 - 1 - 4 Weight: 7

CEE457B: Foundations, Earthworks and Slope Stability
(GCF457B: Mécanique des sols appliquée)

For students of the Fourth Year taking Civil Engineering.

Bearing capacity; analysis and design of shallow and deep foundations; settlements, soil-structure intetaction.

Earth pressure theories; analysis and design of tigid, flexible and btaced tetaining structures.

Slope stability; analysis and design of cuttings and embankments, petfotmance of natural slopes.

Construction methods. Site investigation.

4 - 2 - 6 Weight: 10

CEE483A: Hydraulics and Engineering Hydrology
(GCF483A: Hydraulique et hydrologie appliquée)

For students of the Fourth Year taking Civil Engineering.

The aim of this course is to provide the student with an understanding of the principles of non-uniform incomptessible flow and to ptovide an introduction to engineeting hydtology.

Topics in hydtaulics include pipe netwotk analysis fot drinking water distribution; open channel flow fot waste water collection. The use of computet assisted procedures in water disttibution and sewetage design is included.

Topics in engineering hydrology include analysis of the hydrologic cycle, hydrograph analysis, runoff, flood routing, statistical data analysis and groundwatet flow.

3.5 - 1.5 - 5 Weight: 9

CEE485B: Sanitary and Environmental Engineering
(GCF485B: Techniques sanitaires et de l'environnement)

For students of the Fourth Year taking Civil Engineering.

The aim of this course is to provide the civil engineeting student with a basic understanding of sanitary engineeting ptocesses. The coutse includes analysis of water tteatment and wastewater tteatment. The course also includes topics illustrating the effects of pollutants on public health, the ecological system and the overall cost of pollution control.

The course includes sevetal labotatory exetcises to demonsttate the ptinciples taught.

4 - 2 - 6 Weight: 10

CEE489A: Transportation Planning
(GCF489A: Transports et planification)

Fot students of the Fourth Year taking Civil Engineering.

Characteristics of different modes of transpott. The land use/utban transportation planning process. Ttanspottation studies, data collection and analysis, demand models, forecasts. Traffic flow and capacity, level of service and freeway operations.

3 - 2 - 5 Weight: 8

CEE493: Civil Engineering Project
(GCF493: Projet de génie civil)

For students of the Fourth Year taking Civil Engineeting.

This coutse consists of a practical project undertaken by Fourth Year Civil Engineeting students. Topics ate selected ftom ptoposals submitted by the Department of National Defence and are intended to benefit the civilian and militaty population of Canada as well as ptovide practical field and design expetience for the student. The site work is completed by the entire class duting the Spring of the Third Year and detailed designs and engineering teports are ptepared by selected students duting the Fourth Year. The temaindet of the students are required to complete an engineering tepott on a subject of interest and approved by the Department. The tepott is intended to stress the importance of a proper literature search and laboratoty tests will notmally be carried out as part of the work, the results of which are to be properly integrated with the engineeting report. The results of the study will be ptesented orally.

The course will include lectures on report wtiting and infotmation retrieval. Five guest lectutes ftom industry ot the Military Engineering branch will be invited to discuss topics of interest with the class.

1 - 3 - 4 (Fall Term)
0 - 4 - 4 (Wintet Term) Weight: 13

GRADUATE STUDIES AND RESEARCH

Fot graduate courses see the Calendar of the Graduate Studies and Research Division.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Professor and Head of the Department - Y.T. Chan, BSc, MSc, PhD, PEng.
Associate Professor and Associate Head - C.N. Rozon, BSc, MSc, PhD, PEng.
Professor - D. Al-Khalili, BSc, MSc, PhD, PEng.
Professor , Dean of Academic Services - P.E. Allard, BSc, BASc, MSc, PhD, FEIC, PEng.
Professor - Y.M.M. Antar, BSc, MSc, PhD.
Professor (Adjunct) - M.M. Bayoumi, BSc, Dipl Math, Dr Tech Sc.
Professor, Dean of the Engineering Division - A.Y. Chikhani, BSc, MASc, PhD, PEng.
Professor - M. Farooq, BScEng, MTech, PhD, PEng.
Professor - B. Mongeau, BScA, MScA, DScA, PEng.
Professor, Principal and Director of Studies - B.J. Plant, OMM, CD, ndc, PhD, FEIC, FIEEE, PEng.
Professor - G.E. Séguin, BScA, MScA, PhD.
Professor - C.D. Shepard, BSc, MA, PhD, PEng.
Professor - J.D. Wilson, BSc, PhD, PEng.
Assiociate Professor - G. Ferland, BSc, MSc, PhD.
Associate Professor - M.H. Rahman, BSc, MSc, PhD, PEng.
Associate Professor and Director of Computing and Audio Visual Services - D.R. Smith, CD1, rmc, BEng, MEng, PhD, PEng.
Assistant Professor - F. Chan, BEng, MScA, PhD.
Assistant Professor - G. Boloix, EE, MSc, PhD.
Assistant Professor - C. D'Amours, BScA, MScA, PhD.
Assistant Professor - Major J.L. Derome, rmc, BEng, MEng.
Assistant Professor - G. Drolet, BSc, MSc, PhD.
Assistant Professor - Captain M.G. Keller, rmc, BEng, MEng, PEng .
Assistant Professor - Captain G.S. Knight, CD, rmc, BEng, MEng, PEng.
Assistant Professor - Major (Retired) C.M. Wortley, CD, BEng, MEng, PEng.
Lecturer - Captain J. Dolbec, rmc, BEng, MEng, PEng.
Lecturer - Captain J.C.H. Latour, rmc, BEng, MEng.
Lecturer - M. Nedvidek, BSc, Msc, PEng .
Technical Officer - P. Adam
Network Administrator - F. Couture, BSc, MSc.
Research Associate - M. A. Hanna, BSc, MSc, PhD.
Research Associate - Q. Ma, BEng, PhD.
Research Associate - A. Masoud, BSc, MSc, PhD.
Research Associate - Y. Sun, BSc, MSc.
Research Assistant - M. Hossain, BSc, MEng.
Research Assistant - S. Ismail, BSc, MSc .
Research Assistant - D. Kuhn, rmc, BEng.
Research Assistant - D. Saleem, BSc, MSc.

ACCREDITATION

The baccalaureate degree programmes in Electrical Engineering and Computer Engineeting are accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers.

ELECTRICAL ENGINEERING - COURSE OF STUDY

The prescribed courses of study for students taking Electrical Engineering are set out in the tables under Course Outlines as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 14
Fourth Year	Table 23

NOTE: Any Second Year course pattern in Engineering is acceptable for admission to Third Year Electrical Engineering provided the requisite standing in Chemistry, Mathematics and Physics is obtained. (See Academic Regulation 15.)

COMPUTER ENGINEERING COURSE OF STUDY

The prescribed courses of study for students taking Computer Engineering are set out in the tables under "Course Outlines" as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 13
Fourth Year	Table 22

Note: Any Second-Year course pattern in Engineering is acceptable for admission to Third Year Computer Engineering, provided the requisite standing in Chemistry, Mathematics and Physics is obtained (see Academic Regulation 15).

GRADUATE STUDIES AND RESEARCH

For graduate courses see Calendar of Graduate Studies and Research Division.

LABORATORIES AND EQUIPMENT

The department has a number of modern, well-equipped laboratories which permit the students to supplement their theoretical knowledge with practical experience. They allow the students to conduct experiments in electronics, communications and microwaves, energy conversion and machines, automatic

control and robotics, analog simulation; computer engineering: microcomputers, network and operating systems, 3-D graphics, VLSI circuit design and digital signal processing.

In addition, research rooms and facilities are provided for staff and post-graduate research. The principal research areas of the department are Communications and Microwaves, Automatic Control and Robotics, Power, Microprocessor applications and Embedded Computer systems, VLSI, Software Engineering and Real-Time Operating systems, with emphasis on applicability to the needs of the Canadian Armed Forces.

COURSE DESCRIPTIONS

GEE241B: Electrical Technology
(IGF241B: Technologie électrique)

For students of the Second Year taking Engineering.
Circuit elements (RLCM) and their volt-ampere relationships; Network theorems; Circuit analysis techniques using node voltage and mesh currents; Opamps as circuit elements; Steady state AC analysis, including 3-phase circuits; Ideal transformers; Power transfer and impedance matching. Electric filters: Lowpass, bandpass and high pass filters. Introduction to rotating machines: DC and AC machines and their characteristics.

4 - 2 - 6 Weight: 10

EEE301B: Applied Electromagnetics
(GEF301B: Electromagnétisme appliqué)

For students of the Third Year taking Electrical Engineering.
Review of vector operations and coordinate systems; experimental basis for electromagnetic theory; electrostatics and magnetostatics. Laplace's and Poisson's equations; solutions to boundary-value problems. Maxwell's equations; wave equation and plane waves; transmission lines; shielding and hazards.

3 - 2 - 5 Weight: 8

EEE307B: Computer Interfacing Techniques
(GEF307B: Techniques d'interface)

For students of the Third Year taking Computer or Electrical Engineering.
A course on interfacing techniques applicable to micro-computers. Topics include: description of bus; timing analysis; serial and parallel interfacing; polling and interrupts; counters and interval timers; A/D and D/A conversion; interfacing to magnetic devices; Direct Memory Access (DMA) techniques.

3 - 2 - 5 Weight: 8

EEE311B: Signals and Systems
(GEF311B: Signaux et Systèmes)

For students of the Third Year taking Electrical Engineering.
The aim of this course is to teach the student the basic communications theory and mathematical tools necessary to pursue a study of analog and digital communications. This course covers Fourier analysis of signals, a study of linear systems and filters, sampling theory, probability theory, random variables and random processes.

3 - 2 - 5 Weight: 8

EEE331A: Energy Conversion
(GEF331A: Electrotechnique I)

For students of the Third Year taking Electrical Engineering.
An introduction to energy conversion processes with emphasis on electromechanical devices. Topics include: a survey of energy-conversion methods, properties of magnetic materials and analysis of magnetic circuits; transformers; analysis of electromechanical systems; polyphase systems; performance of a.c. and d.c. electrical machines; introduction to power semiconductor circuits; modelling of physical systems.

3 - 2 - 5 Weight: 8

EEE341B: Electronic Devices and Circuits
(GEF341B: Dispositifs et circuits électroniques)

For students of the Third Year taking Electrical or Computer Engineering.
Introduction to electron devices; diodes, field-effect and bipolar transistors. Single stage small signal amplifier analysis and design. Logic families.

3 - 2 - 5 Weight: 8

EEE343A: Basic Network Analysis
(GEF343A: Analyse des circuits: Concepts fondamentaux)

For students of the Third Year taking Electrical Engineering or Computer Engineering.
Basic concepts of circuit theory; circuit analysis techniques; transient analysis of first and second order linear circuits; sinusoidal steady state analysis; transfer function and frequency response of networks and systems; application of Laplace transform to the solution of network and system equations; state variables, state equations.

3 - 2 - 5 Weight: 8

EEE345A: Logic Design
(GEF345A: Conception de circuits logiques)

For students of the Third Year taking Electrical or Computer Engineering.
This course reviews number systems and introduces digital codes. It covers basic combinational logic topics including Boolean Algebra, SSI logic gates, minimization techniques, and mixed logic theory. A detailed discussion of MSI logic functions such as decoders, multiplexers, comparators and arithmetic logic units follows. The course introduces the concepts of sequential logic and digital memory with material on latches, flip-flops and registers. Classical and Algorithmic State Machine design procedures for, and problems with synchronous, sequential machines are detailed. The course provides an introduction to hardware construction and computer aided simulation tools.

3 - 2 - 5 Weight: 8

EEE351A: Computer Organization and Assembly Language
(GEF351A: Architecture des ordinateurs et langage assembleur)

For students of the Third Year taking Electrical or Computer Engineering.
The microprocessor as a system building block; introduction to architecture. Microcomputer buses, address decoding, memory devices, simple input/output. Introduction to programmeming: instruction sets, addressing modes, assembly and machine-language programmeming, interrupts and vectors. Interfacing with peripherals: parallel and serial interface adapters, interrupt requests and handshakes.

3 - 2 - 5 Weight: 8

EEE365B: Modeling and Simulation of Digital Systems
(GEF365B: Modélisation et simulation des systèmes numériques)

For students of the Third Year taking Computer Engineering.
A digital hardware design course employing contemporary tools and methods for VHSIC (Very High Speed Integrated Circuits). Topics include a review of fundamental concepts, system level design, functional abstraction and decomposition, partitioning, documentation. VHDL, VHSIC Hardware Description Language, is introduced and then used to support this design methodology. Students first analyze and design combinatorial and sequential circuits, then use this experience to design complex digital systems including intelligent memory parts, microsequencets, microcontrollers, device controllers and microprocessors.
The course consists of integrated lectures, demonstrations, exercises, and laboratories. Students undertake extensive laboratory work to learn the VHDL language and practice with complex digital systems design.
Prerequisite: Block structured high level language programmeming course (CSE365 or equivalent), introductory logic design course (EEE345 or equivalent) or permission of the department.

3 - 2 - 5 Weight: 8

EEE371B: Principles of Operating Systems
(GEF371B: Principes des systèmes d'exploitation)

For students of the Third Year taking Computer Engineering.
Introduction to the C language, concurrent processes, inter-process communication, deadlock, scheduling, input/output, file systems, file servers, memory management, virtual storage management.

3 - 2 - 5 Weight: 8

EEE403A: Electronic Circuits
(GEF403A: Circuits électroniques)

For students of the Fourth Year taking Electrical or Computer Engineering.
High frequency small signal models of transistors; multistage amplifiers; cascade configuration. Non-ideal operational amplifier, use of negative feedback, effect of feedback on gain, input and output impedances, noise, distortion and parameter tolerances, applications. Positive feedback circuits: linear feedback oscillators, switching oscillators, multivibrators. Emitter coupled differential amplifier. Use of negative feedback with transistor amplifier. Current mirror, basic Opamp internal structure.

3 - 2 - 5 Weight: 8

EEE407A: Control Systems I
(GEF407A: Asservisseroents I)

For students of the Fourth Year taking Electrical Engineering.
Techniques for the modelling of control system components, state variable models for linear systems, transfer functions, analysis of complete control systems; stability, root locus; performance criteria; design of single-input single-output linear feedback control systems via, state and output feedback, principles of sample-data systems.

3 - 2 - 5 Weight: 8

EEE409B: Electronic Circuits for Communication
(GEF409B: Circuits électroniques de communication)

An elective course for students of the Fourth Year taking Electrical Engineering.
High-frequency models for semiconductor devices; tuned amplifiers; power amplifiers; coupling circuits and power gain maximization; compensation and stability; modulators and demodulators; high-frequency oscillators.

3 - 2 - 5 Weight: 8

EEE411A: Communication Theory
(GEF411A: Théorie de communication)

For students of the Fourth Year taking Electrical Engineering.
Modulation techniques, sampling theorem; AM, FM, PCM, signal-to-noise ratio; Hilbert transforms; digital communications: ASK, FSK, PSK, DPSK, probability of errors; pulse shaping and timing.

3 - 2 - 5 Weight: 8

EEE417A: Electromagnetic Propagation and Radiation
(GEF417A: Propagation et rayonnement électromagnétiques)

For students of the Fourth Year taking Electrical Engineering.
Review of Maxwell's equations and boundary conditions. Waveguide structure models. Resonant cavities. Introduction to fibre-optics. Antenna theory for element and arrays. A study of earth propagation modes such as ground waves, space waves and ionospheric reflections.

3 - 2 - 5 Weight: 8

EEE425B: Digital Control Systems
(GEF425B: Systèmes à asservissement numérique)

An elective course for students of the Fourth Year taking Electrical Engineering.
Sampling, z-transforms and transfer functions; state-space representations; stability; root locus; compensator design; computer control of feedback systems.

3 -2 - 5 Weight: 8

EEE429A: Electric Machines and Power
(GEE429A: Electrotechnique II)

An elective for students of the Fourth Year taking Electrical Engineering.
Review and extension of polyphase circuit theory and analysis. Symmetrical components. Power, energy, maximum demand, frequency and phase measurements. Characteristics of power transformers, a.c. and d.c. rotating machines, including two-machine systems. Electrical power generation and distribution. Survey of the economics of power systems. Methods of analysis of power transmission. Faults in interconnected systems.

3 - 2 - 5 Weight: 8

EEE431B: Digital Signal Processing
(GEF431B: Traitement numérique de signal)

An elective for students of the Fourth Year taking Electrical Engineering.
Discrete-time signals and systems. The z-transform. The discrete Fourier transform and fast Fourier transform. Digital filter design techniques. Classical power spectral estimation. Modern specttal estimation. Hardware implementation of digital signal processing algorithms.

3 - 2 - 5 Weight: 8

EEE433B: Satellite and Mobile Communication
(GEF433B: Communications mobiles et communications satellites)

An elective for students of the Fourth Year taking Electrical Engineering.
Spread Spectrum Systems, Fundamentals of Satellite Communications, Fundamentals of Cellular Mobile Communications. Error correction codes.

