National Defence / Défense nationale

ROYAL MILITARY COLLEGE OF CANADA

UNDERGRADUATE

CALENDAR 2004-2005

Canada

NOTICES

1. The course listings and academic programs described in this Calendar represent Senate-approved requirements and electives for completion of degree requirements. Circumstances beyond the control of the College, such as severe budget shortfalls, may result in restrictions in the number and range of course and program choices available to students as compared with those listed herein or in other College publications. The College reserves the right to limit access to courses or programs, and, at its discretion, to withdraw particular programs, options, or courses altogether. In such circumstances the College undertakes to the best of its ability to enable students registered in affected programs to complete their degree requirements in a satisfactory manner. Prospective students or new registrants are advised to consult the most current information available from the College and its various Faculties in printed or electronic form, as well as academic advisors for the programs concerned, before making registration decisions or course/program choices. The Senate and the Board of Governors of the Royal Military College of Canada reserve the right to invoke changes in this Calendar, in either its printed or electronic forms, at any time 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 Occupation selected. The Canadian Forces reserve the right to limit enrolment in any given course of studies.

3. Both men and women may apply for admission to the Royal Military College of Canada.

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

5. A copy of the current RMC calendar may be viewed on the Internet at: www.rmc-cmr.ca.

6. Additional information may be found on the Internet at: www.forces.gc.ca.

ACADEMIC CALENDAR 2004 - 2005

FALL TERM 2004 - SEPTEMBER 2004

6 Sep	Classes start (years 2, 3, and 4)
13 Sep	Classes start (year 1)
11 Oct	Thanksgiving (no classes)
18 – 20 Oct	Mid-term tests
11 Nov	Remembrance Day (statutory holiday)
3 Dec	End of classes
6- 17 Dec	Examinations
18 Dec	Christmas Holiday begins

WINTER TERM 2005 - JANUARY 2005

10 Jan	Classes start
21 - 25 Feb	Reading Week
1-11 Mar	Mid-term tests
15 Apr	End of classes
18 - 29 Apr	Examinations
25 – 28 Apr	Easter
20 May	Convocation
21 May	Commissioning Parade
24 - 27 May	Supplemental examinations

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GENERAL INFORMATION ON THE ROYAL MILITARY COLLEGE OF CANADA

ROLE

The primary 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 Royal Military College of Canada is a national university for educating and developing leaders committed to serving Canada. To achieve this goal, the demands of an RMC education go beyond academic achievement. The cadet programme consists of four components or "pillars" which each officer cadet must satisfy in order to graduate with an RMC degree. These four pillars are: Academics, Leadership, Physical Fitness and Bilingualism, each of which is incorporated throughout the formal and informal elements of the RMC programme.

The courses of instruction at the Royal Military College of Canada provide a sound and balanced liberal, scientific and military education. In addition, 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, self-discipline, fair play, and fellowship. An Officer Cadet in many ways, in the classroom, on parade, in sports and in other extracurricular activities, is given an opportunity to lead and influence, to learn the art of personnel management, and to experience the value of good teamwork. The co-mingling of English-speaking and French-speaking Cadets from all provinces, and enrolled 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 challenges of national defence. The goal is to produce military leaders dedicated to serving Canada, who are motivated, well educated, ethical, bilingual and physically fit.

HISTORICAL SKETCH

ROYAL MILITARY COLLEGE OF CANADA

In l874, 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 l June l876, the Military College of Canada opened its doors to a class of eighteen gentlemen cadets, "The Old Eighteen". Two years later, in l878, 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 downtown 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 include 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 gear 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 Canada and in many other 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 military commitments worldwide - serving in the navy, army or air force in the Middle East, Asia, Central America, Africa, Eastern and Central Europe and Afghanistan.

"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.

CADET PROGRAMME - ADMISSION REQUIREMENTS

GENERAL QUALIFICATIONS

For admission, a candidate must:

a. be a Canadian citizen;

b. meet the minimum medical standards required for Canadian Forces enrolment;

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

d. 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. Students with family responsibilities will find this particularly demanding.

ACADEMIC QUALIFICATIONS

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

a. the ARTS which leads to a degree in ARTS, including Business Administration , and

b. the SCIENCE/ENGINEERING COURSE option, which leads to a degree in ARTS, SCIENCE or ENGINEERING.

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 enrolled 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 include several courses in the Humanities, while students in Arts are required to successfully undertake university level courses in mathematics and the sciences. The requirements for admission to each programme are summarized below, with specific course requirements listed in the section entitled "Required Academic Subjects".

ADMISSION REQUIREMENTS FOR THE ARTS PROGRAMME

In addition to the requirements outlined above, applicants for admission to the Arts programme must have completed a university preparatory English course at the High School leaving level (normally Gr 12 or the provincial equivalent). A grade 12 university preparatory course in Mathematics (preferably Calculus) is also strongly recommended. Applicants who lack Grade 12 Mathematics must have completed Grade 11 Mathematics at the university preparatory level, and will be required to take an additional pre-university level Mathematics course as part of their First Year Arts programme. Grade 12 Chemistry and Physics are preferred but are not required. Candidates who have not completed Grade 12 Chemistry and Physics will be required to complete makeup courses as part of their RMC programme. See the section entitled "Required Academic Subjects" for a listing of the acceptable courses for admission, specified by province.

ADMISSION REQUIREMENTS FOR THE SCIENCE/ ENGINEERING PROGRAMME

In addition to the admission requirements outlined above, applicants for admission to the Science/Engineering programme must have completed a university preparatory course at the High School leaving level (normally Gr 12 or the provincial equivalent) in each of the following subjects: English, Mathematics (Algebra/Geometry/Trigonometry and Calculus if available within the provincial system), Chemistry, and Physics. See the section entitled "Required Academic Subjects" for a listing of the acceptable courses for admission, specified by province.

Note: Applicants intending to pursue their studies in French should offer equivalent French courses in lieu of the required courses in English.

REQUIRED ACADEMIC SUBJECTS

NEWFOUNDLAND & LABRADOR

ARTS

English 3201
Mathematics 2205 or 2204 acceptable*
Mathematics 3205 or 3207 desirable

SCIENCE/ENGINEERING

English 3201
Mathematics 3205
Mathematics 3207
Chemistry 3202
Physics 3204

NOVA SCOTIA

ARTS

English 12
Advanced Mathematics 11 or Mathematics 11 acceptable*
Mathematics 12 or Advanced Mathematics 12 desirable

SCIENCE/ENGINEERING

English 12
Advanced Mathematics 12
Pre-Calculus Mathematics12
Chemistry 12
Physics 12

PRINCE EDWARD ISLAND

ARTS

English 621A
Mathematics 521B or 521A acceptable*
Mathematics 611B or 621B or 621A desirable

SCIENCE/ENGINEERING

English 621A
Mathematics 621B
Mathematics 611B
Chemistry 621A
Physics 621A

NEW BRUNSWICK (ENGLISH SECTOR)

ARTS

English 121 or 122
Mathematics 111 or 112 acceptable*
Mathematics 120 Advanced or 120 Calculus desirable

SCIENCE/ENGINEERING

English 121 or 122
Mathematics 120 Advanced
Mathematics 120 Calculus
Chemistry 121 or 122
Physics 121 or 122

NEW BRUNSWICK (FRENCH SECTOR)

ARTS

French 10411
Mathematics 30321 acceptable*
Mathematics 30411 or 30412 desirable

SCIENCE/ENGINEERING

French 10411
Mathematics 30411
Mathematics 30412
Chemistry 52411
Physics 51311

QUEBEC (CEGEP 1)

ARTS

English: two core courses
Mathematics - Secondary V 536 or 526 acceptable*
CEGEP 1 level Mathematics in Calculus desirable

SCIENCE/ENGINEERING

English: two core courses
Mathematics: two of; 201-GGF-05, 201-NYA-05, 201-NYC-05 or 201-NYB-05
Chemistry 202-NYA-05
Physics 203-NYA-05

QUEBEC (GRADE 12)

ARTS

A course of study as for the Ontario Arts requirements listed below.