3 - 2 - 5 Weight: 8

EEE441B: Microwave Circuits, Devices and Systems
(GEE441B: Circuits, dispositifs et systèmes à micro-ondes)

An elective for students of the Fourth Year taking Electrical Engineering.
Introduction to microwave concepts and features. Microwave circuit analysis using impedance and scattering-matrix representations. Microwave sources, amplifiers and solid state devices. Microwave passive devices; filters, couplers, etc. Microwave integrated circuits (Microstrip) and CAD techniques. Microwaves receivers and transmitters. Overview of communication satellite systems with emphasis on RF components and link consideration. Introduction to radar basics, target cross-section, MTI and pulse doppler, weather radar, synthetic aperture radar and pulse compression techniques.
Prerequisite: EEE417A Electromagnetic Propagation and Radiation

3 - 2 - 5 Weight: 8

EEE445B: Power Distribution Systems
(GEF445B: Distribution de l'énergie)

An elective for students of the Fourth Year taking Electrical Engineering.
Analysis of steady-stare and transienr stability of interconnected machines and ttansmission networks including symmetrical component theory, circuit breakers and relay applications. Simple load flow studies. Principles of E.H.V. transmission lines and their interconnection through synchronous and asynchronous ties. D.C. generation an transmission.
Prerequisite: EEE429A: Electric Machines and Power

3 - 2 - 5 Weight: 8

EEE447B: Robotics
(GEF447B: Robotique)

An elective for students of the Fourth Year taking Electrical Engineering.
Survey of sensors and transducers for measuring physical quantities; measurement errors and calibration of analog and digital interfaces; sampling, quanrization; actuarors. Implementarion of representative microprocessor-based closed-loop sysrems selected from the areas of moror drives and roborics. Software implementarion of robor conrrol systems. Types of robot arms. Parh control and obsracle avoidance methods. Single processor and multi-processor distributed systems.

3 - 2 - 5 Weight: 8

EEE449B: Power Electronics
(GEF449B: Électronique de puissance)

An elective for students of the Fourth Year taking Electrical Engineering.
Characteristics of power semiconductor devices. Switching circuirs; rectifiers, voltage controllers, converrers, inverters and cycloconverrers. Polyphase circuirs, harmonics and modulation. Applications ro control of DC machine, synchronous and induction motors. Energy conversion.
Prerequisite: EEE331A: Energy Conversion

3-2-5 Weight: 8

EEE453A: VLSI Technologies and Design
(GEF453A: Conception et techniques d'intégration à très grande échelle)

An elective for students of the Fourth Year taking Compurer or Electrical Engineering.
IC technologies overview; MOS transistor; analysis and physical representation; digital CMOS inverter; IC lithography and fabricarion sreps; layout and layout verification; static CMOS; dynamic CMOS; I/O structures; digital subsystems; IC design flow and design tools.

3 - 2 - 5 Weighr: 8

EEE455: Electrical Engineering Design Project
(GEF455: Projet de génie électrique)

For students of the Fourth Year taking Electrical Engineering.
Under the supervision of a faculty member, groups of 2-4 students design and construct a prototype sysrem to satisfy selecred criteria against which its actual performance is evaluated. Oral progress reports are required along with a writren final report and formal examination by a board of staff members.

0 - 1 - 1 (Fall Term)
0 - 4 - 4 (Winter Term) Weight: 8

EEE457: Computer Engineering Design Project
(GEF457: Projet de génie informatique)

For students of rhe Fourth Year taking Computer Engineering.
See EEE455. Emphasis will be placed on software specificarion, documentation and management techniques.

0 - 1 - 1 (Fall Term)
0 - 4 - 4 (Winter Term) Weight: 8

EEE461A: Digital Communications for Computer Engineers
(GEF461A: Communications numériques pour ingénieurs en informatique)

For students of the Fourth Year taking Computer Engineering.
An introduction to spectral analysis and transmission of digital data. Topics include: Fourier series and transform; sampling, AM and FM modulation; analog and digital transmission of digital data; effects of noise and limited bandwidth on data transmission; rransmission media characterisrics; basic probability theory and coding theory.

3 - 2 - 5 Weight: 8

EEE463B: Digital Systems Modelling and Synthesis using VHDL
(GEF463B: Modélisation et synthèse de systèmes digitaux avec VHDL)

An elective course for students of the Fourth Year raking Computer Engineering.
A second level course in language directed design using VHDL. Techniques for the design and simulation of combinatorial and sequential logic systems are defined. Synthesis techniques are presented for a large class of combinatorial and sequenrial systems. Design issues and limitations of synthesis tools are discussed.

3 - 2 - 5 Weight: 8

EEE469A: Computer Organization
(GEF469A: L'architecture des ordinateurs)

For students of rhe Fourth Year taking Computer Engineering.
A course to familiarize the student with some aspects of computer hardware. Topics include: computer design methodology, processor and control design, memory and system organization. Input/ Ourput.

3 - 2 - 5 Weight: 8

EEE473B: Computer Communications
(GEF473B: Télématique)

For students of the Fourth Year raking Computer Engineering.
An elective course for students of rhe Fourth Year taking Electrical Engineering.
Review of compurer-communication rechniques and networks; circuir and packet switching; network topology; queueing and its application to networks; capacity assignment; routing and flow control; multiple-access techniques; network protocols; security and cryptography.

3 - 2 - 5 Weight: 8

EEE477B: Computer Graphics
(GEF477B: Graphomatique)

An elective for students of the Fourth Year taking Computer Engineering.
Graphics algorithms; display devices and techniques; performance of algorithms in software versus hardware for 2-D and 3-D system rendering; organization of graphics hardware; user interfaces for interactive graphics; graphics applications and standards.

3 - 2 - 5 Weight: 8

EEE479A: Object-Oriented Techniques
(GEF479A: Techniques de logiciel orienté objets)

An elective course for students of the Fourth Year taking Computer Engineering.
Introduction to Object-Oriented Analysis (OOA) and Design (OOD). Decomposition of problems into classes and objects. Managing complexity using data and procedural abstraction, encapsulation, and association. Introduction to rhe concepts of overloading, multiple inheritance and polymorphism. Linking analysis to design. Representing objects as tasks. Design criteria for class coupling, cohesion and clarity. Performance considerations. Introduction to C++. Implementing Object-Oriented designs using C++.

3 - 2 - 5 Weight: 8

EEE489B: Modelling and Simulation of Digital Systems
(GEF489B: Modélisation et Simulation des systèmes numériques)

An elective for students of the Fourth Year taking Electrical Engineering.
A digital hardware design course employing contemporary tools and methods. Topics include a review of fundamental concepts, system level design, functional abstraction and decomposirion, partitioning, documentation. VHDL is introduced and then used to support this design methodology. Students first analyze and design combinatorial and sequential circuits, then use this experience to design complex digital systems including intelligent memory parts, microsequencers, microcontrollers, device controllers and microprocessors.
The course consists of integrated lectures, demonstrations, exercises and labs. Students undertake extensive lab work ro learn the VHDL language and practice complex digital systems design.
Prerequisite: Block structured HLL programmeming course (CSE365 or equivalent), introductory logic design course (EEE345 or equivalent) or permission of the department.

3 - 2 - 5 Weight: 8

EEE491A: Software Engineering I
(GEF491A: Génie du logiciel I)

For students of the Fourth Year taking Computer Engineering.
The software engineering problem: programmeming in the large vs. programmeming in the small. Mathematical logic as a basis for specification. An overview of software development approaches.
A rational software process: requirements, decomposition into modules, module interface specifications, programme specifications, implementation, test plan, testing. Object-oriented analysis, design and implemenration. Language support for modules. Modules as finite srare machines. Debugging vs. inspection.

3-2- 5 Weight: 8

EEE493B: Software Engineering II
(GEF493B: Génie du logiciel II)

An elective for students of the Fourth Year taking Computer Engineering.
Software processes and alternative steps in the process. Reusable components. Changing software in response to new requirements. Software maintenance and reverse engineering. Version control and configuration management. Software metrics; predicting reliability. Software architecture. Trustworthy vs. reliable software. Tools that support software development.

3-2- 5 Weight: 8

EEE495B: Digital Systems Architecture
(GEF495B: Architecture de systèmes numériques)

For students of the Fourth Year taking Computer Engineering with hardware specialization.
A general overview on system design methodology and the design process of digital systems; review of IC technologies with comparative analysis; system timing; arithmetic algorithms and silicon implementation; regular structure architectures such as PLAs, memories and systolic arrays; testability and fault tolerance; design tools.
Students will be involved in designing a digital system including the silicon realization using CAE tools.

3 -2- 5 Weight: 8

EEE497B: Digital System Design
(GEF497B: Conception de circuits numériques)

For students of the Fourth Year taking Computer Engineering.
The course introduces students to Programmemable Logic Devices, their structure and application to digital circuit design. Digital simulation and hardware programmeming of PLDs are detailed. Asynchronous sequential circuit analysis and design procedures are covered. Asynchronous circuit hazards, races and oscillations are discussed.
The course discusses microprogrammeming concepts, computer fundamentals and the organization of the microprogrammed machine. Design considerations for the data path and the programme control unit are covered in detail. Several commercial microsequencers are studied in depth.

3 - 2 - 5 Weight: 8

EEE499B: Real-Time Embedded System Design
(GEF499B: Conception de systèmes intégrés en temps réel)

An elective for students of the Fourth Year taking Computer Engineering.
Definition, structure, and properties of embedded real-time systems. Typical applications. Review of related concepts, including tasking models, context switching, interrupts, and the ADA rendez-vous. Specification and design methods for real-time systems and applicable CASE (Computer-Aided-Software-Engineering) tools. Specification and verification of timing. Scheduling and schedulability analysis. Real-time operating systems, kernels, and programmeming languages. Fault tolerance, critical races, deadlock and livelock. Host target development. Distributed systems.

3-2-5 Weight: 8

DEPARTMENT OF MECHANICAL ENGINEERING

Professor Emeritus - J.G. Pike, rmc, BSc, MSc, PhD.
Professor and Head of Departmenr - M.F. Bardon, rmc, BEng, MEng, PhD, PEng.
Professor - R.J. Boness, DipAM, BSc, MEng, PhD, CEng, MIMechE.
Professor - W.E. Eder, Ing, MSc, PEng.
Professor - E.J. Fjarlie, BASc, MASc, PhD, PEng.
Professor - W.C. Moffatt, rmc, ndc, BSc, BSc, MSc, ScD, PEng.
Associare Professor S.H. Benabdallah, BEng, MScA, PhD, PEng.
Associate Professor - I.E. Boros, DiplIng, MASc, PhD, PEng.
Associate Professor - D.L. DuQuesnay, BASc, MASc, PhD, PEng.
Associate Professor - Lieutenant-Colonel (Retired) G.P.J. Lemieux, CD, rmc, BA, BEng, MEng, PhD, PEng.
Assistanr Professor - J.E.D. Gauthier, rmc, BEng, MEng, PhD.
Assisrant Professor - A. Jnifene, BASc, MASc, PhD.
Assistant Professor - Captain J.Y. Laramée, BScA, MSc, ing.
Lecturer - Lieutenant (N) D.H. Duerksen, BEng, MEng, PEng.
Lecturer - J. Maillette, BScA, MASc, ing.
Lecturer - Captain L. Meunier, rmc, BEng, MEng, PEng.
Lecturer - Captain D.C.M. Poirel, CD, rmc, BEng, MEng.
Lecturer - Captain D. Springford, CD, rmc, BEng, MEng.
Research Associare - P.R. Underhill, BSc, PhD.
Research Engineer - D.R. Hamilton, CD, rmc, BEng, BS, MSME, PhD, PEng.
Research Engineer - G. Wang, BE, ME.
Research Engineer - M. Zhou, BEng, MEng, PhD.

ACCREDITATION

The baccalaureate degree programme in Mechanical Engineering is accredited by the Canadian Engineering Accrediration Board of the Canadian Council of Professional Engineers.

COURSE OF STUDY

The prescribed course of study for Mechanical Engineering is set out in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 5
Third Year	Table 15
Fourth Year	Table 24

LABORATORIES AND EQUIPMENT

The department has a number of modern, well-equipped laboratories that permir students to supplemenr their theoretical knowledge with practical experience. These include major installations for the study of Heat Engines, Fluid Dynamics, Materials Science, ComputerAided Drawing, Computer-Aided Design and Manufacture, Dynamics, Electro Optics and Jet Propulsion. The department operates a large teaching and research machine shop.

In addition, research facilities are available for faculty and graduate student study in the areas of heat transfer, gas dynamics, turbomachinery, aerodynamics, variable-speed transmissions, reciprocaring engine performance, alternative fuels, composite materials, fatigue, structures, laser anemometry, and electro-optics.

COURSE DESCRIPTIONS

GEE263: Engineering Graphics
(IGF263: Sciences graphiques)

For studenrs of the Second Year taking Engineering.

Part I

Part I of this course is designed ro acquaint the student with the use of engineering graphics as a means of communicarion. Visualization and interpretation are emphasized by both paper drawing and compurer-aided methods. State-of-rhe-arr hardware and software is used to introduce rhe student to computer-aided drafting and design techniques. Topics studied are: sketching and instrument drawing, applied geometry, solid modelling, multi-view and pictorial projection, sectional views, auxiliary views, dimensioning and rolerancing.

Part II

Part II completes the study of rhe language of drawing wirh: threads and fasreners, detail and assembly drawing, reading and interpreting drawings. The use of computer-aided merhods is continued in this section. Technical schematics and engineering graphs and tables complete rhe course.

Giesecke et al., *Technical Drawing*

1 - 2 - 3 Weight: 8

GEE265A: Engineering Drawing
(IGF265A: Dessin industriel)

For students of the Second Year taking Science.

This course is similar in content to Part I of GEE263.

Giesecke et al., *Technical Drawing*

1 - 2 - 3 Weight: 4

MEE301B: Machine Design
(GMF301B: Eléments des machines)

Fot students of the Third Year taking Mechanical Engineering.

Previous work in mechanics, stress analysis, and metallurgy, as well as new knowledge tegarding safety factors, stress concentration factors and fatigue, is applied to the practical design of machinery. The course is oriented towards the specific design of various machine elements such as shafts, springs, cables, bolts, power screws, beatings, gears, belt dtives, brakes, etc.

Juvinall and Marshek, *Fundamentals of Machine Component Design*

3 - 2 - 5 Weight: 8

MEE303B: Engineering Design
(GMF303B: Principes du design en ingénierie)

Fot students of the Third Year taking Mechanical Engineering.

Approaches and procedures for handling closed and open-ended engineeting problems. Solutions required are to define mechanical systems and their components and machine elements. The procedures include consideration of design specifications, properties of the system to be designed, candidate alternative solutions, manufacturing, standards, acceptance requirements and maintenance. Representative ptoblems involving all stages from conception to drawings will be assigned.

3 - 1 - 4 Weight: 7

MEE311B: Fluid Dynamics
(GMF311B: Dynamique des fluides)

For students of the Third Year taking Mechanical Engineeting.

This course emphasizes the basic concepts of fluid dynamics. The course includes a study of the following: fluid properties; statics, fundamental equations of fluid motion, control volume concept applied to the continuity, momentum, and energy equations, the Eulet and Betnoulli equations; flow measuring devices; dimensional analysis; incompressible flow in closed conduits; inttoduction to the concepts of boundary layet, tutbulence, velocity disttibution in laminar and turbulent flow; flow around immersed objects.

The lectures are supplemented by problem assignments and by experiments conducted in the laboratory.

Gethart, Gross and Hochstein, *Fundamentals of Fluid Mechanics, 2nd ed.*

3 - 2 - 5 Weight: 8

MEE315A: Fluid Mechanics
(GMF315A: Mécanique des fluides)

Fot students of the Third Year taking Civil Engineeting.

Basic concepts of fluid mechanics are studied with emphasis on incomptessible fluids undet steady state conditions. Topics include physical propetties of fluids, ptessure measurements, fluid statics, fundamental equations of fluid motion (Continuity, Momentum and Energy), similitude and dimensional analysis, pipe flow and hydraulic tutbomachines.

The lectures are supplemented by tutorial and laboratory exercises.

Gerhart, Gross and Hochstein, *Fundamentals of Fluid Mechanics*

3 - 2 - 5 Weight: 8

MEE321B: Heat Engines Laboratory
(GMF321B: Laboratoire de machines thermiques)

Fot students of the Third Year taking Chemical and Materials Engineeting.

A laboratory course illustrating the general principles, operating charactetistics, and thermodynamic analysis of intetnal combustion engines, and steam and gas turbines.

This course is part of CME321.

0 - 2 - 2

MEE331A: Strength of Materials
(GMF331A: Résistance des matériaux)

For students of the Third Year taking Mechanical Engineering.

This intermediate course in strength of materials develops the relationships between stresses, strains, deformations, and external loads for linear elastic bodies. Emphasis is given to the following topics: stress and strain at a point, the principle of superposition, combined stresses, Mohr's circle. Other topics include indeterminate structures, non-symmetric bending, non-homogeneous beams in bending, shear flow in thin-webbed beams, etc.

Hibbeler, *Mechanics of Materials*

3 - 2 - 5 Weight: 8

MEE333A: Metallurgy and Engineering Materials
(GMF333A: Metallurgie et matériaux)

For students of the Third Year taking Mechanical Engineering.

This introductory course in materials science emphasizes the relationships between the structure and the properties of engineering materials, namely metals, plastics, ceramics, and composites. The effects of different strengthening mechanisms and thermal processing are studied. Failure mechanisms such as ductile and brittle fractures, fatigue, creep, and corrosion are covered.

The lectures are supplemented by tutorials, assignments on theory and applications, and laboratory experiments with cold working, heat treating and fracture mechanics.

Callister, *Material Science and Engineering - An Introduction*

3 - 2 - 5 Weight: 8

MEE335A: Shop Work and Production Processes
(GMF335A: Travaux d'atelier et procédés de production)

For students of the Third Year taking Mechanical Engineering.

The object of this course is to increase student knowledge, awareness and understanding of basic metal forming, machining and fabrication techniques. A combination of lectures, demonstrations, talks and hands-on experience will be used to familiarize the student with measuring techniques, tolerances, machine tool theory and operation, sheet metal work, welding, and manufacturing processes.

0 - 3 - 3 Weight: 3

MEE345B: Applied Mechanics
(GMF345B: Mécanique appliquée)

For students of the Third Year taking Mechanical Engineering.

This course builds upon the foundations established in PHE213. The principles of kinetics and kinematics are expanded into three dimensions to review Newton's Second Law, Work and Energy, and Impulse and Momentum. Practical engineering applications are used as examples to illustrate the theory and as problem assignments. Vector methods are used almost exclusively and the use of computer solutions is emphasized. Lagrange's formulation is emphasized. The course provides the necessary foundation for work in machine design, systems dynamics and robotics. These concepts are illustrated through a term project consisting of the dynamic modelling of a robot.

Greenwood, *Principles of Dynamics, 2nd Ed.*

3 - 2 - 5 Weight: 8

MEE351A: Thermodynamics I
(GMF351A: Thermodynamique I)

For students of the Third Year taking Mechanical Engineering.

A study of classical Thermodynamics by examining its application to practical devices such as engines and refrigeration systems. The First and Second Laws of Thermodynamics are studied in detail, and applied to the gases and two phase mixtures used in the devices studied.

The lectures are supplemented by problem assignments and experiments in the laboratory periods.

Moran and Shapiro, *Fundamentals of Engineering Thermodynamics, 2nd Ed.*
Keenan, Keyes, Hill, and Moore, *Steam Tables (SI Units)*
Keenan, Chao and Kaye, *Gas Tables: International Version*
Conversion Factors and Tables
Mark's Mechanical Engineers' Handbook

3 - 2 - 5 Weight: 8

MEE353B: Thermodynamics II
(GMF353B: Thermodynamique II)

For students of the Third Year taking Mechanical Engineering.

This course continues the study of classical thermodynamics begun in MEE351A. Further applications in power producing devices and refrigeration systems, mixtures and solutions, and compressible flow are studied in detail. The course is oriented throughout towards practical applications such as power

production and cogeneration, heating and air conditioning, humidification and dehumidification, flow in nozzles and diffusers, and normal shock waves.

The lectures are supplemented by problem assignments and experiments in the laboratory periods.

Moran and Shapiro, *Fundamentals of Engineering Thermodynamics, 2nd Ed.*
John, *Gas Dynamics, 2nd Ed.*
Keenan, Keyes, Hill, and Moore, *Steam Tables (SI Units)*
Keenan, Chao and Kaye, *Gas Tables: International Version Conversion Factors and Tables*
Mark's Mechanical Engineers' Handbook

3 - 2 - 5 Weight: 8

MEE383B: Measurement Devices and Systems
(GMF383B: Instrumentation et système de mesures)

For students of the Third Year taking Mechanical Engineering.

This course is designed to acquaint the student with modern sensors, instrumentarion, and methods of data recording and analysis. Low-pass and high-pass systems of first- or second-order are considered. Transfer functions of devices and instruments are developed and their response to specific inputs are studied. Factors such as precision, hysteresis, response, off-set, etc. are defined. Examples specific to the Canadian Forces are used whenever possible.

Doebelin, *Measurement Systems, 3rd Ed.*

3 - 2 - 5 Weight: 8

MEE403A/B: Design of Engineering Systems

An elective course for students of the Fourth Year taking Mechanical Engineering.

Approaches and attitudes in handling complex and novel engineering design problems, innovation, creativity, and entrepreneurship. Representative engineering problems are assigned to individuals or groups. The assigned problems vary widely in nature and extent. Solution processes require use of a variety of existing knowledge and engineering techniques from other courses, but also ingenuity and imagination. Design solutions must include consideration of requirements specifications, preliminary conceptual design, layout design, manufacturing plan, acceptance requirements and maintenance plan.

Mark's Mechanical Engineers' Handbook
Hubka and Eder, *Engineering Design*

3 - 1 - 4 Weight: 7

MEE405A/B: Computer-Aided Design and Manufacturing for Mechanical Engineers
(GMF405A/B: Conception et fabrication assistées par ordinateur pour les ingénieurs mécaniques)

An elective course for students of the Fourth Year taking Mechanical Engineering.

The aim of the course is to reach the principles of computer-aided design and manufacturing. Topics covered include hardware configurations, review of engineering graphics fundamentals, two-dimensional drafting, principles of three-dimensional modelling and familiarization with an advanced computer-aided design and manufacturing software package. Students will gain hands-on experience with computer-aided design hardware and software through classroom examples and assignments. Extensive use will be made of graphics terminals and a project will require the manufacturing of a machined part on a numerically controlled milling machine.

Onwebiko, *Foundations of Computer-Aided Design*
Lawry, *I-DEAS Master Series 1: Student Guide*

3 - 1 - 4 Weight: 7

MEE411A: Fluid Dynamics
(GMF411A: Dynamiques des fluides)

For students of the Fourth Year taking Mechanical Engineering.

This course continues and extends the study of Fluid Dynamics, initiated in MEE311. The fundamental equations of fluid motion are reviewed and extended. Potential flow is studied and conformal mapping and transformations are introduced. The Navier-Stokes equation is developed and applied to simple cases. The theory of the boundary layer is discussed and exact and approximate methods of solution for boundary layer flows are considered.

Gerhart, Gross and Hochstein, *Fundamentals of Fluid Mechanics, 2nd Ed.*

4 - 2 - 6 Weight: 10

MEE421B: Heat Transfer
(GMF421B: Transfert de chaleur)

For students of the Fourth Year taking Mechanical Engineering.

In this course, the fundamental concepts and mechanisms of heat transfer processes are stressed. The following topics are included: steady and transient conduction in one, two and three dimensions using analytical, numerical, graphical and analogue methods; heat

transfet with free and fotced convection in laminar and tutbulent flow; aerodynamic heating ftom high velocity flow.

The lectutes are supplemented by ptoblem and expetimental laboratory petiods.

Chapman, *Heat Transfer, 4th Ed.*

3 - 2 - 5 Weight: 8

MEE431A/B: Stress Analysis
(GMF431A/B: Analyse des contraintes)

An elective coutse for students of the Fourth Year taking Mechanical Engineering.

This is an advanced coutse in stress analysis, coveting vatious topics such as the theory of elasticity, the finite element method, totating disks, thick-walled pressure vessels, non-circultar shafts in torsion, failure theories, energy methods, and composite matetials.

Cook and Young, *Advanced Mechanics of Materials*
Budynas, *Advanced Strength and Applied Stress Analysis*

3 - 1 - 4 Weight: 7

MEE433A/B: Mechanical Behaviour of Advanced Materials
(GMF433A/B: Comportement mécanique des matériaux avancés)

An elective coutse fot students of the Foutth Year taking Mechanical Engineeting.

This course continues the study of engineeting matetials to covet plastics, ceramics, composites, and specialty alloys. The focus is on mechanical properties, uses, manufacturing and processing of these advanced materials. The applications of these materials in engineering ate also outlined. The effects of temperatute, environment, failute mechanisms and prevention are coveted.

The lectutes ate supplemented by laboratory experiments and demonstrations.

3 - 1 - 4 Weight: 7

MEE443B: Hydraulic and Pneumatic Feedback Control
(GMF443B: Asservissements hydrauliques et pneumatiques)

For students of the Fourth Year taking Mechanical Engineeting.

A first course in linear feedback control systems which logically follows MEE445A: Dynamic Systems. The material is coveted undet the following main topics: performance specification and preliminary design, stability ctiteria and techniques of feedback control. The examples and the ptoblems used to illustrate the theory will concentrate on hydraulic and pneumatic systems as used on current military hardware. Computers are used extensively fot the design of control systems and to carry out time-dependant simulations.

Hostetter, Savant and Stefani, *Design of Feedback Control Systems*

3 - 1 - 4 Weight: 7

MEE445A: Dynamic Systems
(GMF445A: Systèmes dynamiques)

Fot students of the Fourth Year taking Mechanical Engineering.

This course is a continuation of MEE345B. Topics coveted include: detivation and solution of equations of motion using Newtonian and Lagrangian methods, free and forced vibration of single and multiple degrees of freedom systems, time domain and frequency tesponse of cascaded electto-mechanical systems. The laboratory periods are used to perfotm detailed analyses of specific systems, and include extensive use of digital computers.

Cannon, *Dynamics of Physical Systems*

3 - 2 - 5 Weight: 8

MEE451A/B: Combustion Engines
(GMF451A/B: Moteurs à combustion)

An elective coutse for students of the Fourth Year taking Mechanical Engineeting.

Afiet a review of basic thetmodynamic and combustion ptinciples necessary for studying the topics of intetest, the lectures consider the design and operation of spark-ignition, Diesel, and gas-turbine engines. Some of the topics studied are: fuel and ignition systems; supercharging, combustion chambers; properties and perfotmance of fuels; sources and control of air pollution; alcohol, hydrogen, and other non-conventional fuels.

The lectures ate supplemented by assignments and laboratory expetiments.

Obett, *Internal Combustion Engines and Air Pollution*

3 - 1 - 4 Weight: 7

MEE457A/B: Compressible Flow
(GMF457A/B: Écoulements compressibles)

An elective course for students of the Fourth Year taking Mechanical Engineering.

This course continues the srudy of compressible flow thar was introduced in MEE353B - Thermodynamics II. The ropics include flow in subsonic and supersonic nozzles and diffusers, supersonic wind tunnels, shock tubes and one-dimensional unsteady flow, normal and oblique shock waves, oblique shock wave reflecrions, Prandrl Meyer Flow, flow in constanr area ducts wirh friction, heating and cooling, and rarefied gas dynamics. The course emphasizes the application of the principles covered to practical engineering problems.

The lectures are supplemented by assigned problems, computer exercises, and laboratory experiments.

John, *Gas Dynamics*
Keenan, Chao, and Kaye, *Gas Tables SI Units*

3 - 1 - 4 Weighr: 7

MEE461A/B: Aeronautical and Space Propulsion
(GMF461A/B: Propulsion aéronautique et spatiale)

An elective course for students of the Fourrh Year taking Mechanical Engineering.

Illustrarions of the application of the fundamental principles of fluid mechanics and rhermodynamics to the analysis of present-day and proposed propulsion sysrems. Topics covered include turbojers and ramjets; their associated components including compressors, combustors and turbines. Currenr developments in chemical, electrical and nuclear rockets are discussed and relared to space vehicle missions and requirements.

The lectures are supplemented by assigned exercises and laboratory problems in relared areas.

Hill and Peterson, *Mechanics and Thermodynamics of Propulsion, 2nd Ed.*

3 - 1 - 4 Weighr: 7

MEE465A/B: Tribology

An elective course for students of the Fourth Year taking Mechanical Engineering.

Among rhe ropics considered are: surface ropography, Herrzian conract stresses and deformation, friction and wear theories, lubricant properties and testing, hydrodynamic lubricarion, solution of Reynolds equarion, elasto-hydrodynamic lubrication, boundary lubrication, lubricity of aviation fuels, rolling conracr bearing design, bearing dynamics and a selection of tribological solutions to real engineering problems.

Halling, *Principles of Tribology*
Hamrock and Dowson, *Ball Bearing Lubrication*

3 - 1 - 4 Weight: 7

MEE467A/B: Aircraft Performance
(GMF467A/B: Performance des avions)

An elective course for students of rhe Fourth Year taking Mechanical Engineering.

This course will introduce the students to the analysis and methods used in the evaluation of aircrafr flight performance parameters from the aircraft design specifications. Topics covered will include the determination of flight ceiling, range and endurance, climbing and manoeuvring flight, take-off and landing parameters for turbine powered aircraft. Velocity hodographic presentations and energy state methods, manoeuvre envelope and wind effects will be analyzed.

Hale, *Introduction to Aircraft Performance, Selection and Design*
Asselin, *Aircraft Performance*

3 - 1 - 4 Weight: 7

MEE471: Engineering Project
(GMF471: Projet de génie)

For students of the Fourth Year raking Mechanical Engineering.

This course provides rhe student with the opportunity ro undertake a projecr of sufficient magnitude to include all essential elemenrs of an independent engineering srudy, under rhe supervision of a faculty member. Students are expected to perform a rhorough literarure survey on rheir selected topic, propose a plan of attack, prepare a schedule for rhe major phases of rhe project, design and build the apparatus and the instrumentation as required, inregrare theory taughr in previous engineering courses and acquire the new knowledge required for the analytical porrion of rhe project. Students submit three written reports to their project supervisor and make two oral presentations to classmares and faculty members during rhe course of the year.

0 - 3 - 3 (Fall Term)
0 - 6 - 6 (Winter Term) Weight: 10

GRADUATE STUDIES AND RESEARCH

For graduate courses, see the Calendar of the Graduate Studies and Research Division.

APPLIED MILITARY SCIENCE

Head of Department and Course Director - Colonel H.J. Marsh, CD, OMM, laic, plsc, pcsc, awc, BSc
Directing Staff - Lieutenant-Colonel D.E. Green, CD, ptsc, plsc, pcsc, BSc, MDA
Directing Staff - Lieutenant-Colonel J.E.J. Lotd, CD, plsc, pcsc, Bsc, MSc
Directing Staff - Lieutenant-Colonel J.E. Motrison, CD, ptsc, plsc, pcsc, BEng
Ditecting Staff - Lieutenant-Colonel E.R. Robinson, CD, tmc, plsc, pcsc, BSc, MEng, PEng

The Department of Applied Military Science is a depattment within the Faculty of Engineering and is responsible for the preparation, cootdination and ptesentation of the Land Force Technical Staff Coutse (LFTSC). The LFTSC is conducted by the Department in collaboration with the Departments of Chemistry and Chemical Engineering, Electrical and Computer Engineering, Mechanical Engineeting, Civil Engineering and Business Administration.

COURSE OF STUDY

The LFTSC is a 10-month course for commissioned officers of the Canadian Land Force which leads to the qualification: Land Force Technical Staff Officer. One course pet yeat is conducted; candidates for the course are selected by National Defence Headquarters.

The aim of the course is to educate and train selected Army officers to analyze and define operational equipment requirements and to manage the evaluation, acquisition and in-service support of land force equipment.

FACILITIES

The LFTSC is housed in a separate building which offers a 35-seat classroom, a 50-seat lecture theatre, syndicate rooms, staff offices, and a laboratory and work area for vehicles and weapons. All the offices, the theatre, the classroom and the syndicate rooms ate connected by a local area network which in turn is linked to the RMC network.

In addition, extensive use is made of RMC laboratory and library facilities.

COURSE DESCRIPTION

The LFTSC syllabus consists of Introductory Studies (Chemistry and Heat Transfer, Stress Analysis, Dynamics of Physical Systems, Optimization, Probability and Statistics, Waveform Analysis Techniques, Software Applications, Basic Electricity/Electronics/Power, Climates and the Environment, Materials); Nuclear, Biological and Chemical Defence; Defence Management (Management Theory and Practice, Economics of Defence, Decision Analysis, Decision Support Systems, Quality Management, Human Factors Engineering, System Effectiveness, Project Management, Ttials and Evaluations and Robotics); Communications; Information Systems; Vehicles and Mobility; Weapon Systems; Surveillance and Target Acquisition and a Course Project.

In the course, emphasis is placed on the practical application of technology to land fotce tactical equipment and systems. The LFTSC includes academic and military lecturers, seminat work, laboratories, demonstrations and exetcises. The course is supported by visiting lecturers from the Department of National Defence, the Canadian Forces, Research and Development agencies and from Industry. Extensive field studies are conducted at military R&D and industtial locations in Canada and the United States.