SCIENCE/ENGINEERING

A course of study as for the Ontario Science/Engineering requirements listed below.

ONTARIO

ARTS

English 12 U
Mathematics 11 U or 11M acceptable*
Mathematics 12 U Functions and Intro Calculus desirable

SCIENCE/ENGINEERING

English 12 U
Mathematics 12U – Functions and Intro Calculus
Mathematics 12U - Geometry and Discrete Mathematics
Chemistry 12 U
Physics 12 U

MANITOBA

ARTS

English 40
Mathematics 30S Pre-Calculus acceptable*
Mathematics 40S Pre-Calculus desirable

SCIENCE/ENGINEERING

English 40
Mathematics 40S Pre-Calculus
Chemistry 40
Physics 40

SASKATCHEWAN

ARTS

English A30 and B30
Mathematics 20 acceptable*
Mathematics A30, B30 or C30 desirable

(SCIENCE/ENGINEERING

English A30 and B30
Mathematics B30
Mathematics C30
Chemistry 30
Physics 30

ALBERTA/NORTHWEST TERRITORIES/NUNAVUT

ARTS

English 30
Pure Mathematics 20
Pure Mathematics 30 or 31 desirable

SCIENCE/ENGINEERING

English 30
Pure Mathematics 30
Mathematics 31
Chemistry 30
Physics 30

BRITISH COLUMBIA/YUKON

ARTS

English 12
Mathematics 11 Principles or 11 Applications acceptable*
Mathematics 12 Principles or Calculus desirable

SCIENCE/ENGINEERING

English 12
Mathematics 12 Principles
Mathematics 12 Calculus recommended
Chemistry 12
Physics 12

Notes:

*1. Grade 11 mathematics courses listed above are the minimum acceptable level for admission to an Arts programme. Candidates without one of the desired Grade 12 mathematics courses will be required to take an additional pre-university mathematics course as part of their First Year course of study.

2. 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.

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

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

5. Required course codes may vary in response to changes in provincial education course coding systems.

NON-CANADIAN EDUCATION SYSTEMS

Students who complete secondary school through education systems other than Canadian provincial systems will be considered individually but will be required to meet equivalent standards to those indicated above. Applicants must offer as a minimum a secondary school Mathematics course that is a prerequisite for the study of calculus. Admission requirements for commonly encountered education systems are outlined below.

GENERAL CERTIFICATE OF SECONDARY EDUCATION (G.C.S.E.)

Arts Programme. Candidates from systems offering the General Certificate of Secondary Education (G.C.S.E.) must normally offer seven subjects, at least two of which must be at the Advanced Level (excluding the General Paper). To be eligible for consideration, grades at both the Advanced and Ordinary Levels normally must not be lower than "C". Transfer Credits are not given.

Science/Engineering Programme. Candidates with a G.C.S.E. must offer seven subjects of which a minimum of two must be at the Advanced Level. Advanced Level subjects normally must include Mathematics and either Physics or Chemistry. If either Physics or Chemistry is not taken at the Advanced Level, it must be taken at the Ordinary Level. English is required at the Ordinary Level. Admission will be normally refused if the grades in Mathematics, Physics, Chemistry or English are lower than "C".

INTERNATIONAL BACCALAUREATE SYSTEM

Arts Programme. Full-diploma candidates who pass six subjects with at least three at the Higher Level, and who accumulate a grade total of 28, exclusive of bonus points, may be considered for admission. Higher Level English must be taken at least at the Subsidiary Level. Candidates granted the IB Diploma may receive transfer credits on the basis of subjects completed with a grade of 5 or better.

Science/Engineering Programme. Students will be considered for admission with an International Baccalaureate Diploma with an overall total of 28 grade points or better, exclusive of bonus points. Mathematics, Chemistry and Physics taken at the Higher Level are preferred; however, one of the above may be taken at the Subsidiary Level. English must be taken at least at the Subsidiary Level.

USA SYSTEMS

Arts Programme. The minimum entrance requirement for candidates from the United States is completion of a full secondary school programme with high standing. The programme must include at least four full-year credit courses in English. SAT I (both Verbal and Mathematical) results, rank in class, and an official profile of the school will also be considered.

Science/Engineering Programme. The minimum entrance requirement for candidates from the United States is completion of a full secondary school programme with high standing. The programme must include at least four, and preferably five, full-year credit courses in Mathematics and English and one, preferably two, full-year credit courses in each of Physics and Chemistry. SAT I (both Verbal and Mathematical) results, SAT II results in one of Mathematics, Physics (preferable) or Chemistry, rank in class and an official profile of the school will also be considered. Advanced Placement courses in prerequisite subjects provide excellent preparation, but Transfer Credits are not given.

TRANSFER CREDIT AND ADVANCED STANDING

Advanced Standing to the Second Year may be granted upon admission to students whose prior post secondary 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 that have been assessed as duplicating RMC courses, provided that 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 preclude enrolment.

PREPARATORY YEAR

An optional year of pre-university studies for the degree programmes offered at RMC is available for students not yet academically ready to enter the College. Any candidate who has completed secondary V in Quebec, or has completed a 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 on completion of high school and will do some military orientation training prior to starting class in September. During this qualifying year the students are housed on campus at Fort Saint-Jean where courses and most activities take place. The summer after Preparatory Year and before coming to RMC students will need to successfully complete a Basic Officers Training Course. 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.

CADET PROGRAMME – 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 monthly 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 vacation 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 three to five years (depending on the number of years of subsidized education) in a regular component of the Canadian Forces.

An Officer Cadet who is enrolled under the ROTP may apply for release without obligation after the first of November of the first academic year and prior to the commencement of the 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 from any Canadian Forces Recruiting Centre.

RESERVE ENTRY TRAINING PLAN (RETP)

The purpose of the Reserve Entry Training Plan (RETP) is to educate and train selected Primary Reserve candidates at the Royal Military College of Canada. Successful candidates will become officers in the Reserve Force or may be considered for transfer to the Regular Force. 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 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 except that Landed Immigrants are also eligible.
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 2004/2005 academic year, and may be increased or lowered without notice:

a. an annual College Fee of $1524;

b. a charge for room and board of approximately $3000 for the nine months of the academic year; and

c. annual Mess and other recreational fees approximately $325.

Payment of fees and costs can be arranged in two installments, the first upon registration, and the second by the 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 non-commissioned members in the Regular component of 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 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 ROTP. On graduation, both groups of officer cadets are commissioned and promoted.