RMC LANGUAGE CENTRE

Director, Language Centre - K. Jensen, BA, MEd.
Senior Teacher - E. Bedrossian, BA, MA.
Senior Teacher - C. Paré, BA, BEd.
Language Teacher - S.D. Abboud, BComm, BA, DipEd, DEF, DSEF, DDMA, MA, MTS.
Language Teacher - J. Angi, BA, MA.
Language Teacher - N.A. Bérubé, LèsL.
Language Teacher - S. Bodner, BA, MEd.
Language Teacher - R.L.G. Charette, BA, BEd, MEd.
Language Teacher - R. Cormier, BA (Hist).
Language Teacher - Y. Côté, BA, LèsL, BEd.
Language Teacher - P. Dallain-Kennedy, BA, SpécEns.
Language Teacher - E. Labonté, BA.
Language Teacher - P.-A. Lagueux, BA, LèsL, MA, PhD.
Language Teacher - D. Lauzon, BA.
Language Teacher - J. McTavish, BA, BEd, MA, ARCT, Grad Diplome HR, Cert. Ed. Tech.
Language Teacher - P. Proulx, BA, BScSoc.
Language Teacher - J. Roux, BA, SpécL, LèsL.
Language Teacher - D. Ruta, BA, LèsL.
Language Teacher - A. Sauvé, BA, BPEP,BétL.
Language Teacher - D. Scherter, BA.
Language Teacher - N. Shirinian, BA, BPEd.
Language Teacher - G. Toussaint, BASpéc(Soc), BA(Esp), Cert.Ant.
Language Teacher - L. Trahan, BA, SpecL.
Language Teacher - C. Vachon, BA, BEd.
Language Teacher - E. Ward, LèsL, MA.
Language Teacher - J. Wolfe BA, MA, MAT ESL.
Resource Centre Coordinator - K. Doyle, BA, BEd.

As stated under "Second Language Training" in the general information section of this calendar where the policy concerning second language training is explained, all students who do not achieve the "exemption" level of bilingualism on initial testing are required to take second-language training.

The aim of the Language Centre is to enable students to function well in their second language as officers of the Canadian Armed Forces.

Every effort is made to ensure that students become bilingual in the shortest possible time. Classes are small, usually composed of eight students. Five periods, each lasting 45 minutes, are timetabled for each week of the academic year. The learning process is given a practical aspect by the frequent use of visual aids, including video recordings. Classroom activities are designed to promote a high level of participation by the student. Students who have not reached the "exemption" level by the end of their first year take an intensive summer course of about 200 hours.

Students who have not reached the exemption level are tested at the end of each academic year and the summer course to determine whether they have achieved a satisfactory rate of progress and to indicate to them and the Language Centre staff their actual competence in the language skills.

PHYSICAL EDUCATION AND ATHLETICS

Athletic Director and Head of the Department of Physical Education and Athletics - Mrs. J. Thibault, OMM, CD, BEd, BEdP
Varsity Manager - Mr. T.M. Taylor, CD, CYP, BA, BPEd.
Physical Education Manager - Mr. A. Cantin, CD, BEdP

FACILITIES AND EQUIPMENT

RMC's athletic facilities include four gymnasia with various combinations of basketball, volleyball, badminton and tennis courts; one indoor swimming pool; one weight training area; one indoor artificial ice arena; nine rugby/football/soccer fields; five outdoor tennis courts; two 400-metre cinder running tracks; one indoor rifle and pistol range; six squash courts, and two martial arts training rooms.

With its location on Lake Ontario, the College has excellent facilities for recreational sailing and boating.

In addition to the RMC facilities, use is made of nearby military athletic facilities which include an eighteen-hole golf course, a curling rink, four gymnasia, three sports fields and a ten-lane bowling alley.

Equipment is provided for participation in the Physical Education programme, varsity sports programme, representative teams, intramural sports programme and recreational club activities.

PHYSICAL EDUCATION PROGRAMME

Each cadet participates for two periods per week in the compulsory physical education programme which are twofold:

a. the development and maintenance of a high level of physical fitness which will enable each cadet to attain the required standard on the CMC physical fitness test; and

b. the development of an officer who is knowledgeable and experienced in fitness training methods, who is capable of performing a variety of sports skills and activities, and who has the ability to organize and administer athletic events.

Physical fitness testing takes place at the beginning, in the middle and at the end of each academic year.

PEE101

Practical instruction is given in physical fitness training methods, nutrition, aerobic conditioning, sports skills and combative activities. Instruction is also provided in basic and survival swimming to bring all students up to the Military Swim Standard.

PEE201

All students follow a common programme reviewing instruction in physical fitness training methods, and familiarizing themselves with various individual sports and team sports.

PEE301 and PEE401

All students will choose four elective activities: two in the fall term and two in the winter term. Over twenty different sport activities are offered including aquatics, learn to skate, badminton, basketball, broomball, rugby, hockey, softball, soccer, squash, tennis, and volleyball.

INTRAMURAL SPORTS PROGRAMME

The intramural athletic programme has a twofold purpose. First, it provides each cadet with the opportunity to develop skills and apply the principles which are taught in the physical education programme. Second, it provides each cadet with the opportunity to compete in a variety of sports activities on a biweekly basis.

The intramural programme is divided into team and individual sports. The team sports are organized into leagues, and all cadets who are not varsity athletes must participate in these leagues. Certain sports are conducted as Cadet Wing Championship events which are open to all cadets.

The fall term intramural programme offers activities such as soccer, hockey, aerobics, flag football, and softball, with Cadet Wing Championships being conducted in cross-country running and a regatta.

Included in the Winter Term intramural programme are badminton, floor hockey, ice hockey, indoor soccer, squash and volleyball with a Cadet Wing Championships being conducted in broomball.

The programme is organized on a seasonal basis. The fall programme runs from September to the end of November, and the winter programme from early December to the end of March. Responsibility for the day-to-day operation of the programme is given to the cadets themselves under the supervision of the physical education staff, thus affording them an opportunity to develop qualities of leadership. In addition to playing, cadets are expected to learn and carry out the duties of coaches, managers, team captains, game officials, and league convenors.

Each cadet is assessed on every phase of the programme and the cumulative assessment becomes part of his or her personal Service documents.

INTERCOLLEGIATE AND INTERUNIVERSITY ATHLETIC PROGRAMME

An extensive varsity team sports programme is offered at the Royal Military College for cadets capable of participating at a higher skill level.

RMC is a member of the Ontario Universities Athletic Association (OUAA) fot men's events including cross-country running, curling, fencing, rugby, hockey, swimming and track and field.

The College is a membet of the Ontario Women's Interuniversity Athletic Association (OWIAA) for ladies' events including cross-country running, fencing and swimming.

RMC has teams participating in the Ontario Colleges Athletic Association (OCAA); these include basketball (male), soccer indoor and outdoor (male and female), volleyball (male and female) and badminton (male and female).

RMC also competes regularly in biathlon, squash, judo, taekwondo, pistol, tifle, and karate. Additionally, RMC box horse display team has earned an excellent reputation for its outstanding and unique performance.

The intercollegiate and interuniversity programme is an extension of the physical education programme and thus contributes to the achievement of the overall aim by instilling a high degree of self-discipline, the desite to excel, and the willingness to sacrifice personal interest for coordinated team effort. The intercollegiate interuniversity programme also provides an opportunity for involvement with contemporary university and college students, thereby btinging the Royal Military College into the focus of the civilian community.

DRILL

Drill Sergeant Major - Master Warranr Officer J.G.C. Michaud, CD.
Drill Insrrucror - Petty Officer 2nd Class J.J.S. Morinville, CD.
Drill Instructor - Sergeant K.W. Taylor
Drill Instructor - Sergeant M.G. Ebacher, CD.
Pipe Major - Sergeant D.J. Smith
Drum Instructor Sergeant - Sgt. B.R. Ryckman, CD
Brass and Reed Instructor - Sgt. S. Gagnon, CD.

Presenr day scientific and technical knowledge demands that the Canadian Forces possess the highest standard of cohesion and efficiency. Drill is a powerful aid to the cementing of a firm foundation on which to build these requirements. It develops individual pride, mental alertness, precision, and esprir de corps which will assisr the Officer Cadet to carry out orders instinctively and immediately at all times.

The attainment of good discipline calls for a high developmenr of personal qualiries, parricularly self-conrrol and cooperarion. Drill and formal parades are designed ro develop these qualiries so thar rheir practice becomes habitual and will persist under the srrain of activiries in peace and war.

DRE101

To prepare cadets so rhey may participare as members, in rhe ranks, of the various ceremonial functions here at rhe College. Instrucrion in all foor and rifle drill is given. At the completion of each rerm, every cadet completes a practical test on his ability to carry our rifle drill.

2 periods a week (unril Ex-Cadet Weekend)
1 period a week (Both Terms)

DRE201

A continuarion of the basic movements with the rifle and instruction on ceremonial rifle exercises. Colours drill is instructed during the second rerm, after which the cader is expecred ro complete a colours drill test and compere in the Second Year colours drill competition.

1 period a week (Both Terms)

DRE301

Up until the completion of ex-cader weekend in October, cadets review all drill with the rifle, as well as drill on the march. Instruction is then provided on all rhe movements commonly employed with the sword. At the completion of the first rerm, all cadets are expected to pass the sword drill test. During the second rerm, cadets use their drill periods to prepare for the sword drill competition held amongst the Third Year class.

1 period a week (Both Terms)

DRE401

For those caders with appointments on the ex-cadet parade, a review of all sword drill movements is conducted. For those Fourth Year cadets who will be in the ranks, a review of rifle exercises is carried our. At the completion of ex-cadet weekend, all Fourth Year cadets prepare for the sword drill test, which takes place sometime in late November.

1 period a week (Borh Terms)

CANADIAN FORCES MILITARY COLLEGE

AN ACADEMIC DIVISION AND
CONSTITUENT COLLEGE OF THE
ROYAL MILITARY COLLEGE OF CANADA
KINGSTON, ONTARIO

DEAN OF THE CANADIAN FORCES MILITARY COLLEGE

R.G. Haycock, BA (WLU), MA (Waterloo) PhD (Western), Dean of Arts.

CONSULTANTS:

Arts Division - T.B. Vincent, BA (Dalhousie), MA, PhD (Queen's)

Science Division - R.E. Johnson, BSc (McMaster), BS, PhD (Penn)

GENERAL INFORMATION

BACKGROUND

In 1972, the Chief of the Defence Staff directed that, where appropriate, selected candidates for the University Training Programme - Officers (UTPO) and the University Training Programme - Non-commissioned Members (UTPNCM) should be sent to a Canadian Military College (CMC) as undergraduates. To accommodate these students, whose overall obligations would be different from those of the RMC officer-cadet, the Canadian Forces Military College (CFMC) was established as an Academic Division and Constituent College of RMC under the jurisdiction of the Senate, Faculty Council, and Faculty Board of RMC. The first CFMC students enrolled at the beginning of the 1973-74 academic year.

Past Deans of the CFMC have been:

1973-74:	Dr. J.B. Plant
1974-80:	Dr. W.S. Avis
1980-84:	Dr. W.F. Furter
1984-93:	Dr. D.W. Kirk

ROLE

The CFMC offers undergraduate studies leading to academic degrees for serving personnel of the Canadian Forces selected through the UTPO and UTPNCM and admitted by the CFMC Admissions Committee to a programme for which they are judged qualified. It also incorporates the RMC Extension Division, and the Department of Military Leadership and Management.

All academic short courses at RMC are conducted under the auspices of the Canadian Forces Military College. Student groups taking such courses normally consists of serving officers of the Canadian Forces sent to RMC for the duration of the course, and, in certain cases, civilian employees of the Federal Government.

In normal university terms, the Canadian Forces Military College is RMC's division of continuing education, responsible for the education of mature students to the Baccalaureate level. Specifically, it administers both full-time, day, degree programmes (UTPO, UTPNCM); and part-time, evening, university level courses (the Extension programme) and short courses.

UNIVERSITY TRAINING PLANS

UNIVERSITY TRAINING PLAN - NON-COMMISSIONED MEMBERS (UTPNCM)

The UTPNCM is a DND-sponsored subsidization plan open to certain other ranks in the Canadian Forces who meet the academic requirements for admission to a Canadian Military College or other Canadian university as candidates for a baccalaureate degree. Depending on their level of academic standing, UTPNCM candidates may enter either at the First Year level or with Advanced Standing. Except for certain allowances made for age, service experience, and marital status, these officer cadets must meet substantially the same academic and military-training requirements as those in the Regular Officer Training Plan (ROTP). On graduation, both groups of officer cadets are commissioned and promoted. The conditions governing eligibility, application, selection procedures, and so on are set forth in CFAO 9-13, as modified by subsequent orders.

The UTPNCM was set up in 1951 to provide a university education in Mathematics and Physics and in Engineering for a limited number of other ranks in the RCN and RCAF. In 1964, the plan was expanded to include degree programmes in Arts and Commerce, and in 1968 extended to include candidates from all three elements up to a maximum of 155 under subsidization at any one time. In 1973, the ceiling was raised to 200 and the direction altered so that a number of UTPNCM cadets would be posted to the Canadian Military Colleges as candidates for one of the several baccalaureate degrees available at these Colleges.

UNIVERSITY TRAINING PLAN - OFFICERS (UTPO)

The UTPO is a DND-sponsoted subsidization plan open to commissioned officers serving in the Canadian Forces who are within two years of meeting course requirements fot a baccalaureate degree at a Canadian Military College ot othet Canadian Univetsity. Thus all students admitted under this plan must enter as candidates with Advanced Standing. The conditions governing eligibility, application and selection ptocedures, and so on are set forth in CFAO 9-40, as modified by subsequent otders.

The UTPO was set up in 1968, when earlier subsidization plans for the RCN and CA(R) and RCAF were amalgamated to provide for a maximum of 50 officets to attend university fot up to two years to complete a baccalaureate degree. In 1973, a number of UTPO students were accepted by RMC as degree candidates.

ADMISSION REQUIREMENTS

GENERAL QUALIFICATIONS

To qualify fot admission to CFMC, a candidate must be:

1. a Canadian citizen;
2. a serving member of the Canadian Fotces;
3. an applicant accepted by the CFMC Admissions Committee; and
4. an applicant selected by the appropriate DND Selection Board.

ACADEMIC QUALIFICATIONS

1. ACADEMIC REQUIREMENTS

a. UTPNCM: Admission to First Year. The normal academic requirements for admission are those set forth under "Academic Qualifications" in the RMC Calendar.

b. UTPNCM: Admission with Advanced Standing. As for UTPO (see below), except that the CFMC decision regarding admission will be forwarded directly to NDHQ rather than by a Certificate of Acceptability to the candidate.

c. UTPO. The applicant must have been granted a Certificate of Acceptability by the CFMC Admissions Committee; this document will indicate the Course of Study approved and state clearly any conditions on which admission depends. The following classes of students may apply:

(1) those who have completed (or will have completed) an acceptable number of appropriate course-credits at one or more recognized universities, such students being admissible with Advanced Standing;

(2) those who are ovet 22 years of age and who have been away from school or university fot at least two years, such students being admissible as "matute students" who satisfy the Admissions Committee of theit capacity to succeed in academic courses at the level demanded in the CFMC degree programmes.

NOTES:

1. No credit will normally be transfetted for coutses in which the mark obtained is less than 60 per cent (C), or for courses which constitute part of a failed year.

2. At the discretion of the Admissions Committee, full or part credit may be gtanted for recognized coutses offered under the auspices of DND (such as Staff College); all such courses must be judged by the Admissions Committee to be equivalent in content to courses required by CFMC for a degree.

2. DETAILS OF DEGREE REQUIREMENTS

a. FOR UTPNCM ADMITTED TO FIRST YEAR

UTPNCM students admitted to First Year ate eligible for the same degree pattetns in Arts, Science, and Engineering as ROTP and RETP students at RMC. The degree requirements ate set out in the Course Outlines in the RMC Calendar. Acceptance must be approved by the College Admissions Committee and by the Dean CFMC.

b. FOR UTPNCM ADMITTED WITH ADVANCED STANDING

Students admitted to a Course of Study for which they are deemed qualified by virtue of course credits transferred on admission may be awarded up to fourteen credits towards an Honours degree and up to ten credits towards a Pass degree. Depending on these qualifications, students are eligible fot the same degree patterns in Arts, Science, and Engineering as ROTP and RETP students at RMC, and also fot special three-year Pass Arts and Pass Science degrees and special four-year Honours Arts and Honours Science degrees available only to students admitted with Advanced Standing. Acceptance must be approved by the College Admissions Committee and by the Dean CFMC.

c. FOR UTPO

The same degree arrangements apply to UTPO as to UTPNCM admitted with Advanced Standing (see above), but with the added condition that all UTPO entrants must be within two years of attaining the degree sought. Hence UTPO students are admitted to CFMC for one or two years with Advanced Standing. Also fot UTPO students, the RMC requirement to take coutses in Military Psychology and Leadership (MPL) is notmally waived, though specific MPL courses may be taken as electives (with the permission of the

Department under which the students are seeking their degree and of the MPL Department). Acceptance must be approved by the CFMC Admissions Committee and by the issuance of a Certificate of Acceptability.

DEGREE PROGRAMMES (ADVANCED STANDING ENTRY)

Whenever possible, preference is given to placing UTPO and UTPNCM students who have been admitted with Advanced Standing in either Arts or Science, into the regular degree patterns in these areas available to ROTP and RETP students. Cases where this may not be possible can occur as a result of a limitation imposed on the time allowed to achieve a degree, as in the case of UTPO, or where a candidate has the required number of transfer credits for admission with Advanced Standing but is deficient in a subject area prerequisite to a regular pattern. Alternatives exist in the form of special CFMC degree patterns in Arts and Science (but not in Engineering), unavailable to ROTP and RETP students, which can be tailored to match the backgrounds and requirements of individual candidates.

ARTS AND SCIENCE (SPECIAL PATTERNS)

GENERAL:

a. The required courses and the course pattern for each area of specialization given below will be set by the Department and/or Division concerned and approved by the Dean, CFMC.
b. Course credits are normally accumulated by full-time students at the rate of five each year for a Pass degree and six each year for an Honours degree.
c. One credit is defined as the equivalent of a course taken at a rate of three lecture hours per week over two terms, that is, a six-credit-hour (6.0) course in the terminology used by most universities. Partial credits are accorded to courses of lesser duration or weight.

PASS (THREE-YEAR) DEGREE - For the degree of Bachelor of Arts or Bachelor of Science, at least fifteen credits are required, no fewer than five of which must be earned in courses taken at CFMC. Pass programmes in Arts are normally available in Humanities (English, French or History), Social Science (Politics and Economics), Military and Strategic Studies, and Business Administration; and, in Science, in Space Science, Materials Science or in General Science.

NOTE: Candidates for Pass degrees who attain an overall weighted average of 80 per cent in the graduating year will have "With First Class Standing" inscribed on the degree scroll. Requirements for Pass Standing are given in Academic Regulation 28.

HONOURS (FOUR-YEAR) DEGREE - For the degree of Bachelor of Arts (Honours) or Bachelor of Science (Honours), at least twenty credits are required, no fewer than six of which must be earned in courses taken at CFMC. Honours programmes in Arts are currently available in Humanities (English, French or History), Social Science (Politics and Economics), Military and Strategic Studies; and, in Science, in Honour Science (Physics, Information Science or Chemistry), Space Science or in Materials Science.

NOTE: For requirements related to earning and maintaining Honours Standing in Arts and Science, see Academic Regulation 16 to 20.

ENGINEERING

To qualify for the degree Bachelor of Engineering, a candidate must offer completed work that conforms to the full content of an Engineering degree programme. Such work may consist of any combination of previously earned credits awarded by the Admissions Committee and credits taken in course at the CFMC, provided that (1) in each academic year in full-time study at the CFMC the candidate is registered in courses totalling no less than twenty-five classroom contact hours per week, and (2) no less than one such academic year is completed in full-time study at the CFMC. Degrees in Engineering are currently available in Chemical and Materials Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, and Mechanical Engineering.

YEAR STRUCTURE

Each CFMC student is designated as being in a year that corresponds to the year of study in a given programme. Thus a student taking a full four-year programme would enter First Year coded 1-4 and progress through 2-4, 3-4, 4-4. A student admitted with Advanced Standing into a four-year degree programme would enter at the 2-4, 3-4, or 4-4 point depending on the number of acceptable credits transferred, or if admitted with Advanced Standing into a three-year degree programme would enter at either the 2-3 or 3-3 point depending again on transfer credits. (It is noted that UTPO students, because of the two-year time limit of the UTPO programme, can enter only at 3-4, 4-4, 2-3, or 3-3.)

CURRICULUM

Students seeking detailed information concerning the curriculum should consult the appropriate sections of this Calendar.

UTPO CLASS SENIOR

A UTPO Class Senior will be appointed annually by the Director of Administration in consultation with the Dean of the Canadian Forces Military College. The UTPO Class Senior shall be responsible to the Director of Administration, who serves as the

Commanding Officer for the UTPO students, for their general control and deportment. The UTPO Class Senior shall also provide liaison between the UTPO students on the one hand, and the Dean CFMC and the Director of Administration on the other.

DRILL, PHYSICAL EDUCATION, AND INTRAMURAL SPORTS

UTPNCM

Officer-cadets of the UTPNCM have their own squadron - Otter - and their own Squadron Commander. Otter Squadron comes under the Military Wing directly, rather than under the Cadet Wing. The UTPNCM students are required to take part in drill and physical education on the same basis as the ROTP/RETP students except that adjustments in the programme are made to allow for age and service experience. As for sports, UTPNCM students must take part in a games programme organized by and for Otter Squadron, and are also free to participate in inter-collegiate sports and other organized activities at RMC on the same basis as other officer-cadets.

UTPO

As commissioned officers, UTPO students are responsible for maintaining the standards of drill and physical fitness prescribed by the terms of their commitment to the Canadian Forces. Therefore they are not required to take drill and physical education classes as are the UTPNCM. However they are encouraged to take part in the Otter Squadron games programme and are free to participate in intramural or intercollegiate sports and other organized activities at RMC.

SUMMER TRAINING

UTPNCM

Officer-cadets of the UTPNCM will follow the same summer-training programme as the ROTP and RETP officer cadets.

UTPO

Commissioned officers will be assigned appropriate duties by DND for the summer recess.

COUNSELLING

Each first-year student is normally assigned an academic counsellor who is a member of the Faculty.

Each academic Division (Arts, Science, Engineering) also has an academic counsellor, who is a member of the Faculty of that Division, to counsel all of the CFMC students in the Division. At present, these are:

Arts Division - T.B. Vincent, BA (Dalhousie), MA, PhD (Queen's)
Science Division - R.E. Johnson, BSc (McMaster), BS, PhD (Penn)
Engineering Division - Head or Professor-in-Charge of the appropriate engineering programme

These counsellors also advise the CFMC Admissions Committee on the acceptability of transfer credits for advanced-standing-entry candidates, and on course patterns for such students.

The Dean CFMC is available at any time to counsel CFMC students in academic and other matters. In matters military, UTPNCM students should consult their Squadron Commander, UTPO students their Commanding Officer (the Director of Administration).

RESIDENCE

No UTPNCM or UTPO students live in residence.

MESSING AND RECREATION

UTPNCM

Since officer cadets of the UTPNCM live out, they do not normally mess at RMC although arrangements can be made for meals in the cadet dining-room or the RMC Canteen at reasonable cost. For recreational activities, they must be members of the RMC Cadet Mess and Recreational Centre and are eligible for associate (social) membership in the Kingston Officers' Mess.

UTPO

As commissioned officers, UTPO students are regular members of the RMC Senior Staff Mess and subject to the obligations that go therewith.

MEDALS, SCHOLARSHIPS AND PRIZES

CFMC students are eligible to compete for many of the awards also available to the ROTP/RETP officer cadets. There are additional awards open only to UTPNCM students, and others

open only to CFMC students who have entered with Advanced Standing. See the section on Medals, Scholarships and Prizes in an earlier section of this Calendar for more detail.

ACADEMIC REGULATIONS (CFMC)

The RMC Academic Regulations are applicable to CFMC students except where different conditions are set down in this CFMC section; significant differences include the following:

a. No. 1. The duration of the programme corresponds to Regulation No. 1 for UTPNCM students, except for those admitted with Advanced Standing. That for UTPO students may be for one or two academic years, as detailed elsewhere in this section.

b. No. 3. All degrees granted to CFMC students are CFMC degrees. Nevertheless, since CFMC degrees are granted on the authority of the RMC Senate, they are also considered to be RMC degrees. The Pass Arts and Pass Science degrees described above are peculiar to CFMC and available only to students admitted with Advanced Standing.

c. Nos. 6-15. Each CFMC student is assigned to a Year based on accumulated years of university course-credits. (See "Year Structure" above.)

(1) Since the UTPNCM year-structure coincides with that of RMC, Academic Regulations 6-15 apply.
(2) Since the UTPO year-structure does not coincide with that of RMC, Regulations 6-15 do not apply. For UTPO students, all of whom enter with Advanced Standing, the overall programme for both Pass and Honours degrees is established by the Department concerned in consultation with the Dean CFMC.

d. Nos. 16-20. These regulations apply to all CFMC students except that the following regulation will be substituted by students seeking admission under the UTPO:

"Entry into the Honours programme will normally be open to those students who enter CFMC with Advanced Standing provided that they have obtained sufficient acceptable credits to make possible the completion of an Honours programme."

e. No. 21. This regulation regarding extra courses applies to UTPNCM students but must be modified as follows for UTPO students, who are not required to take courses in Military Leadership and Management:

Where an additional course is needed by a UTPO to meet the requirements for an Honours degree, it may be taken at another university by Letter of Permission provided that authority is obtained from DND and that the student take such course(s) on personal time and at personal expense during the summer recess at CFMC. To receive credit for this course, a student must obtain a grade satisfactory to CFMC.

f. Nos. 42-43. These regulations apply to UTPNCM students but not toUTPO students, who may be excluded by the two-year limitation imposed on attendance by CFAO 9-40.

g. Nos. 44-45. These regulations apply to both UTPNCM and UTPO students.
Voluntary withdrawal is covered in the CFAOs governing these plans.

h. No. 46. This regulation does not apply to UTPO students.

j. Students admitted with Advanced Standing will normally participate in Second Language Training (SLT), including summer SLT, and must demonstrate progress from year to year to achieve pass standing.

NOTE: Certain RMC Academic Regulations distinguish between officer cadets and students; UTPO students are excluded from those referring specifically to officer cadets.

EXTENSION DIVISION AND THE CONTINUING STUDIES PROJECT

CHAIR: A. J. Barrett, CD, rmc, BSc, MSc (RMC), PhD (London)

In 1970-71, the Royal Military College of Canada initiated a limited programme in extension studies. In 1996-97, the programme has been expanded considerably and incorporated into the Continuing Studies Project.

The Continuing Studies Project was commenced in 1996 to provide increased access to university level courses for service personnel, their dependents and other members of DND. A significant advantage of this programme is its flexibility and versatility, which does much to address problems posed by operational and posting requirements. Courses are available in both official languages; assignments and exams may be completed in the official language of choice.

At the undergraduate level, the Project offers the Bachelor of Military Arts and Sciences. The BMASc is a unique degree programme for the Canadian Forces, thoroughly grounded in the

elements of the military profession, integrating in-service training and special and standard university courses. Additionally, courses offered toward the BMASc may be applied toward selected programmes in the BA or BSc.

In September 1997, the Project will offer classroom courses in Borden, Edmonton, Esquimalt, Gagetown, Halifax, Kingston, Ottawa, Petawawa, Saint-Jean, Toronto, Trenton, Valcartier and Winnipeg. Correspondence courses are available for students in other sites.

With the authorization of the Dean of the CFMC and on a space-available basis, Continuing Studies students in the Kingston area may attend normal day classes at RMC.

For a copy of the Continuing Studies calendar or for further information, please contact the Office of Continuing Studies at (613) 541-6000 ext 6587/6734 or through e-mail at bmasc@rmc.ca

ACADEMIC REGULATIONS

DEFINITIONS

Course of Study: A group of courses completing a year's programme of studies.

Subject: A division of the programme of studies.

Course: A series of lectures and/or laboratory periods, designated by a number in the curriculum, required for annual assessment.

Elective: Within a Course of Study a course that a student may elect to take as opposed to one that is required to complete the Course of Study.

Failed-Credit Standing: Standing granted on the recommendation of the Faculty Board, and with the approval of Faculty Council and the Commandant, in a failed course for the purpose of allowing a student who fails one course to pass the year. The mark will be recorded with the annotation "Failed-Credit" (FC) and remains a failure for the purpose of determining whether or not work prerequisite to other courses has been completed. Failed-Credit standing will not normally be granted in a course failed by a Third or Fourth Year engineering student.

Board Pass: Upon recommendation of the department responsible for the Course of Study, a Board Pass may be awarded in one course to an engineering student in the Fourth Year final examinations provided that:

(i) the student's overall average exceeds fifty per cent by at least as much as the course mark is less than fifty per cent,

(ii) the course mark is not less than forty per cent, and

(iii) not more than one course has been failed.

The mark will be recorded with the annotation "Board Pass" (BP).

Carry a Course: When it has been recommended by Faculty Board and approved by Faculty Council and the Commandant, a student carries a course - after failing this course in the previous year - by taking the failed course again (or an authorized equivalent) in the academic year immediately following the failure together with the full academic workload of the normal next year of the Course of Study following the year in which the course was failed. The mark of the first attempt will be recorded on the transcript of marks of the work for that year with the annotation against the failed course "Failed, but permitted to carry". That year will not be cleared until the carried course is passed, and no credit will be allowed for the subsequent year after a year has been failed and not cleared.

Supplemental Examination: An examination set upon the recommendation of the Faculty Board, and with the approval of Faculty Council and the Commandant, in a course in which a student has failed. A pass in a supplemental examination may be accepted by Faculty Board to remove the deficiency of the failure. If the failed course is required to complete the work of a year, the year is failed until the supplemental examination is passed.

Advanced Standing: Placement granted on admission to a level beyond First Year in a Course of Study. It is determined after an examination of an applicant's previous work for which credit can be given.

Transfer Credits: Credits for work done at an accredited institution; transfer credits may reduce the number of courses which must be taken in a year provided the resulting number of course weights does not fall below 80% of the minimum number of weights required for that year in the student's degree programme.

Challenge Examination: An examination to test the knowledge of candidates in the subject matter of a particular course, the purpose of which is to establish a basis for the granting of credit for the course, without the normal requirements for attending the course and completing the usual course requirements.

DURATION OF THE PROGRAMME OF STUDIES

1. The duration of the programme of studies for officer cadets starting at the Royal Military College of Canada is normally four years. The years are designated as follows: First Year, Second Year, Third Year, and Fourth Year.

2. Entrance to the First Year requires completion of the secondary school programmes as outlined as admission requirements in the Calendar.

DEGREES

3. (a) A degree of Bachelor of Arts (Honours), Bachelor of Arts, Bachelor of Science (Honours), Bachelor of Science, or Bachelor of Engineering as appropriate, shall be granted by the Royal Military College of Canada to a student who has successfully completed the requirements of the College.

   (b) A degree of Master of Arts (MA), Master of Science (MSc), or Master of Engineering (MEng) shall be granted by the Royal Military College of Canada to those who successfully complete the requirements of the College.

   (c) The degree Doctor of Laws (LLD) honoris causa, Doctor of Science (DSc) honoris causa, Doctor of Military Science (DScMil) honoris causa, or Doctor of Engineering (DEng) honoris causa shall be granted by the Royal Military College of Canada to those who are worthy of the honour.

4. A student in Honours Arts, Honours Science or in Engineering who attains First Class Honours will have the degree script so inscribed. Students who meet the requirement for other distinctions as specified by the faculties of Arts, Science or Engineering will have their academic transcripts and degree scripts annotated accordingly.

CERTIFICATE OF QUALIFICATION

5. A Certificate of Qualification may be granted to a student who has successfully completed the First and Second Years of prescribed study.

PROGRAMME OF STUDIES

6. Not allocated.

First Year

7. All students registered in First Year are required to take all the courses prescribed in the Calendar under "First Year General Course" or "First Year Arts Course" except where transfer credit has been granted.

Second Year

8. All students who have completed the First Year in Arts and who are registered in Arts in Second Year are required to take the courses prescribed in the Calendar under "Second Year Arts" or "Arts - Business Administration".

9. All students who have completed the First Year General Course of Study may, in exceptional circumstances and with the permission of the Dean of Arts, transfer to Second Year Arts. They will be excused Second Year Science courses, but may be required to complete prerequisite work in Economics, History, and/or Politics. A transfer to Second Year Arts - Business Administration will not normally be possible.

10. All students registered in a Science Course of Study in Second Year are required to take courses prescribed in the Calendar under "Honours Science", "Space Science" or " Science" except where transfer credit has been granted.

11. All students in an Engineering Course of Study in Second Year are required to take courses prescribed in the Calendar under "Engineering". Students planning a degree in Civil Engineering will register in this option and commence the specialization with courses in the Winter Term of Second Year.

Third and Fourth Years

12. Courses of study in Third and Fourth Year are offered in Honours Arts, Arts, Honours Science, Space Science, Science and in Engineering. Details of each option are described elsewhere in this Calendar.

13. In addition to commitments to Drill, Physical Education and Second Language Training, a student in Third and in Fourth Year Arts will, each year, undertake a minimum of the equivalent of five and one-half full courses. The course requirements will be dictated by the type of degree sought, as outlined in the departmental sections of the Calendar. At least one Arts elective and one Science course will be a feature of the Course of Study each year.