INITIAL BACCALAUREATE DEGREE PROGRAMME (IBDP)

The Initial Baccalaureate Degree Programme (IBDP) is a DND-sponsored subsidization plan open to commissioned officers serving in the Regular component of 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 IBDP, refer to the Canadian Forces Military College section in this Calendar.

ADMISSION PROCEDURE

APPLICATION

All civilian applicants to the full-time undergraduate programme offered at the College must apply in person to a Canadian Forces Recruiting Centre. As part of the application process, applicants must compete for Canadian Forces enrolment under Regular Officer Training Plan (ROTP) or the Reserve Entry Training Plan (RETP). Information concerning the application process may be obtained from any Canadian Forces Recruiting Centre (CFRC) at 1-800-856-8488.

The deadline for application for admission under the ROTP or RETP is normally early March of the academic year prior to entry, but may be earlier for certain military occupations.

A birth certificate, social insurance number 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 Counselor 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 Counselor 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 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.

MILITARY STRUCTURE OF THE COLLEGE

SERVICE QUALIFICATIONS

All who enter the Royal Military College are enrolled 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 enrolled 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.

CADET WING

The Director of Cadets (DCdts) is the Commanding Officer of the Cadet 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 Cadet Wing and civilian staff. The Division Commanders and Squadron Commanders of the Cadet Wing advise, guide, counsel, and evaluate all cadets. The Cadet Wing staff is responsible for military training programmes for all officer cadets including physical fitness, drill, and officer development. They are also available to answer cadet enquiries and give advice on military matters.

CADET ORGANIZATION

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 enrolled under the University Training Plan -Non- commissioned Members (UTPNCM). Under the guidance of commissioned officers (the Squadron Commanders) and civilian staff (athletics), this organization controls cadet life at the College within limits laid down by the Commandant.

Senior officer cadets of Third and Fourth year hold staff and command appointments in the Cadet 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 Block Duty Cadet (BDC) and Cadet Wing Duty Officer (CWDO).

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 fitness 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 fitness, 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 teamwork 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 at the beginning of October, 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 high level of fitness, 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.

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:

0600 hrs	Réveil
0700 hrs	Réveil, on mornings without a scheduled activity group activity
0630 - 0800 hrs	Wash, Dress
	Sick Parade
	Morning activities
	Breakfast
0800 – 1140hrs	Classes
1150 - 1330 hrs	Lunch 1, 2
1340 - 1615 hrs	Classes
1630 - 1830 hrs	Sports (Tue, Thu)
1630 - 1800 hrs	Tutorials (Mon)
1700 - 1930 hrs	Dinner
1900 - 2200 hrs	Study hours
2300 - 0600 hrs	Silent hours

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 Fourth Year officer cadets. Other senior cadets are allocated single rooms on a space available basis. In the First Year, officer cadets are placed in doubled rooms. 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.

CANEX

The CANEX is a small store for personal articles, souvenirs, snacks and dry cleaning.

CHAPLAIN SERVICES

The Chaplains – Protestant and Roman Catholic – conduct regular Sunday Services of Divine Worship. Officer Cadets and other College personnel and their families are invited to attend all regularly scheduled activities. All religious denominations are catered for.

Officer Cadets will find during Bible Study groups, padre's hours and at other occasions, opportunities for valuable interchange with the Chaplains and each other on ethical, moral and religious issues. The Chaplains are always available for individual counseling.

RMC ATHLETIC BOARD

The RMC Athletic Board is responsible for the planning, control, supervision, and financial support of all officially organized sports and recreational activities of the staff and

cadets, except for those activities specifically excluded from its jurisdiction by the Commandant. All cadets are members. Coordinating authority is vested in the Athletic Director.

VARSITY SPORTS

The College is a member of the Ontario Universities Athletic (OUA). The OUA is one of the four intercollegiate associations which make up the Canadian Interuniversity Sports (CIS). The College has 7 Varsity teams competing in the following OUA sports: basketball (men and women), volleyball (men and women), fencing (men and women), soccer (men and women), hockey (men). RMC teams also take part in a number of invitational competitions, as well as the traditional international hockey game with West Point (United States Military Academy). RMC also has Varsity level teams in the following sports: pistol and rifle and taekwondo.

RECREATION CLUBS
(SUBJECT TO CHANGE DEPENDING ON INTEREST)

Equestrian, cycling, yachting, war games, social dance, stage band, climbing, windsurfing, astronomy, video editing, photo, arts, fish & game, old 18, jiu-jitsu, karate, precision drill, outdoors, drama, broomball, debating, power flying, rowing, stage band, judo and Duke of Edinburgh.

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 local 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.

PIPE AND DRUM BAND

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 BAND

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 Pipes and Drums at Mess Dinners, high school tours and other College functions. Previous experience, although welcome, is not necessary, as novice instruction is available. There are approximately 20 dancers in the section.

CHOIR

The RMC Choir also performs at Mess Dinners and other College functions including the famous Concert in Scarlet. There are about 40 members in the section.

PHYSICAL EDUCATION AND ATHLETICS

INTRODUCTION

The RMC Physical Education 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 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 CIS, OUA, 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 variety of activities. Intramural participation is compulsory for those cadets who are not part of a 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

One of the objectives at RMC is to develop in its cadets the ability to communicate in the second official language. An officer must be able to understand, communicate and give orders in both languages. Consequently second language training is mandatory for all students who do not possess the required standards. Three language skills are measured by the Second Language Evaluation System: reading, writing and oral interaction. Each skill is assessed at four levels of language proficiency: A, B, C and E. Upon arrival at RMC, students are tested in order to place them in a class appropriate for their level and ability. Small, homogeneous classes, usually composed of an average of 8 students are created to give students the opportunity to progress according to their abilities, to interact and enhance their learning. Five 50 minute periods of instruction are given every week as part of the regular study program.

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. RMC is a bilingual institution. Students who have reached the functional level in their second language may register in courses in the language of their choice. 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 semester. Second year students who do not achieve the exemption level by the end of the academic year take an intensive summer course of about 250 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. All publications, orders and routines are given in the language of the week to encourage practice to the extent permitted. First year Anglophone students and first year francophone students share rooms in order to facilitate communication in both languages.

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

Every effort is made to grant 14 working days of annual leave during the summer months before or after the summer training period.

PAY

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

BASIC OFFICER TRAINING (BOT)

This training is common for all cadets and is taken in two parts. The first part, the Initial Assessment Period (IAP), is done during a seven-week period prior to the start of the First Year academic term. The second part, the Basic officer Training Programme (BOTP), includes further military training conducted during the academic year. The aim of Basic Officer Training 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 BOT, cadets receive instruction in weapons, map using, leadership theory and exercise, first aid, general service knowledge, and military writing.

PHASES II, III AND IV

During summers following the Second, Third, and Fourth Years, officer cadets receive further formal military training in the form of Phase training, Summer Second Language training (SSLT), or on-the-job training (OJT). 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 laboratories 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 to purchase and maintain a personal computer, associated peripherals, and software which satisfy the specifications established for the programme in which the student is enrolled. Several departments provide micro computer laboratories dedicated to their own programs 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 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 John W. Spurr

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 AND 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 details, 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.

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 enrolled 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.

Professional Engineers of Ontario Scholarships are awarded to eligible students. (Fall)

a. Entrance Scholarship

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

(1) one to the student who obtained the highest academic standing; and
(2) one to the student who exhibited exceptional role model qualities through participation in non-academic activities while maintaining above average marks.