14. Candidates for a degree in Honours Science specialize in Chemistry, Mathematics and Computer Science or Physics in Fourth Year. Students completing the Honours Science programme in Second Year with a B- combined average in Mathematics, Physics and Chemistry may enter Third Year Honours Science, Space Science or Science. Those completing Second Year Space Science may enter Third Year Science, Space Science or Science. All students in Honours Science, Space Science and Science must take an Arts elective course in each of the Third and Fourth Years.

15. Candidates for a degree in Engineering must select one of the five prescribed Courses of Study: Chemical and Materials Engineering, Civil Engineering, Computer Engineering, Electrical Engineering or Mechanical Engineering. Qualification standing in Chemistry, Mathematics and in Physics is required to study Engineering, and entry into any Course of Study is subject to the approval of the Head of the department concerned. All students in Engineering must take on Arts elective course in each of the Third and Fourth Years.

HONOURS COURSES OF STUDY:

16. To earn an Honours degree a student in the Humanities, Social Sciences and in Military and Strategic Studies must successfully complete the required courses set out in the Arts Course of Study with at least ten courses in one discipline, must maintain a minimum B average in the honours courses in the final two years of the Course of Study, and must attain at least a B- average in the Fourth Year of study. Students who have completed the Honours requirements and have attained an A- minimum average in the honours courses completed in the final two years of study will earn a First Class Honours degree.

17. A Business Administration degree with Honours will be earned by a student who successfully completes all courses in the programme, attains a minimum B average in all Business Administration courses and attains at least a B- average in the Fourth Year of study. To earn First Class Honours, a student must complete all courses in the programme, attain a minimum A- average in all the Business Administration courses, and must attain a B- average in the Fourth Year of study.

18. The Faculty Council may, for cause stated, remove a student from an Honours Course of Study in Arts even though the student may have obtained the standard required by these regulations.

HONOURS COURSES OF STUDY - SCIENCE

19. A student in an Honours programme in Science must normally pass all courses without supplemental examinations, and must maintain in each of the Third and Fourth Years a minimum B- average in all courses prescribed by the Division of Science. A student in Materials Science or Space Science must, in addition, complete a programme totalling at least 125 Weights in Science in Third and Fourth Year in order to obtain an Honours degree. A student in Honours Science, or Space Science who attains an overall B- average will be granted a degree with Second Class Honours, provided that the student has obtained a pass standing in each course of the Honours Course of Study.

20. The Faculty Board may, for cause stated, remove a student from an Honours Course of Study in Science at any time, even though the student may have obtained the standard required by these regulations.

EXTRA COURSES

21. A student may not take an extra course except by special permission of the Dean and Chairman of the Division in which the student is registered. The grades in these courses count toward the student's overall average with extra courses taken in the field of study counting toward the calculations for Honours standing.

LIMITATION OF SELECTION OF THIRD YEAR COURSE OF STUDY

22. A student who has been recommended not to take a certain Course of Study on the completion of the Second Year may be refused permission to register in this Course of Study in the Third Year.

DRILL AND PHYSICAL EDUCATION

23. Courses in Drill and Physical Education must be taken by all cadets in all years.

CONTINUITY OF STUDY

24. Under normal circumstances a student may not postpone a year of study.

CHANGES IN THE COURSE OF STUDY

25. The courses selected by any student may not be altered later than three weeks after the beginning of the academic year or in the case of single term courses three weeks after the beginning of that term without the permission of the Dean and the Chairman of the Division in which the student is registered or, in the case of a transfer between Divisions, the approval of the Dean and Chairman of the Department or Programme to which the student requests transfer.

26. A student may not transfer from one Course of Study to another without having obtained the full prerequisite standing in the Course of Study to which entry is desired.

ATTENDANCE

27. A student who does not attend classes through illness or any other cause must complete term work and all assignments to the satisfaction of the department concerned.

ACADEMIC STANDING

Pass Standing

28. To be granted pass standing a student must obtain

    (a) a minimum overall average of fifty per cent; and,
    (b) D- in each course except that a student may be passed with failed-credit or board-pass standing on one course.

The overall average is computed by converting the letter grades assigned in each course to numeric values, multiplying by the course weight, summing the products and dividing by the toral of the weights of the courses involved. Extra courses are excluded in computing overall averages. (Refer to Academic Regulation 30 for the conversion scale and to Academic Regulation 36 for an understanding of weights).

29. To be granted pass standing a cadet must:

    (a) achieve a satisfactory standard in Physical Education and in Drill;
    (b) achieve a satisfactory standard in Second Language Training; and
    (c) obtain a favourable report in Officer-Like Qualities.

Grades

30. Grades for all courses are reported and appear on transcripts as letter gtades. For purposes of calculating overall averages and determining place-in-class, the assigned letter grades are converted using the conversion scale shown below.

Gradation of Academic Standing:

	Letter Grade	Percentage Grade Relationship	Conversion Scale
First Class	A+	94-100	95
	A	87-93	90
	A-	80-86	83
Second Class	B+	76-79	78
	B	73-75	75
	B-	70-72	72
Third Class	C+	66-69	68
	C	63-65	65
	C-	60-62	62
Pass	D+	56-59	58
	D	53-55	55
	D-	50-52	52
Failure	E*	40-49	45
Serious Failure	F*	Below 40	20

* A failed course may be reported as a numeric grade in which case the assigned mark will be used in calculating the overall average and determining place-in-class.

Note: The grading system was revised and these practices were introduced in the 1993/94 academic year. Transcripts issued subsequently are annotated with the former and current practices.

Aegrotat Standing

31. Aegrotat standing may be granted by the Faculty Council to a student who has been unable to write one or more of the final examinations, but who has received satisfactory term marks in each course.

FINAL EXAMINATION

32. Final examinations will be held at dates and times specified in the examination timetables.

33. A student may write examinations in either English or French, except that the examinations in language courses must be written in the language concerned.

34. The Faculty Board constitutes the examining board for all final examinations. Standing in final examinations is granted by the Faculty Board subject to confirmation by the Faculty Council.

35. A student may be refused permission to write a final examination:

    (a) in any course involving practical work in a laboratory if laboratory work has been unsatisfactory; and
    (b) in any course if the requirements with regard to assignments have not been met.

WEIGHTS

36. Each course has been assigned a weight, which is included in the Calendar description. Weights are used in determining the overall average and in granting the privileges of writing supplemental examinations and of repeating a year.

SUPPLEMENTAL EXAMINATIONS

37. A student may be granted the privilege of writing supplemental examinations in failed courses provided:

    (a) the overall average is not less than 50 per cent and
    (b) no more than two courses have been failed or, if more than two courses have been failed, the percentage of weights failed does not exceed 35.

38. Supplemental examinations at the Royal Military College of Canada will be held at dates and times specified in the supplemental examination timetables.

39. To obtain pass standing in a supplemental examination a student must obtain a mark of at least D-, normally not including the previous term mark or examination mark.

40. Marks obtained in supplemental examinations shall not be used to advance a student's academic average in any year.

FAILURE OF A YEAR

41. A student shall fail a year:

    (a) if the student's ovetall average is less than 50 per cent; or
    (b) if the student fails in more than two courses and is ineligible to write supplemental examinations under the conditions of Academic Regulation 37; or
    (c) if the student fails one or more supplemental examinations and is not granted failed-credit standing or is not allowed to carry a failed course; or
    (d) if the student fails a course that the student has been permitted to carry; or
    (e) if the student is required to withdraw under Academic Regulation 44(b).

REPEATING A YEAR

42. (a) A student may be permitted to repeat any year, including the Fourth Year.
    (b) A student may be permitted to repeat the Second Year in Engineering if the student has failed to qualify for Engineering as required by Regulation 14.
    (c) A student who has failed will be considered for a repeat year unless the Faculty Council has determined that the student must withdraw.
    (d) A student may repeat only once during the student's entire programme of studies.

43. A student permitted to repeat a year must carry the equivalent work load of the student's full Course of Study, except in the Fourth Year. A student repeating the Fourth Year may be given the option of either repeating the full Course of Study or of repeating those courses in which the mark achieved was less than D+. In the latter case, the part of the Course of Study which has been repeated will be considered the full Course of Study for the purposes of applicable Academic Regulations.

WITHDRAWAL

44. (a) A student whose overall average is less than 45 per cent or whose percentage of weights failed exceeds 50 shall normally be required to withdraw.
    (b) A student who at the end of the Fall Term has an overall average of less than 45 per cent may be required to withdraw after a review of the student's record.
    (c) A student who fails a course that the student has been allowed to carry shall normally be required to withdraw.

45. A student who fails a year may be required to withdraw from the College, and a cadet who fails a year, having previously failed a year, must withdraw.

46. A cadet who, in the opinion of the staff, fails to develop the necessary officer-like qualities will, on the approval of the Commandant for such action, be required to withdraw.

APPEALS AND PETITIONS

47. A student with a complaint or grievance which is academic in nature should communicate that concern to the instructor, Head of Department and/or Dean and Chair of the faculty involved. If the matter remains unresolved in this informal process, a formal petition to the Faculty Council can be initiated.

48. Formal petitions to the Faculty Council must be made in writing and be submitted through the Registrar for consideration by the Council. If the matter concerns the denial of exemption from Second Language Training, the appeal should be directed to the Dean of Science. Normally, petitions will be heard only if submitted within ninety days of the event or academic decision giving rise to the appeal. For more specific information and other principles governing student appeals, the Registrar, as Secretary to the Faculty Council, should be consulted.

ACADEMIC MISCONDUCT

49. **Plagiarism** is the presentation or submission of work as one's own which originates from some other, unacknowledged source. In term papers, assignments and examinations, the verbatim or almost verbatim presentation of someone else's work without attribution constitutes an example of plagiarism.

50. **Cheating** is the act or attempt to give, receive, share or utilize unauthorized information or assistance before or during a test or examination. The presentation of a single work to more than one course without the permission of the instructors involved; the improper acquisition through theft, bribery, collusion or otherwise of an examination paper prior to the examination; the impersonation of a candidate at an examination: all constitute examples of cheating.

51. **Penalties** are imposed upon students found guilty of cheating or plagiarism. Academic sanctions for such misconduct may range from the award of a zero grade for the work involved, to a recommendation for expulsion from the College.

OFFICERS OF ADMINISTRATION

CHANCELLOR AND PRESIDENT - The Minister of National Defence The Honourable Arthur Eggelton, PC, MP

COMMANDANT AND VICE-CHANCELLOR - Brigadier-General K. C. Hague, CD, rmc, BA (RMC)

PRINCIPAL - Captain (N) (Ret'd) B.J. Plant, OMM, CD, ndc, PhD (MIT), FEIC, FIEEE, PEng

DIRECTOR OF CADETS - Lieutenant-Colonel J.J.C. Michaud, CD, plsc, pcsc, BAd (CMR)

DIRECTOR OF ADMINISTRATION - Lieutenant-Colonel D.J. Southen, CD, rmc, plsc, psc, BA (RMC)

ACADEMIC STAFF

CHIEF LIBRARIAN - S.O. Alexander, BA (Delhi), BA (Lakehead), MA (Delhi), MLS (Western)

REGISTRAR - M.A. Labbé, BA (Bowdoin), MA (Maryland), PhD (Pittsburgh)

ASSOCIATE REGISTRAR (RECORDS) - D. Charles, BSc (Guelph)

ASSISTANT REGISTRAR AND MUSEUM CURATOR - J.R. McKenzie, CD, rmc, plsc, BA, MA (RMC)

MILITARY STAFF

DEPUTY DIRECTOR OF CADETS - Major J.J.P. Bergeron, CD, plsc, pcsc

ADJUTANT - Captain G.J. Burton, CD, plsc

STANDARDS - Captain R.P. Haskell

TRAINING - Captain P.A. Grignon

A DIVISION - LCdr P.C. Henderson

B DIVISION - T.B.A.

C DIVISION - Major M.L.L. Dubuc

COMPAGNIE FORT ST-JEAN -

COLLEGE CHIEF WARRANT OFFICER - Chief Warrant Officer J.A.D. Perry, CD

SQUADRON COMMANDERS

A DIVISION

No. 1 Squadron Commander, Hudson Squadron - Lt(N) W.P. Smith
No. 2 Squadron Commander, LaSalle Squadron - Captain A.J. O'Keefe
No. 3 Squadron Commander, Pontiac Squadron - Captain J.M.F. Bisaillon
No. 4 Squadron Commander, Frontenac Squadron - Captain D.D. Tremblay

B DIVISION

No. 5 Squadron Commander, Brock Squadron - Captain R.D. Parent
No. 6 Squadron Commander, Brant Squadron - Captain J.T.C. Kung
No. 7 Squadron Commander, Wolfe Squadron - Captain J.P. Dooley

C DIVISION

No. 8 Squadron Commander, Mackenzie Squadron - Lt(N) R.D. Monahan
No. 9 Squadron Commander, Verchère Squadron - Captain J.G.D.G Rheault
No. 10 Squadron Commander, Montcalm Squadron - Captain J.R.R. Hone

Otter Squadron Commander, (UTPNCM) Squadron - Captain W.R. Foster

ATHLETIC DEPARTMENT

Athletic Director and Head of the Department of Physical Education and Athletics - Mrs. J. Thibault, OMM, CD, BÉd, BÉdP (UQ - Trois-Rivières)

Varsity Manager - Mr. T. M. Taylor, CD, BA, BPEd (Dalhousie)

Physical Education Manager - Mr. A. Cantin, CD, BÉdP (UQ - Trois-Rivières)

CHAPLAINS

CHAPLAIN (PROTESTANT) - Major B.E. Sweet, CD, BA (Windsor), Mdiv (Toronto)

CHAPLAIN (ROMAN CATHOLIC) - Major E. Ratelle

DRILL STAFF

Drill Sergeant-Major - Master Warrant Officer J.G.C. Michaud, CD

ADMINISTRATIVE STAFF

DEPUTY DIRECTOR OF ADMINISTRATION - Lieutenant-Commander M.L. Fish, CD, BA (McMaster)

PERSONAL ASSISTANT TO COMMANDANT -

COLLEGE PERSONNEL ADMINISTRATION OFFICER - Captain D.R. Barr, rmc, BA(RMC)

COLLEGE PERSONNEL SERVICES OFFICER - Master Warrant Officer G.E. Côté, CD

FOOD SERVICES OFFICER - Captain K.A. Leadbeater, BSc (St. Francis Xavier)

SUPPLY OFFICER - Caprain C. Roy

MEDICAL OFFICER - Lieutenant (N) R.N. Porter, MD

DENTAL OFFICER - Captain T. Pohlman, BSc, DDS (Western)

COLLEGE COORDINATOR OFFICIAL LANGUAGES - L. Wolff

FINANCIAL MANAGEMENT OFFICER - E. A. McIlwaine, BMA (Western) , CMA (SMAO)

SUPERVISOR, GRAPHIC DESIGN - G. Locklin

SUPERVISOR, AUDIO VISUAL SERVICES - Sergeant R.W. MacEachern, CD

BOARD OF GOVERNORS

PESIDENT

The Honourable J. Gilles Lamontagne, P.C., O.C., CD

VICE-PRESIDENT

Commander, CFRETS,
Major-General V.M. Caines, CD, BA, rmc

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The RMC Board of Governors was established in 1996. Its role is to review and approve the strategic direction of the College, and to assist the Commandant of the College and the Commander of Canadian Forces Recruiting Education and Training System Headquarters. The Board will also provide advice to the Assistant Deputy Minister (Personnel) (ADM (Per)) on all matters relating to the College.

THE SENATE

The Senate was created by the Royal Military College of Canada Degrees Act, 1959, and is composed of the President, the Commandant, the Principal, the Chairs of the Academic Divisions and the Registrar. Its function is to grant degrees and honorary degrees.

THE FACULTY COUNCIL

The Faculty Council is composed of the Principal as Chair, the Registrar as Secretary, the Deans of Divisions, the Heads or Acting Heads of the various Departments, the Director of Cadets, and other members of the Senior Staff designated by the Chair. Its function is to determine on all matters of an educational character including all courses of study, the Library, and the Calendar, to conduct examinations, to recommend to the Senate the candidates for degrees and diplomas, to award College medals, prizes and scholarships and generally to make such recommendations to the Commandant as may be deemed expedient for promoting the interests of the College.

THE FACULTY BOARD

The Faculty Board is composed of the Principal as Chair, the Professors, the Associate Professors, the Assistant Professors, the Lecturers, the Chief Librarian, the Registrar, the Director of Administration, the Director of Cadets, the Officers of the Military Wing, all other members of the senior staff designated by the Chair, and students representing the student body invited by the Chair to attend. The function of the Faculty Board is to deal with examination results of undergraduate students; to make recommendations to the Faculty Council on honours standing and academic failures; to exercise academic supervision of students; to make recommendations to the Commandant on Cadet Wing appointments; and to make recommendations to Faculty Council or the Commandant on any matter affecting the general interest of the College.

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M.F. BARDON, rmc, BEng, MEng (RMC), PhD (Calgary), PEng - Professor and Head of the Department of Mechanical Engineering.

A.J. BARRETT, CD, rmc, BSc, MSc (RMC), PhD (London) - Dean of Canadian Forces Military College, Dean of the Continuing Studies and Professor of Mathematics.