The Dr. P.F. 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. (Fall)

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 Traffic Control or Air Weapons Pilot by reason of academic standing, character, and proficiency in classification training. This award was first instituted in 1951 by Colonel C.S. MacInnes in memory of his brother the late Brigadier-General Duncan Sayre MacInnes, CMG,DSO, Royal Engineers, who graduated with honours from RMC in 1897. (Spring)

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. (Fall)

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. (Fall)

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. (Fall)

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 or an approved international university following graduation. (Spring)

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. (Fall)

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 enrolled 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 "cadets" and officers enrolled under the University Training Plan, Officers (UTPO).

MEDALS

The Governor General's Silver Medal is awarded to the student 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. (Spring)

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. (Fall)

Military Leadership Excellence Award (Gold Medal, Third Year; Silver Medal, Second Year; Bronze Medal, First Year). This medal is awarded to the ROTP/RETP cadet attaining the highest standards of proficiency in each of the four pillars in the Third, Second and First Year of the RMC programme. (Fall)

AWARDS, PRIZES, AND TROPHIES

FOURTH YEAR

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 four pillars of the RMC programme. (Spring)

The Leinster Shield is awarded to the ROTP/RETP squadron amassing the most points in the Commandant's Competition, with events involving military, athletic and academic prowess. After each event, the squadron leading in the competition flies its pennant from a designated flagstaff and takes the right-of-the-line position on parade. At year's end, the winning squadron will take the right-of-the-line on the Commissioning Parade. The position of right-of-the-line is traditionally a place of honour, as this was the unit that lead the Army into battle. The Leinster Shield was originally inaugurated in 1892 by the 1st Battalion, Prince of Wales Leinster Regiment (Royal Canadians) for their inter-company challenge shield. The shield came to RMC in 1922 when the Leinster Plate was entrusted to Canada on the disbanding of the Regiment. The Class of 1933 refurbished the Shield for use in the Commandant's Competition. (Spring)

The J. Douglas Young Sword of Excellence is awarded in conjunction with the Leinster Shield on Graduation Parade to the Cadet Squadron Senior (CSS) of the Squadron winning the Commandant's Competition. The sword will be carried by the CSS of the Squadron until the next graduation parade. The two CSSs of the winning squadron will receive a commemorative plaque for personal retention. The College Number of the Honour Slate CSS will be engraved on the scabbard to permit a continuing record. The J. Douglas Young Sword of Excellence was donated by the Class of 1933 in memory of their Classmate #2360 John Douglas Young, who was killed in action on D-Day, 6 June 1944. (Spring)

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. (Spring)

The Department of National Defence Award of Merit is awarded to the graduating ROTP/RETP cadet attaining highest standards in each of the four pillars of the RMC programme. The winner of the Wilkinson Sword of Honour is excluded from consideration for this award. (Spring)

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. (Spring)

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. This trophy was given for annual competition by the Class of 1932 in memory of their classmates, No. 2039 T.W.E. Harris and No. 2021 J.G. Bigelow (Spring)

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 Engineering, provided that the overall average is at least A-and that the course has been completed in the normal number of years. (Spring)

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. (Spring)

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

Engineer, based on high standards of proficiency in each of the four pillars. (Spring)

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, based on high standards of proficiency in each of the four pillars. (Spring)

The Royal Canadian Artillery Association Prize is awarded to the best Land Operations cadet (Armoured, Artillery, Infantry) in the graduating class, based on high standards of proficiency in each of the four pillars. (Spring)

The Air Force Association of Canada Award of Merit is awarded in alternate years to the best Air Operations cadet in the graduating class, based on high standards of proficiency in each of the four pillars. (Spring)

The Air Cadet League of Canada Award of Merit is awarded in alternate years to the best Air Operations cadet in the graduating class, based on high standards of proficiency in each of the four pillars. (Spring)

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, based on high standards of proficiency in each of the four pillars. (Spring)

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. (Spring)

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

The Stuart S. Barton Science Award is awarded to the student who has maintained the highest overall academic average in the 4th year of an Honours Science program, provided this average is above 80%. (Spring)

CMR St-Jean Ex-Cadet Prize is awarded to the ROTP/RETP Fourth Year Cadet with the most improved second language since entry in the Military College while attaining a superior performance in the other pillars of the programme. (Spring)

The Delta Seminars Prize is awarded to the engineering student with the highest mark in PSE/F401B. (Spring)

Departmental 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. (Spring)

THIRD YEAR

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

The Corps of Guides Prize is awarded to the cadet who obtains the highest marks in Surveying and Terrain Analysis. (Fall)

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

The Howard B. Ripstein Award of Excellence (Third Year) is awarded to an Air, Army, and Navy cadet who have completed the third year of undergraduate studies and has demonstrated excellence in all four pillars of the Royal Military College of Canada programme. (Fall)

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. (Fall)

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

The Grant Prize is awarded to the cadet in Second Year attaining the highest physical fitness score in the Physical Fitness Test. (Fall)

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

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. (Fall)

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. (Fall)

The Fulton Award is awarded to the cadet in First Year attaining the highest physical fitness score in the Physical Fitness Test. (Fall)

The Hope Medallion is awarded to the recruit showing best potential of leadership during the Recruit Camp. This is awarded to First Year Class Senior. (Fall)

The Howard B. Ripstein Award of Excellence (First Year) is awarded to an Air, Army, and Navy cadet who have completed the first year of undergraduate studies and summer training and has demonstrated excellence in all four pillars of the Royal Military College of Canada programme. (Fall)

The Captain John Bart Teamwork Prize is awarded to the First Year team that wins the College's Obstacle Course Competition. It given in conjunction with the Captain John Bart Leadership Award which is awarded to the best leader in each Squadron during the Obstacle Race. (Fall)

ANY YEAR

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

The Shield of Duty is awarded to the Officer Cadet who best exemplifies the qualities of civic duty that are the hallmark of an Ex-Cadet, through contributions to the College, the Club, and his/her community. (Spring)

PROGRAMME AND DEPARTMENTAL PRIZES

The MPL Departmental Prize is awarded annually to the cadet in the Fourth Year who obtains the highest aggregate mark over four years in the required courses of study in the Department of Military Psychology and Leadership. The recipient must have a minimum mark of A- in the required Fourth Year MPL course. (Spring)

Programme Prizes - Third Year. A prize is awarded annually to the cadet standing highest in each academic programme in the Third Year providing the year has been passed without condition and an overall average of A- or above has been attained. (Fall)

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. (Fall)

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 four pillars of the RMC programme. (Spring)

The Class of 78 - Dr. Walter S. Avis UTPNCM Honour Shield. The UTPNCM Honour Shield is presented annually to the UTPNCM graduate who has contributed 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 supporter of the squadron. (Spring)

Canadian Forces Military College Medals and Awards (graduating student). A medal is awarded annually in each of Honours Arts, Honours Science, and Engineering to the graduating student entering CFMC with Advanced Standing who, having First Class honours, stands highest in the course of study, provided that an overall average of Second Class honours without failures or conditions was maintained in the Third Year. (Spring)

Prizes will be awarded annually to those students entering CFMC with Advanced Standing who stand highest among the Advanced Standing CFMC students in the years and programmes listed below, provided that the year has been clearly passed without condition and that an overall weighted average of A- or better has been obtained (Spring):

a. Second Year of a three-year (Pass) programme;
b. Third Year of three-year (Pass) programme; and
c. Third Year of a four-year programme in each of Arts, Science,and Engineering.

UTPNCM Drill and Physical Education Departmental Prize. Prizes are awarded:

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

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

PRESTIGIOUS SCHOLARSHIPS

NSERC Scholarship (Natural Sciences & Engineering Research Council of Canada) (Spring)

The National Sciences and Research Council of Canada (NSERC) fosters the discovery and application of knowledge through the support of university research and the training of scientists and engineers. The Council promotes the use of this knowledge to build a strong national economy and improve the quality of life of all Canadians.

The Athlone-Vanier Engineering Fellowships (Spring)

Under the original Athlone-Fellowship Scheme, which operated between Canada and Britain for a period of twenty years up to 1972, eight hundred young Canadian engineers pursued post-graduate studies of industrial training in Great Britain. These engineers (The "Athlones") consider that the scheme was of substantial benefit to their careers and feel that similar benefits should be made available to young engineers in Canada, the UK and possibly other European countries.

With the active collaboration of the Engineering Institute of Canada and of the British Government, a group of Athlones established in 1989 a new scheme which would function on a reciprocal basis between participating countries. The new programme is known as the Athlone-Vanier Engineering Fellowships, acknowledging as well the bicultural character of Canada. The new organization was incorporated under the above names on April 26, 1989, by letters patent under the Canada Corporation Act.

The objective of the organization is to give young Canadian engineers the opportunity to develop new technical expertise in engineering fields in various countries, particularly in the United Kingdom and France.

War Studies Scholarship

RMC promotes the development of first-rate scholars in the interdisciplinary programme of War Studies by means of several scholarships at RMC to provide the tuition fee for students in MA of PhD studies. The objective of this programme is to refine critical and scholarly skills and, as a result, produce a better educated officer corps.

DRDC (Defence Research & Development Canada) – RMC (Royal Military College of Canada) Fellowships (Spring)

Defence Research and Development Canada is the national authority for providing scientific, engineering and technological leadership in the advancement and maintenance of Canada's defence capabilities. The Branch's R&D programme is carried out directly in five laboratories located across Canada and indirectly through support at the Royal Military College of Canada in Kingston Ontario.

DRDC supports the development of high-calibre Canadians in engineering, humanities and science through a number of fellowships tenable at the Royal Military College of Canada that provide financial assistance to graduate students engaged in master's or doctoral programmes in engineering or humanities or natural sciences.

ACADEMIC PROGRAMMES

INTRODUCTION

The Royal Military College offers academic programmes leading to the undergraduate degrees listed below. It should be noted that not all programmes are open to cadets under the ROTP and RETP entry plans.

DEGREE PROGRAMME	CONCENTRATION OR SPECIALIZATION	ACADEMIC YEARS (or equivalent) to complete
Bachelor of Arts (Honours) (BA (Honours)	English French History Politics [1] Economics[1] Military and Strategic Studies Business Administration [2]	4
Bachelor of Arts (BA) with major concentration	English French History Politics [1] Economics[1] Military and Strategic Studies Business Administration	4
Bachelor of Arts (BA)[3]	No major concentration Minor concentration only	3
Bachelor of Science (Honours) (BSc (Honours))	Chemistry Mathematics and Computer Science Physics Space Science Or combination of two majors	4
Bachelor of Science (BSc) with major concentration	Chemistry Computer Science Mathematics Physics Space Science Or combination of two majors	4
Bachelor of Science (BSc)[3]	No major concentration Minor concentration only	3
Bachelor of Engineering (BEng)	Chemical Engineering Civil Engineering Computer Engineering Electrical Engineering Mechanical Engineering	4
Bachelor of Military Arts and Science (Honours) (BMASc(Honours))	No major concentration	4
Bachelor of Military Arts and Science (BMASc)	No major concentration	3

Notes:

1. For students commencing 2nd Year prior to September 2002, only a combined major in Politics and Economics is offered.
2. The BA (Honours) programme in Business Administration was introduced in September 2002 and is not open to students who commenced 2nd Year Business Administration prior to this date.
3. The general BA and BSc programmes without a major concentration are not normally open to ROTP and RETP cadets. Cadets may only transfer into these programmes with special permission from the Dean of the Division.
4. The BMASc (Honours) and BMASc degrees are offered through the Division of Continuing Studies and are not open to ROTP or RETP cadets. For more information on the specific requirements of these degrees consult the Continuing Studies Calendar.

4 YEAR DEGREE

For ROTP and RETP cadets, the normal duration of the programme of studies at RMC is four years, no matter which degree is sought. However, permission may be granted for a student to repeat not more than one failed year, provided performance in all other areas is satisfactory.

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

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

GENERAL REQUIREMENTS

The Core Curriculum represents the minimum content in certain areas which are required content of all RMC degrees. However, all students need not pass exactly the same pattern of courses in order to complete all core curriculum requirements.

The Core Curriculum contains within it two separate themes. The first theme is the minimum standard for mathematics (which also includes logic and information technology) and sciences (chemistry and physics). The second theme is the basic requirements in the Canadian history, language and culture, Politics, International relations and leadership and ethics.

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 programmes.

Professional Military Training is required of all cadets in all four years.

FIRST YEAR

First Year may be completed in either Arts or in the Science/Engineering Programme.

Students who complete the First Year Science/Engineering Programme may proceed in Engineering or in Science in subsequent years.

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

SECOND YEAR

In Second Year, courses of study are available in Arts, Science, or Engineering. Details may be found in the Course Outlines section.

ARTS

The following fields of study in Arts are available, for both BA (Honours) and BA programmes:

a. English
b. French Studies
c. History
d. Politics
e. Economics
f. Military And Strategic Studies
g. Business Administration.

Students in the Arts will normally select a major in Second Year. The major will consist of a set of courses required by the programme, together with required Arts and Science Core Curriculum courses, and electives. Students wishing to obtain an Honours degree in a major 0will be required to complete additional courses and requirements as specified by the department of study. Application for entry into Honours programmes will be made to the department and will normally be done during Third Year (or at the beginning of Third Year in the case of Business Administration.)

In addition to the major, students may also develop a minor in one subject (History, English, French Studies, Politics and Economics, Business Administration, Military Strategic Studies or Military Psychology and Leadership) which is not an integral part of their major concentration. A minor concentration is also available in Military Psychology and Leadership.

SCIENCE

Students who have completed the First Year Science/Engineering Programme with a combined average in Chemistry, Mathematics Computer Science and Physics of B- or better may enter an Honours programme in Science in Second Year. Students who have completed the First Year Science/Engineering Programme may enter any major concentration programme in Science. A minor programme either in Science or in Arts may also be selected with the permission of the appropriate Department Heads and Deans.

The course of study selected in the Second Year will normally be continued in the Third Year.

A detailed description and the requirements for each programme can be found in the appropriate departmental calendar entry.

HONOURS SCIENCE

A BSc (Honours) degree is normally a four year degree programme and is offered in the following disciplines:

a. Mathematics and Computer Science
b. Chemistry
c. Physics
d. Space Science
e a combination of two majors.