LIEUTENANT-COLONEL J. P. BRADLEY, BA (Prince Edward Island), MA (Western), PhD (Western) - Associate Professor of Military Psychology and Leadership and Head of the Department of Military Psychology and Leadership.

Y.T. CHAN, BSc, MSc (Queen's), PhD (New Brunswick), PEng - Professor and Head of the Department of Electrical and Computer Engineering.

A.Y. CHIKHANI, BSc (Cairo), MSc, PhD (Waterloo), PEng - Professor of Electrical and Computer Engineering and Dean of the Engineering Division.

M.-A. ERKI, BASc, MASc, PhD (Toronto), PEng - Professor and Head of the Department of Civil Engineering.

E.J. ERRINGTON, BA (Trent), BEd (Toronto), MA, PhD (Queen's) - Professor of History and Chair of the Department.

B.J. FUGÈRE, BSc, MSc (Montreal), PhD (Hull) - Dean and Chair of the Science Division, Professor of Mathematics and Computer Science.

R.G. HAYCOCK, BA (WLU), MA (Waterloo), PhD (Western) -Dean and Chair of Arts Division, Chair of the Military and Strategic Studies programme, Chairman of War Studies and Professor of History.

A.H. ION,BA, MA (McGill), PhD (Sheffield) - Professor-in-charge, Military and Strategic Studies and Professor of History.

K. JENSEN, BA (Sir Geo Wms), MEd (St Michael's, Vermont) - Director, Language Center.

M. A. LABBÉ, BA (Bowdoin), MA (Maryland) PhD (Pittsburgh) - Registrar and Secretary of the Faculty.

J.P. LAPLANTE, BSc, MSc, PhD (Sherbrooke) - Professor of Chemistry and Head of the Department of Chemistry and Chemical Engineering.

COLONEL H.J. MARSH, CD, OMM, laic, plsc, pcsc, awc, BSc (Queen's) - Head of Applied Military Science Department and Course Director.

LIEUTENANT-COLONEL J.J.C. MICHAUD, CD, plsc, pcsc, BAd (CMR) - Director of Cadets.

G. QUILLARD, BA, MA (Lille), MA (Toronto), PhD (Paris) - Associate Professor of French Studies and Head of the Department.

P. ROCHON, BSc, PhD (Ottawa), PEng - Professor of Physics, Head of the Department of Physics and Professor-in-Charge, Engineering Physics Programme.

B.W. SIMMS, CD, rmc, BEng (RMC), MASc (Toronto), PhD (Queen's), PEng - Professor, Head of Business Administration and Co-appointed to the Mechanical Engineering Department.

D.R. SMITH, CD, rmc, BEng, MEng (RMC), PhD (Carleton), PEng - Associate Professor of Electrical and Computer Engineering and Director of Computing and Audio Visual Services.

J.J. SOKOLSKY, BA (Toronto), MA (Johns Hopkins), PhD (Harvard)- Professor of Politics and Head of the Department of Political and Economic Science.

LIEUTENANT-COLONEL D.J. SOUTHEN, CD, rmc, plsc, psc, BA (RMC) - Director of Administration.

J. THIBAULT, OMM, CD, BEd, BÉdP (UQ - Trois-Rivières) - Athletic Director and Head of the Department of Physical Education and Athlétics.

T.B. VINCENT, BA (Dalhousie), MA, PhD (Queen's) - Professor of English and Head of the Department of English and Philosophy.

R.D. WEIR, CD, BSc (New Brunswick), DIC (ICST), PhD (London), FCIC, CChem (UK), FRSC (UK), PEng - Professor of Chemical Engineering, Head of the Department of Chemistry and Chemical Engineering, and Professor-in-Charge, Chemistry and Materials Engineering.

ACADEMIC STAFF

S.D. ABBOUD, BComm (Caire), DipEd (Ain Chams), DEF, DSEF (Paris), DDMA (McGill), BA, MA (Warerloo), MTS (Queen's) - Language Teacher.

P. ADAM - Technical Officer, Department of Electrical and Computer Engineering.

G. AKHRAS, DipIng (d'Alep), MScA, PhD (Laval), ing - Professor of Civil Engineering.

D. AL-KHALILI, BSc (Baghdad), MSc, PhD (Manchester), PEng - Professor of Electrical and Compurer Engineering.

P.E. ALLARD, BSc, BASc, MSc, PhD (Ottawa), FEIC, PEng - Professor of Electrical and Computer Engineering and Dean of Academic Services.

M. AMAMI, BSc, LicSc.éco, PhD (Sorbonne), Ing (ENSAE, Paris)- Associate Professor of Business Administration.

J.C. AMPHLETT, BSc, PhD (Wales) - Professor of Chemisrry and Chemical Engineering.

W.S. ANDREWS, CD, rmc, BEng, MEng, PhD (RMC), PEng - Assistant Professor of Chemical Engineering and Chemical Enginering.

J. ANGI, BA, MA (McMaster) - Language Teacher.

Y.M.M. ANTAR, BSc (Alexandria, Egypr), MSc, PhD (Manitoba) - Professor of Electrical and Computer Engineering.

P. BAILLE, Lic ès Sci, Dr 3rd Cycle (Toulouse), PhD (York) - Assistant Professor of Mathematics and Computer Science.

M.F. BARDON, rmc, BEng, MEng (RMC), PhD (Calgary), PEng - Professor of Mechanical Engineering and Head of the Department of Mechanical Engineering.

A.J. BARRETT, CD, rmc, BSc, MSc (RMC), PhD (London) - Dean of Canadian Forces Military College, Dean of Continuing Studies ,Professor of Mathematics and Computer Science.

E. BATALLA, BSc (Montreal), MSc, PhD (McMaster) - Associate Professor of Physics and Coordinator of Space Science programme.

P.J. BATES, BSc, (Queen's), MEng, PhD (McGill) - Assistanr Professor of Chemistry and Chemical Engineering.

R.J. BATHURST, BSc, MSc, PhD (Queen's), PEng - Professor of Civil Engineering.

M.M. BAYOUMI, BSc (Alexandria, Egypt) , Dip Math(Switzerland), Dr Tech Sc. - Professor (Adjunct) of Electrical and Computer Engineering.

A.N.S. BEATY, BSc, PhD (Nottingham), CEng, MICE, PEng - Associate Professor of Civil Engineering.

E. BÉDROSSIAN, BA, MA (Ottawa) - Senior Teacher, Language Centre.

MAJOR J.L.C. BELLEROSE, CD, rmc, BEng (RMC), MEng (Fredericton), PEng - Assistant Professor of Civil Engineering.

S.H. BENABDALLAH, BEng (Algeria), MScA, PhD (École Polytechnique), PEng - Associare Professor of Mechanical Engineering.

R. BENESCH, BSc, MSc (Alberta), PhD (Queen's) - Professor of Mathemarics and Computer Science.

L.G.I. BENNETT, CD, rmc, BEng (RMC), MASc, PhD (Toronro) - Professor of Chemistry and Chemical Engineering.

M. BENSON, BA (York University), BEd (Toronro), MA Calgary, PhD (McGill) - Associate Professor of French Studies.

S. BERG, BA, BEd, MA, PhD (Alberta) - Assistanr Professor of English.

U.G. BERKOK, BA, (Bosphorus), MA (East Anglia), PhD (Queen's)- Assistanr Professor of Economics and Co-appointed ro the Business Administration Department.

N.A. BÉRUBÉ, LèsL (Laval) - Language Teacher.

S. BODNER, BA (Western), MEd (Toronto) - Language Teacher.

G. BOLOIX, EE (Venezuela), MSc (Georgia, USA), PhD (Ecole Polytechnique) - Assistant Professor of Electrical and Computer Engineering.

R.J. BONESS, DipAM (Sheffield), BSc (Strathclyde), MEng (Sheffield), PhD (RMCS), CEng, MIMechE - Professor of Mechanical Engineering.

H.W. BONIN, BA, BSc (Montreal), BScA, MIng (École Polytechnique), PhD (Purdue), ing, PEng - Professor of Nuclear Engineering in Department of Chemistry and Chemical Engineering.

S.R. BONNYCASTLE, BA (Queen's) PhD (U. of Kent ar Canrerbury) - Professor of English.

C. BORDELEAU, BSc, MSc (Sherbrooke), PhD (Carleton), MICC, CChem, Chim - Assistant Professor of Chemistry and Chemical Engineering.

I.E. BOROS, Dipl Ing (Cluj), MASc, PhD (Toronto), PEng - Associate Professor of Mechanical Engineering.

LIEUTENANT-COLONEL J. P. BRADLEY, CD, BA (Prince Edward Island), MA (Western), PhD (Western) - Associate Professor of Military Psychology and Leadership and Head of the Department of Military Psychology and Leadership.

J. BRIMBERG, BEng, MEng (McGill), MBA, PhD (Toronro), PEng - Professor of Business Administration and Co-appointed to the Mechanical Engineering Department.

P.G. BUCKHOLTZ, BSc (Alfred U), MSc, PhD (Queen's) - Associate Professor of Mathematics and Computer Science.

J.R. BUCKLEY, BSc (McMasrer), PhD (Brit Col) - Associate Professor of Physics.

V.T. BUI, BScA, MScA, PhD (Laval) - Professor of Chemistry and Chemical Engineering.

CAPTAIN A. CARTY, CD, BA (Queen's), MEd (Queen's) - Lecturer in Military Psychology and Leadership.

F. CHAN, BEng (Mcgill), MScA, PhD (Ecole Polytechnique) - Assistanr Professor of Electrical and Computer Engineering.

Y.T. CHAN, BSc, MSc (Queen's), PhD (New Brunswick), PEng - Professor and Head of the Department of Electrical and Computer Engineering.

D. CHARBONNEAU, BEng (McGill), MA (Queen's), PhD (Queen's) - Assistant Professor in Military Psychology and Leadership.

R.L.G. CHARETTE, BA, BEd (Ottawa), MEd (Queen's) - Language Teacher.

M.L. CHAUDHRY, BA, MA (Panjab), PhD (Kurukshetra) - Professor of Mathematics and Computer Science.
A.Y. CHIKHANI, BSc (Cairo), MASc, PhD (Waterloo), PEng - Professor of Electrical and Computer Engineering and Dean of the Engineering Division.

P. CONSTANTINEAU, BA, MA (Montreal), PhD (Heidelberg) - Associate Professor of Politics.

R. CORMIER, BA (Hist) (Concordia) - Language Teacher

Y. CÔTÉ, BA (Laval), LèsL (Montreal), BEd (Montreal) - Language Teacher.

F. COUTURE, BSc (Eng), MSc (Eng) (Laval) - Network Administrator of Electrical and Computer Engineering.

K.A.M. CREBER, BSc, MSc (Western), PhD (Queen's) - Associate Professor of Chemistry and Chemical Engineering.

P. DALLAIN-KENNEDY, BA, SpécEns, (Montreal) - Language Teacher.

C. D'AMOURS, BScA (Ottawa), MScA (Ottawa), PhD (Ottawa) - Assistant Professor of Electrical and Computer Engineering.

CAPTAIN J.D. de BOER, rmc, BEng, MEng (RMC) - Lecturer in Physics.

MAJOR J.L. DEROME, rmc, BEng, MEng (RMC) - Assistant Professor Electrical and Computer Engineering.

CAPTAIN J. DOLBEC, rmc, BEng, MEng (RMC), PEng - Lecturer in Electrical and Computer Engineering.

K. DOYLE, BA (WLU), BEd (Toronto) - Resource Coordinator, Language Centre.

N.F. DREISZIGER, BA, MA, DipREES, PhD (Toronto) - Professor of History.

G. DROLET, BSc (Eng), MSc (Eng) (Laval), PhD (Laval) - Assistant Professor of Electrical and Computer Engineering.

CAPTAIN S. DUBOIS, rmc, BEng (RMC) MSc (Toronto), PhD (Queen's).

LIEUTENANT (N) D.H. DUERKSEN, BEng (McGill), MEng (RMC), PEng - Lecturer in Mechanical Engineering.

D.L. DUQUESNAY, BASc, MASc, PhD (Waterloo) PEng - Associate Professor of Mechanical Engineering.

P.J.S. DUNNETT, BSc (Bradford), MA, PhD (Simon Fraser) - Professor of Economics and Co-appointed ro the Business Administration Department.
W.E. EDER, Ing (Austria), MSc (Swansea), PEng - Professor of Mechanical Engineering.

M.-A. ERKI, BASc, MASc, PhD (Toronto), PEng - Professor and Head of the Department of Civil Engineering.

E.J. ERRINGTON, BA (Trent), BEd (Toronto), MA, PhD (Queen's) - Professor of History and Chair of the Department.

M.J.B. EVANS, BSc, PhD (Bristol), CChem (UK), FRSC (UK) - Professor of Chemistry and Chemical Engineering.

M. FAROOQ, BScEng (Panjab), MTech (IIT Delhi), PhD (New Brunswick), PEng - Professor of Electrical and Computer Engineering.

G. FERLAND, BSc(Eng), MSc(Eng) (Laval), PhD (Queen's) - Associate Professor of Electrical and Computer Engineering.

J.S. FINAN, BA, MA (Queen's), PhD (LSE) - Associate Professor of Politics.

E.J. FJARLIE, BASc, MASc (British Columbia), PhD (Saskatchewan), PEng - Professor of Mechanical Engineering.

CAPTAIN J.S. FOURNIER, BEng (École Polytechnique) - Lecturer in Mathematics and Computer Science.

B.J. FUGÈRE, BSc, MSc (Montreal), PhD (Hull) - Dean of the Science Division, Professor of Mathematics and Computer Science.

J.P. GAGNON, BA, LèsL (Laval), MA (Carleton), PhD (Laval) - Associate Professor of History.

Y. GAGNON, rmc, BA, MA (Laval), BA (RMC), PhD (University of California) - Professor of Politics.

J.E.D. GAUTHIER, rmc, BEng, MEng (RMC), PhD (Queen's) - Assistant Professor of Mechanical Engineering.

N. GAUTHIER, BA, BSc (Laval), MSc, PhD (Toronto) - Professor of Physics.

F. GENDRON, BA (Montreal), MA (McGill), PhD (La Sorbonne) - Associate Professor of History.

R. GERVAIS, ndc, BA, BSc, MSc, PhD, (Montreal), - Professor of Mathematics and Computer Science.

CAPTAIN C. GINGRAS, MTh (Laval), MCL (Ottawa), ICL (Ottawa), MSW (Windsor), RSW (Windsor) - Assistant Professor of Military Psychology and Leadership.

R. GODARD, Lic ès Sci, Dr 3rd Cycle (Paris), PhD (York) - Associate Professor of Mathematics and Computer Science.

J.R. GOSSELIN, BScA (École Polytechnique, Montreal), PhD (Cornell), PEng - Associate Professor of Physics.

W.J. GRAHAM, BA (Dalhousie), LLB, MBA (Queen's), PhD (Queen's) - Assistant Professor of Business Administration.

P. GRAVEL, ndc, BMath, MMath (Waterloo), PhD (Montreal) - Professor of Mathematics and Computer Science.

LIEUTENANT-COLONEL D.E. GREEN, CD, ptsc, plsc, pcsc, BSc (Dalhousie), MDA (Cranfield) - Directing Staff in Applied Military Science.

S.H. GUIMOND, BA (McGill), MSc (Montreal), DEA (Paris), PhD (Montreal) - Professor of Military Psychology and Leadership.

L.E. HADDAD, Lic ès Sci (Beyrouth), MSc, PhD (Montreal) - Associate Professor of Mathematics and Computer Science.

H. HASSAN-YARI, BA (Mashhad), MA, PhD (UQAM) - Assistant Professor of Politics.

MAJOR J.P.R. HAU, CD, BA (Winnipeg), MA (Manitoba) - Assistant Professor in Military Psychology and Leadership.

R.G. HAYCOCK, BA (WLU), MA (Waterloo), PhD (Western) - Dean of the Arts Division, Chair of the Defence Studies Committee, Professor of History.

M. A. HENNESSY, BA (British Colombia), MA, PhD (New Brunswick) - Assistant Professor of History.

CAPTAIN M.K. HEPPELL-MASYS, rmc, BEng (RMC) - Lecturer in Chemistry.

J.A. HÉROUX, BEng (McGill), MIng (École Polytechnique, Montreal), PEng - Assistant Professor of Civil Engineering.

M. HURLEY, BA, MA (Western), PhD (Queen's) - Associate Professor of English.

W.J. HURLEY, BSc (Queen's), MBA (York), PhD (Queen's) - Professor of Business Administration.

A.H. ION, BA, MA (McGill), PhD (Sheffield) - Professor in charge of Military and Strategic Studies Programme, Professor of History

G. ISAC, LSc, DSc (Bucarest) - Professor of Mathematics and Computer Science.

A.L. JENKINS, BA, MA (Oxon), MBA (McGill), PhD (Toronto), PEng - Professor of Business Administration.

K. JENSEN, BA (Sir Geo Wms), MEd (St. Michael's, Vermont) - Director, Language Centre.

E.V. JEZAK, AB (Harvard), PhD (Minnesota) - Associate Professor of Mathematics and Computer Science.

A. JNIFENE, BASc, MASc, PhD (Ottawa) - Assistant Professor of Mechanical Engineering.

R.E. JOHNSON, BSc (McMaster), MS, PhD (Penn) - Associate Professor of Mathematics and Computer Science.

S. KÉITA, BEng (Bamako), MSc (Laval), PhD (Laval) - Assistant Professor of Economics and Co-appointed to the Business Administration Department.

CAPTAIN M.G. KELLER, rmc, BEng, MEng (RMC), PEng - Assistant Professor of Electrical and Computer Engineering.

B.A. KELLY, BSc, BEd, MSc (Queen's) - Technical Officer, Department of Chemistry and Chemical Engineering.

J.C. KENNEDY, BA, MD, PhD (Toronto) - Professor (Adjunct) of Chemistry.

CAPTAIN H.T. KENNY, CD, rmc, BEng (RMC), MSc, PhD (Calgary) - Assistant Professor of Physics.

S.F.A. KETTLE, BSc (Leeds), PhD (Cantab) - Professor (Adjunct) of Chemistry and Chemical Engineering.

CAPTAIN J. D. KLAMMER, BA (Simon Fraser), MSc (Calgary) - Lecturer of Military Psychology and Leadership.

H.P. KLEPAK, CD, BA (McGill), MA (London), PhD (London) - Professor of History.

CAPTAIN G.S. KNIGHT, rmc, BEng, MEng (RMC), PEng - Assistant Professor in Electrical and Computer Engineering.

E. LABONTÉ, BA (Queen's) - Language Teacher.

G. LABONTÉ, BSc, MSc (Montreal), PhD (Alberta) - Professor of Mathematics and Computer Science.

G. LABRECQUE, BA, LLL, MA, PhD (Laval) - Assistant Professor of Geography.

A.R. LACHAÎNE, BSc, MSc, PhD (Ottawa) - Professor of Physics.

P.-A. LAGUEUX, BA, LèsL, MA (Laval), PhD (Paris) - Language Teacher.

P. LAMARCHE, BASc, MASc (Ottawa), PhD (Waterloo), ing - Assistant Professor of Civil Engineering.

J.P. LAPLANTE, BSc, MSc, PhD (Sherbrooke) - Professor of Chemistry and Head of the Department of Chemistry and Chemical Engineering.

CAPTAIN J.Y. LARAMÉE, BScA (Sherbrooke), MSc (Arizona) ing - Assistant Professor of Mechanical Engineering.

CAPTAIN J.C.H. LATOUR, rmc, BEng, MEng (RMC) - Lecturer in Electrical and Computer Engineering.

D. LAUZON, BA (Queen's) - Language Teacher.

CAPTAIN J.-F. LEGAULT, CD, rmc, BEng, MEng, PEng (RMC) - Lecturer in Chemistry and Chemical Engineering.

R. LEGAULT, BA, MA, PhD (Montreal) - Assistant Professor of History.

LIEUTENANT-COLONEL (Retired) G.P.J. LEMIEUX, CD, rmc, BA (College Ste Marie), BEng, MEng (RMC), PhD (Queen's), PEng - Associate Professor of Mechanical Engineering.

G. LEPORE, BSc (Sir George Williams), MA, PhD (McGill) - Associate Professot of Economics.

B.J. LEWIS, BSc (Toronto), MEng (UTIAS), PhD, PEng (Toronto) - Professor of Chemical Engineering and Professor in charge, Chemical and Materials Engineering Programme.

MAJOR W.J. LEWIS, CD, rmc, BEng, MEng (RMC), BEd, MEd (Queen's), MBA (Man) - Assistant Professor (Adjunct) of Chemistry and Chemical Engineering.

J.H. LINDSAY, BA, MA (Toronto) - Assistant Professor of Mathematics and Computer Science.

G.L.P. LORD, BA, BSc, MSc, PhD (Montreal) - Assistant Professor of Chemistry and Chemical Engineering.

LIEUTENANT-COLONEL J.E.J. LORD, CD, plsc, pcsc, BSc (CMR), MSc (Cranfield) - Directing Staff in of the Department of Applied Military Science.

L.Y. LUCIUK, BSc, MA (Queen's), PhD (Alberta) - Associate Professor of Geography.

J. MAILLETTE, BScA (Laval), MASc (Toronto), ing - Lecturer in Mechanical Engineering.

C. MAINGON, BEd (McGill), MA, PhD (British Columbia) - Associate Professor of French Studies.

R.F. MARSDEN, BSc (RMC), PhD (Brit Col) - Professor of Physics.

COLONEL H.J. MARSH, CD, OMM, laic, plsc, pcsc, awc, BSc (Queen's) - Course Director and Head of the Department of Applied Military Science.

L.C. MCDONOUGH, rmc, BA (RMC), MA, PhD (Queen's) - Associate Professor of Economics.

B.J.C. MCKERCHER, BA, MA (Alberta), PhD (London School of Economics), FR HistS - Professor of History and Chair of the War Studies Committee.

J. MCTAVISH, BA (Carleton), BEd (Ottawa), MA (Arizona State), ARCT (Toronto) Grad Diploma HR, Cert Ed Tech (McGill) - Language Teacher.

P.G. MEAGHER, BA, MA, PhD (Toronto) - Assistant Professor of French Studies.

CAPTAIN L. MEUNIER, rmc, BEng, MEng (RMC), PEng - Lecturer in Mechanical Engineering.

LIEUTENANT-COLONEL J.J.C. MICHAUD, CD, plsc, pcsc, BAd (CMR) -Director of Cadets.

W.C. MOFFATT, rmc, BSc (RMC), ndc, BSc, MSc (Queen's), ScD (MIT), PEng - Professor of Mechanical Engineering.

G.J.A. MONETTE, BA, MA (ens) (Montreal), MA, PhD (Queen's) - Assistant Professor of French Studies.

B. MONGEAU, BScA, MScA, DScA (École Politecnique) PEng - Professor of Electrical and Computer Engineering.

LIEUTENANT-COLONEL J.E. MORRISON, CD, ptsc, plsc, pcsc, BEng (Lakehead) - Directing Staff in the Department of Applied Military Science.

B.K. MUKHERJEE, BSc, PhD (St. Andrews) - Professor of Physics.

M. NEDVIDEK, BSc (Western), MSc (Queen's) PEng - Lecturer in Electrical and Computer Engineering.

K.E. NEILSON, BSc, BA, MA (Alberta), PhD (Cantab) - Professor of History.

L.J. NORRBY, Fil mag, Fil lic, Fil dr (Stockholm) - Associate Professor (Adjunct) of Chemistry and Chemical Engineering.

B.G. ONG, BSc (Queen's), SM (MIT), PhD (Queen's), PEng - Assistant Professor of Mathematics and Computer Science.

P.J. PAQUETTE, BCom (Montreal), MA, PhD (McGill) - Associate Professor of Economics.

C. PARÉ, BA (Windsor), BEd (Western) - Senior Teacher, Language Teacher.

LIEUTENANT (N) J.R.M. PIERRE, CD, rmc, BEng, MEng (RMC) - Lecturer in Chemistry and Chemical Engineering.

CAPTAIN (N) (R) B.J. PLANT, OMM, CD, ndc, PhD (MIT), FEIC, FIEEE, PEng - Principal and Director of Studies, Professor of Electrical and Computer Engineering.

CAPTAIN D.C.M. POIREL, CD, rmc, BEng (RMC), MEng (McGill) - Lecturer in Mechanical Engineering.

J.S. POLAND, BSc, DPhil (Sussex) - Assistant Professor (Adjunct) of Chemistry and Chemical Engineering.

R.H. POTTIER, BSc (Moncton), PhD (New Brunswick) - Professor of Chemistry and Chemical Engineering.

R.A. PRETE, BA (Saskatchewan), MA (Brigham Young), PhD (Alberta) - Associate Professor of History.

P. PROULX, BA, BScSoc (Laval) - Language Teacher.

J.H.P. QUENNEVILLE, rmc, BEng (RMC), MEng (École Polytechnique), PhD (Queen's) PEng - Associate Professor of Civil Engineering.

G. QUILLARD, BA, MA (Lille), MA (Toronto), PhD (Paris) - Professor of French Studies and Head of the Department.

D.S. QUINN, BSc, (Heriot-Watt), PhD (Edinburgh) - Associate Professor (Adjunct) of Chemistry and Chemical Engineering.

T.J. RACEY, BSc (Waterloo), BEd (Queen's), MSc, PhD (Guelph) - Professor of Physics.

M.H. RAHMAN, BSc (UET, Dhaka), MSc, PhD (Queen's), PEng - Associate Professor of Electrical and Computer Engineeting.

S. RANGANATHAN, ndc, BSc, MSc (Delhi), MTech (IIT), PhD (Cornell) - Professor of Physics.

K.J. REIMER, BSc, MSc (Calgary), PhD (Western), FCIC - Professor of Chemistry and Chemical Engineering.

P. R. ROBERGE, BA, BSc, MChA, PhD (Sherbrooke) - Professor of Materials Science in Department of Chemistry and Chemical Engineering.

LIEUTENANT-COLONEL E. R. ROBINSON, CD, plsc, rmc, pcsc, MEng (RMC), BSc (Carleton) PEng - Directing Staff in the Department of Applied Military Science.

P. L. ROCHON, BSc, PhD (Ottawa), PEng - Professor of Physics, Head of the Department of Physics.

MAJOR W.J. ROMAN, CD, rmc, BEng (RMC), MEng (RMC) - Assistant Professor of Business Administration.

J. ROUX, BA, Spéc (Lettres) (Algiers), LèsL (Montreal) - Language Teacher.

C.N. ROZON, BSc, MSc (Sherbrooke), PhD (Queen's), PEng - Associate Professor of Electrical and Computer Engineering.

D. RUTA, BA, LèsL, (Laval) - Language Teacher.

A. SAUVÉ, BA(Montreal), BPEP(Montreal), BétL (Québec) - Language Teacher.

CAPTAIN G. SAUVÉ, BEng, MEng (McGill) - Lecturer of Civil Engineering.

D. SCHERTER, BA (Toronto) - Language Teachet.

P.J. SCHURER, BSc, MSc, PhD (Groningen) - Professor of Physics.

G.E. SÉGUIN, BScA, MScA (Ottawa), PhD (Notre Dame) - Professor of Electrical and Computer Engineering.

C.D. SHEPARD, BSc, MA (Queen's), PhD (Illinois), PEng - Professor of Electrical and Computer Engineering.

L. SHIRINIAN, BA (Toronto), MA (Carleton), PhD (Montreal) - Associate Professor of English.

N. SHIRINIAN, BA, BPED (Toronto) - Language Teacher.

R.M. SHOUCRI, BSc (Alexandria), MSc (Laval), MSc (Illinois Institute of Technology), PhD (Laval), PEng - Professor of Mathematics and Computer Science.

B.W. SIMMS, CD, rmc, BEng (RMC), MASc (Toronto), PhD (Queen's), PEng - Professor, Director of Business Administration and Co-appointed to the Mechanical Engineering Department.

G.E. SIMONS, BMath (Waterloo), MSc (Toronto), PhD (Waterloo) - Associate Professor of Mathematics and Computer Science.

A.M. SKABARNICKI, BA (Toronto), MPhil, PhD (Yale) - Associate Professor of English.

D.R. SMITH, CD, rmc, BEng, MEng (RMC), PhD (Carleton), PEng - Associate Professot of Electrical and Computer Engineering and Directot of Computing and Audio Visual Services.

J.J. SOKOLSKY, BA (Toronto), MA (Johns Hopkins), PhD (Harvard)- Professor of Politics and Head of the Department of Politicals and Economics.

LIEUTENANT-COLONEL D.J. SOUTHEN, CD, rmc, plsc, psc, BA (RMC) - Director of Administration.

CAPTAIN D. SPRINGFORD, CD, rmc, BEng, MEng (RMC) - Lecturer in Mechanical Engineering.

P.S. SRI, BSc, MA (Madras), MA (McMaster), PhD (Alberta) - Professor of English.

M.W. STACEY, BSc (Brit Col), PhD (Dalhousie) - Associate Professot of Physics.

R.C. ST-JOHN, BA (Waterloo), MA, PhD (Westetn) - Associate Professor of Military Psychology and Leadership.

A. ST-PIERRE, BSc (Sherbrooke), BSc (UQ - Montreal), MBA, CMA, CGA - Professor of Business Administration.

J.A. STEWART, CD, rmc, BEng (RMC), MSc (Waterloo), PhD (Queen's), - Associate Professor of Civil Engineering.

M. TÉTREAULT, BIng, MScA (École Polytechnique), PhD (Queen's), PEng - Assistant Professor of Civil Engineering.

S.M. THOMAS, BSc, MSc (Kerala), PhD (Southern Illinois) - Associate Professot of Mathematics and Computer Science.

T.L. THOMAS, BA (Queen's), MA (Concordia), PhD (Carleton) - Assistant Professot of Politics.

W.T. THOMPSON, BASc, MASc, PhD (Totonto), PEng - Professor of Materials Engineering in Department of Chemistry and Chemical Engineering.

G.M. TORRIE, BSc, MSc, PhD (Toronto) - Professor of Chemistry and Chemical Engineering.

G. TOUSSAINT, BASpéc(Soc), BA (Esp) (Ottawa), Cert Ant (Haiti) - Language Teachet.

L. TRAHAN, BA SpecL (Montreal) - Language Teacher

J.M. TREDDENICK, CD, rmc, nadc, BA (RMC), PhD (Queen's) - Professor of Economics.

C. VACHON, BA, BEd (Laval) - Language Teacher.

CAPTAIN M. VILLENEUVE, BA (Ottawa) - Assistant Professor of Military Psychology and Leadership.

T.B. VINCENT, BA (Dalhousie), MA, PhD (Queen's) - Professot of English and Head of the Department of English.
E. WARD, LèsL (Damas), MA (Queen's) - Language Teacher.

D.L. WEHLAU, BSc (Western), MA, Phd (Brandeis) - Associate Professor of Mathematics and Computer Science.

R.D. WEIR, CD, BSc (New Brunswick), DIC (ICST), PhD (London), FCIC, CChem(UK), FRSC(UK), PEng - Dean of Graduate Studies and Research Division, Professor of Chemical Engineering.

A.J. WHITEHORN, BA (York), MA, PhD (Carleton) - Professor of Politics.

M.J. WILMUT, ndc, BSc (Sir Geo. Williams), MA, PhD (Queen's) - Professot of Mathematics and Computer Science.

J.D. WILSON, BSc (Edinburgh), PhD (London), PEng - Professor of Electrical and Computer Engineering.

J. WOLFE, BA (Ttinity College, Toronto), MA (Queen's), MAT ESL (St Michael's, Vermont) Language Teachet.

MAJOR (Retired) C.M. WORTLEY, CD, BEng, MEng (Nova Scotia Technical College), PEng - Assistant Ptofessot of Electrical and Computer Engineering.

L.S. WRIGHT, BSc (Queen's), PhD (Carleton), PEng - Professor of Physics.

D.A. YOUNG, CET - Technical Officet, Department of Civil Engineering.

J.D. YOUNG, BA, SpecPolSc (Guelph), MScSoc (Laval), PHD (Queen's) - Associate Ptofessot of Politics.

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ACTING/HEAD, MASSEY LIBRARY DIVISION - B. Cameron, BA (Sherbtooke), MLS (Western).

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(Zagreb); S. VanVolkingburgh, CET (St. Lawrence); C. Walsh, CET (ST. Lawrence)

ELECTRICAL AND COMPUTER ENGINEERING - M. A. Hanna, BSc, MSc(Cairo),
PhD(Calgary); Q. Ma, BEng(Beijing), PhD(Loughborough); A. Masoud, BSc(Jordan), MSc, PhD(Queen's); Y. Sun, BSc, MSc; M. Hossain, BSc(Rajshahi), MEng (Condordia); S. Ismail, BSc, MSc(Pakistan); D. Kuhn, rmc, BEng (RMC); D. Saleem, BSc(Baghdad), Msc (U.K.).

BUSINESS ADMINISTRATION - P.M. Anderson, BA (Brock), MSc (Queen's).

MECHANICAL ENGINEERING - D.R. Hamilton, CD, rmc, BEng (RMC), BS, MSME (USNPGS), PhD (Queen's), PEng; P.R.Underhill, BSc (Trent), PhD (York, UK); G. Wang, BE, ME (Beijing). M. Zhou, BEng, MEng (Beijing), PhD (Loughborough).

MATHEMATICS AND COMPUTER SCIENCE - Y. Liang, BSc, MSc (China), PhD (Leeds).

RMC CLUB OF CANADA

Lieutenant Colonel (Retired) D.M. Youngson, CD, rmc, psc - Executive-Director