It is intended for candidates preparing for post-graduate scholarships and graduate school. Students entering an Honours programme require the permission of the appropriate department(s).

A BSc (Honours) degree will be awarded if the following conditions are completed:

a. The Core Curriculum;
b. the First Year Science/Engineering Programme; and
c. 25 semester courses in science or engineering at the Second, Third and Fourth Year level either:

i. in a single discipline as specified in the appropriate departmental regulations; (for a BSc(Honours) with a single major) or
ii. in 12 different semester courses from each of two disciplines as specified in appropriate departmental regulations (for a BSc (Honours) with a double major) plus one science elective
iii. Honours Thesis (or its equivalent) in one of the Honours disciplines. The thesis will count as two semester courses for a total equivalent to 45 semester courses.

A candidate must normally maintain a B- average in the Science/Engineering courses in the Second, Third and Fourth Years of the programme of study or may be required to withdraw from the BSc (Honours) programme and continue in a BSc programme with a major or double major.

MAJORS

A BSc with a major is normally a four-year programme and is intended to prepare the candidate for post-graduate studies and can be obtained in the following disciplines:

a. Chemistry
b. Computer Science
c. Mathematics
d. Physics
e. Space Science

A BSc degree with a major will be awarded upon successful completion of:

a. the Core Curriculum;
b. the Science/Engineering Programme for First Year; and
c. twenty-four half year courses or their equivalent in science and/or engineering at the Second, Third and Fourth Year level as approved by the Dean of Science. Twelve of these courses will be in the major as specified by the major department. Departmental regulations should be consulted for details. This programme has a total equivalent to 42 semester courses

COMBINED MAJORS

With the permission of the Dean of Science, a candidate who successfully completes the requirements of a major programme for two disciplines will be awarded a BSc with two majors.
Minors

A minor course of study in the Science Division consists of 8 semester courses or equivalent in the minor subject as specified by departmental regulations. Candidates for a degree in science may undertake a minor in the Division of Science or in the Division of Arts with the permission of the appropriate Dean. The Arts minor will conform to requirements specified by the Division of Arts.

Note: A major programme can be combined with a minor in another discipline, such as a major in Physics and a minor in Business Administration. Other combinations are available, restricted to timetable considerations, and subject to the regulations of the departments involved.

GENERAL SCIENCE

A BSc degree without a major will be awarded upon successful completion of:

a. the Core Curriculum;
b. the Science/Engineering Programme for First Year; and
c. equivalent to 12 half year courses of science or engineering at the Second, Third or Fourth Year level, 8 of which satisfy the minor requirement of a discipline of the Science Division

Note: Course approval and the permission of the Dean of Science are required to enter this program

Conditions of Entry

The General Science Programme is open, under exceptional circumstances to students who have successfully completed the First Year Science/Engineering Programme. The permission of the Dean of Science is required in all cases.

Engineering

Students completing First Year Science/Engineering may proceed in an engineering programme for which they have qualified. An overall average of at least 55 percent is normally required for admission into any engineering degree programme. Students are required to choose a specific degree programme at the beginning of Second Year. The available engineering programmes are Chemical Engineering, Civil Engineering, Computer Engineering, Electrical Engineering and Mechanical Engineering. Admission to an engineering programme requires the approval of the Head of the Department. There is sufficient commonality in all programmes to allow students to change their specialization without the need to take additional courses up until the end of the first semester of second year. Students wishing to change their specialization during the first semester will require the approval of the Heads of both affected departments. Students may also change their specialization at any time in the second term, but may be required to make up specific courses in order to satisfy the requirements of their chosen degree. Changes at this time will require the approval of the Dean of Engineering and the Heads of both departments.

Third And Fourth Year Arts

Arts students will continue in their major and minor programmes in Third and Fourth Year. Specified course requirements from Second Year will complement the selected programme. Application to an Honours programme in the major in the second term of Third Year (or at the beginning of Third Year in the case of Business Administration.)

In addition to requirements of Second Language Training, Physical Education, and Professional Military Training, students will continue with their required courses for their major. The mandatory courses in Military Psychology and Leadership and other core curriculum requirements 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 requirements (i.e., whether the student has entered an Honours programme in their major -- see course outlines section) and timetable limitations.

Third And Fourth Year Science

The concentration selected in the Second Year will normally be continued in the Third and Fourth Year.

The description and the requirements for each of these programmes can be found in the calendar regulations of the appropriate departments.

A student who has successfully completed the Second Year engineering may enter a science programme in Third Year with the permission of the Dean of Science.

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 programme of study for the purposes of Academic Regulations.

THIRD AND FOURTH YEAR ENGINEERING

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

With the approval of the Dean of Engineering, students who complete Second Year of a science programme may be permitted to enter Third Year Engineering with some additional courses.

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

3 YEAR DEGREES

See appropriate section under the Division of Arts, Division of Science, and Division of Continuing Studies.

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 an "A/B" as the seventh and eight characters. This indicates 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 in the box below are the subject codes for courses given in English and their counterpart for courses given in French.

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 credit for the course is also shown with each course description.

BAE	Business Administration	AAF	Administration des affaires
CEE	Civil Engineering	GCF	Génie civil
CCE	Chemistry and Chemical Engineering	CCF	Chimie et génie chimique
CSE	Computer Science	INF	Informatique
ECE	Economics	ECF	Économie politique
EEE	Electrical Engineering	GEF	Génie électrique
ENE	English*	FRF	Français
GEE	General Engineering	IGF	Ingénierie générale
GOE	Geography	GOF	Géographie
HIE	History	HIF	Histoire
MAE	Mathematics	MAF	Mathématiques
MEE	Mechanical Engineering	GMF	Génie mécanique
MSE	Military and Strategic Studies	EMF	Études militaires et stratégiques
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.*

ATH	Athletic pillar	ATH	Pilier athlétique
PMT	Professional Military Training	FPM	Formation professionnelle militaire

TABLE 1 : FIRST YEAR ARTS

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
ENE110: Introduction to Literary Studies and University Writing Skills	12	2	3	-	3	6	3	-	3	6	
HIE102: Canada	12	2	3	-	3	6	3	-	3	6	
PSE112: Introduction to Psychology	12	2	3	-	3	6	3	-	3	6	
ECE102: Elements of Economics	12	2	3	-	3	6	3	-	3	6	
POE106: Canadian Civics and Society	12	2	3	-	3	6	3	-	3	6	
MAE106A: Discrete Mathematics with Probability	6	1	3	-	3	6	-	-	-	-	
MAE108B: Elements of Differential Calculus	6	1	-	-	-	-	3	1	4	4	**A**
SLEFR1:	-	-	-	5	5	2	-	5	5	2	
ATH101:	-	-	-	2	2	-	-	2	2	-	
PMT 100 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**72**	**12**	**18**	**9**	**27**	**38**	**18**	**10**	**28**	**36**	

NOTES:

A. Students who do not have high school leaving mathematics (OAC, Gr 12, or CEGEP 1) must also take MAE103A in the fall term.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 2 : FIRST YEAR SCIENCE / ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
ENE100: Introduction to Literary Studies and University Writing Skills	12	2	3	-	3	6	3	-	3	6	
PSE123B: Fundamentals of Human Psychology	6	1	-	-	-	-	3	-	3	3	
MAE101: Introductory Calculus	14	2	3	1	4	4	3	1	4	4	
MAE129A: Introduction to Algebra	7	1	3	1	4	4	-	-	-	-	
CSE101B: Introduction to Algorithms and Computing	7	1	-	-	-	-	3	1	4	4	
PHE104: General Physics	18	2.5	3	3	6	6	3	3	6	6	
CCE101: Engineering Chemistry	16	2.5	3	2	5	5	3	2	5	5	
SLEFR1:	-	-	-	6	6	2	-	6	6	2	
ATH101:	-	-	-	2	2	-	-	2	2	-	
PMT 100 Series:	-	-	-	2	2	-	-	2	2	-	**A**
Total	**80**	**12**	**15**	**17**	**32**	**27**	**18**	**17**	**35**	**30**	

NOTE:

A. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 3 : SECOND YEAR ARTS

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
ENE200: Cross-currents of Thought in 20-th Century Literature	12	2	3	-	3	6	3	-	3	6	
HIE202: Introduction to Canadian Military History	12	2	3	-	3	6	3	-	3	6	
MAE208A: Elements of integral Calculus (and Linear Algebra)	6	1	3	1	4	4	-	-	-	-	
Arts Electives: 4 term courses to be taken over Fall and Winter terms.	24	4	6	-	6	12	6	-	6	12	**A,B,C**
Science Core	6 (12)	1 (2)	(3)	-	(3)	(6)	3	-	3	6	**D**
SLEFR2:	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**E**
Total	**60 (66)**	**10 (11)**	**15**	**10**	**25**	**30**	**15**	**9**	**24**	**32**	

NOTES: on Arts Electives

A. No more than the equivalent of two full-year courses can be taken from the same department (not including core courses in English and 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. For details on individual programmes and course descriptions see the entries under the respective Departments. Student 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.

NOTE: on Science Core

D. See Table 5 concerning Science Core requirements. A list of courses offered is available from the Registrar's Office.

NOTE: other

E. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 4 : SECOND YEAR ARTS - BUSINESS ADMINISTRATION

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
ENE200: Cross-currents of Thought in 20-th Century Literature	12	2	3	-	3	6	3	-	3	6	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	6	
MAE208A: Elements of integral Calculus (and Linear Algebra)	6	1	3	1	4	4	-	-	-	-	
BAE204: Financial Accounting	12	2	3	-	3	6	3	-	3	6	
BAE220A: Introduction to Information Technology	6	1	3	-	3	6	-	-	-	-	
BAE242B: Quantitative Methods I	6	1	-	-	-	-	3	-	3	6	
ECE206A: Macroeconomic Theory and Policy I (Honours only)	6	1	3	-	3	6	-	-	-	-	**A**
ECE224A: Microeconomics I	6	1	3	-	3	6	-	-	-	-	
Elective (Arts or Science)	6	1	-	-	-	-	3	-	3	6	**B**
Science Core	6 (12)	1 (2)	(3)	-	(3)	(6)	3	-	3	6	**C**
SLEFR2	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**D**
Total Honours:	**72 (78)**	**12 (13)**	**18**	**10**	**28**	**36**	**18**	**9**	**27**	**38**	
Total Major:	**66 (72)**	**11 (12)**	**15**	**10**	**25**	**30**	**18**	**9**	**27**	**38**	

NOTES:

A. Required for Honours; recommended for Major.

B. A list of courses for the major and electives can be obtained from the Registrar's Office. The list includes courses for minors.

C. See Table 5 concering Science Core requirements. These courses can be taken in either Fall or Winter term. A list of courses offered is available from the Registrar's Office.

D. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 5: SCIENCE REQUIREMENTS FOR ARTS AND BUSINESS ADMINISTRATION

Subjects completed at High School Leaving Level (Gr 12 or OAC)	Required Science Courses	Total Science Core credits required	Total Science Core credits required (Bus Admin only)
Without Chemistry	MAE108B + MAE208A + MAE106A + CCE106A + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	7	6 (no IT)
Without Physics	MAE108B + MAE208A + MAE106A + PHE202B + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	7	6 (no IT)
Without Mathematics	MAE103A + MAE108B + MAE208A + MAE106A + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	7	6 (no IT)
Without Chemistry and Physics	MAE108B + MAE208A + MAE106A + CCE106A + PHE202B + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	8	7 (no IT)
Without Chemistry and Mathematics	MAE103A + MAE108B + MAE208A + MAE106A + CCE106A + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	8	7 (no IT)
Without Physics and Mathematics	MAE103A + MAE108B + MAE208A + MAE106A + PHE202B + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	8	7 (no IT)
Without Chemistry, Physics and Mathematics	MAE103A + MAE108B + MAE208A + MAE106A + CCE106A + PHE202B + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course	9	8 (no IT)
Chemistry, Physics and Mathematics completed	MAE108B + MAE208A + MAE106A + 1 Chemistry and 1 Physics at the 200-300 level + 1 Information Technology Course + other Science Elective	7	5 (no IT or other Science Elective)

COMMENTS:

1. Students should take courses in the following order:

First Year: MAE106A + MAE108B OR MAE103A + MAE106A + MAE108B

Second Year: MAE 208A + one science core course OR MAE208A + CCE106A and/or PHE202B

Third and Fourth Year: all remaining science core requirements, should be spread evenly over the two years.

2. For Business Administration the course BAE220A (or BAE308A and BAE410A combined) satisfies the Information Technology (IT) core curriculum requirement, and BAE242A counts as a Science Elective.

TABLE 6: SECOND YEAR SCIENCE

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	3	
HIE207A: Canada	6	1	3	-	3	3	-	-	-	-	
POE205B: Canadian Civics and Society	6	1	-	-	-	-	3	-	3	3	
MAE201: Intermediate Calculus	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE203: Engineering Calculus	14	2	3	1	4	4	3	1	4	4	
Science Courses: These numbers are approximations. For details on individual programmes (Honours, Double Major, Major, and Minor) and course descriptions see the entries under the respective Departments.	36 (42)	6 (7)	9 (+)	(?)	9 (+)	9 (+)	9	(?)	9	9	**B**
SLEFR2	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**C**
Total	**68 (74)**	**11 (12)**	**15 (+)**	**10 (+)**	**25 (+)**	**18 (+)**	**18**	**10 (+)**	**28**	**21**	

NOTES:

A. MAE201 is recommended for those intending to do Honours Mathematics and Computer Science or to do a major in Mathematics. Other students may take MAE201 with permission of the Mathematics and Computer Science Department Head.

B. Students should consult the yearly listing of courses offered provided by the Registrar's Office. Students wishing to obtain a minor must obtain the Department Head's approval for the minor. Extra courses are permitted but require the approval of the Dean of Science.

C. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 7 : SECOND YEAR CHEMICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	3	
HIE207A: Canada	6	1	3	-	3	3	-	-	-	-	
POE205B: Canadian Civics and Society	6	1	-	-	-	-	3	-	3	3	
MAE201: Intermediate Calculus	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE203: Engineering Calculus	14	2	3	1	4	4	3	1	4	4	
MAE209B: Probability & Statistics	6	1	-	-	-	-	3	-	3	4	
MAE229A: Linear Algebra	7	1	3	1	4	4	-	-	-	-	
PHE207A: Electricity and Magnetism	7	1	3	1	4	4	-	-	-	-	
Expt. Physics	-	-	-	3	3	3	-	-	-	-	**B**
CCE220A: Introduction to Materials Science and Engineering Materials	6	1	3	-	3	3	-	-	-	-	
CCE240B: Introduction to Biological Sciences	6	1	-	-	-	-	3	-	3	3	
GEE231B: Introduction to Mechanics of Materials	6	1	-	-	-	-	2	2	4	4	
GEE241B: Electrical Technology	8	1	-	-	-	-	3	2	5	5	
GEE265A: Engineering Graphics - I	6	1	1	2	3	3	-	-	-	-	
GEE283A: Engineering Economics	4	0.5	2	-	2	4	-	-	-	-	
SLEFR2:	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**C**
Total	**88**	**13.5**	**18**	**17**	**35**	**30**	**20**	**14**	**34**	**28**	

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. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 8 : SECOND YEAR CIVIL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	3	
HIE207A: Canada	6	1	3	-	3	3	-	-	-	-	
POE205B: Canadian Civics and Society	6	1	-	-	-	-	3	-	3	3	
MAE201: Intermediate Calculus	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE203: Engineering Calculus	14	2	3	1	4	4	3	1	4	4	
MAE209B: Probability & Statistics	6	1	-	-	-	-	3	-	3	4	
MAE229A: Linear Algebra	7	1	3	1	4	4	-	-	-	-	
PHE205A: Mechanics	7	1	3	1	4	4	-	-	-	-	
Expt. Physics	-	-	-	3	3	3	-	-	-	-	**B**
CCE220A: Introduction to Materials Science and Engineering Materials	6	1	3	-	3	3	-	-	-	-	
GEE231B: Introduction to Mechanics of Materials	6	1	-	-	-	-	2	2	4	4	
GEE235B: Introduction to Earth Sciences	8	1	-	-	-	-	3	2	5	5	
GEE265A: Engineering Graphics - I	6	1	1	2	3	3	-	-	-	-	
GEE267B: Engineering Graphics - II	6	1	-	-	-	-	1	2	3	3	
GEE283A: Engineering Economics	4	0.5	2	-	2	4	-	-	-	-	
SLEFR2:	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**C**
Total	**88**	**13.5**	**18**	**17**	**35**	**30**	**18**	**16**	**34**	**28**	

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. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 9 : SECOND YEAR ELECTRICAL AND COMPUTER ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	3	
HIE207A: Canada	6	1	3	-	3	3	-	-	-	-	
POE205B: Canadian Civics and Society	6	1	-	-	-	-	3	-	3	3	
MAE201: Intermediate Calculus	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE203: Engineering Calculus	14	2	3	1	4	4	3	1	4	4	
MAE209B: Probability & Statistics	6	1	-	-	-	-	3	-	3	4	
MAE229A: Linear Algebra	7	1	3	1	4	4	-	-	-	-	
PHE229B: Electromagnetism	6	1	-	-	-	-	3	-	3	3	
CCE220A: Introduction to Materials Science and Engineering Materials	6	1	3	-	3	3	-	-	-	-	
GEE241B: Electrical Technology	8	1	-	-	-	-	3	2	5	5	
GEE243B: Applied Computer Programming	8	1	-	-	-	-	3	2	5	5	
GEE245A: Logic Design	8	1	3	2	5	5	-	-	-	-	
GEE265A: Engineering Graphics - I	6	1	1	2	3	3	-	-	-	-	
GEE283A: Engineering Economics	4	0.5	2	-	2	4	-	-	-	-	
SLEFR2:	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**91**	**13.5**	**18**	**15**	**33**	**28**	**21**	**14**	**35**	**29**	

NOTES:

A. Qualified engineering students who wish to take MAE201 are encouraged to do so.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 10: SECOND YEAR MECHANICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
HIE203B: Canadian Mililitary History	6	1	-	-	-	-	3	-	3	3	
HIE207A: Canada	6	1	3	-	3	3	-	-	-	-	
POE205B: Canadian Civics and Society	6	1	-	-	-	-	3	-	3	3	
MAE201: Intermediate Calculus	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE203: Engineering Calculus	14	2	3	1	4	4	3	1	4	4	
MAE209B: Probability & Statistics	6	1	-	-	-	-	3	-	3	4	
MAE229A: Linear Algebra	7	1	3	1	4	4	-	-	-	-	
PHE205A: Mechanics	7	1	3	1	4	4	-	-	-	-	
Expt. Physics	-	-	-	3	3	3	-	-	-	-	**B**
CCE220A: Introduction to Materials Science and Engineering Materials	6	1	3	-	3	3	-	-	-	-	
GEE231B: Introduction to Mechanics of Materials	6	1	-	-	-	-	2	2	4	4	
GEE241B: Electrical Technology	8	1	-	-	-	-	3	2	5	5	
GEE265A: Engineering Graphics - I	6	1	1	2	3	3	-	-	-	-	
GEE267B: Engineering Graphics - II	6	1	-	-	-	-	1	2	3	3	
GEE283A: Engineering Economics	4	0.5	2	-	2	4	-	-	-	-	
SLEFR2:	-	-	-	5	5	2	-	5	5	2	
ATH201:	-	-	-	2	2	-	-	2	2	-	
PMT 200 Series:	-	-	-	2	2	-	-	2	2	-	**C**
Total	**88**	**13.5**	**18**	**17**	**35**	**30**	**18**	**16**	**34**	**28**	

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. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 11 : THIRD YEAR ARTS

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271A: Introduction to Military History and Thought	6	1	3	-	3	6	-	-	-	-	**A**
Arts Electives: 6 term courses to be taken over Fall and Winter Terms.	36	6	9	-	9	18	9	-	9	18	**B**
Science Core	12	2	3	-	3	6	3	-	3	6	**C**
SLEFR3:	-	-	-	5	5	2	-	5	5	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**D**
Total	**60**	**10**	**18**	**9**	**27**	**35**	**12**	**9**	**21**	**26**	

NOTES:

A. All students in 3rd year must take HIE271A. However, students in History or in Military and Strategic Studies must take HIE270 in its place.

B. For details on individual programmes and course descriptions see the entries under the respective departments. Student 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.

C. See Table 5 concering Science Core requirements. These courses can be taken in either Fall or Winter term. A list of courses offered is available from the Registrar's Office.

D. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 12: THIRD YEAR ARTS - BUSINESS ADMINISTRATION
(Academic Year 2004-2005 only - changes anticipated for 2005-2006)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271A: Introduction to Military History and Thought	6	1	3	-	3	6	-	-	-	-	
BAE300B: Finance	6	1	-	-	-	-	3	-	3	6	
BAE304A: Management Accounting	6	1	3	-	3	6	-	-	-	-	
BAE316B: Intermediate Marketing	6	1	-	-	-	-	3	-	3	6	
BAE320A: Business Law	6	1	3	-	3	6	-	-	-	-	
BAE330A: Organizational Theory	6	1	3	-	3	6	-	-	-	-	
BAE342B: Quantitative Methods II	6	1	-	-	-	-	3	-	3	6	
BAE344B: Operations Management	6	1	-	-	-	-	3	-	3	6	
Science Core	6	1	-	-	-	-	3	-	3	6	**A**
SLEFR3:	-	-		5	5	2	-	5	5	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**60**	**10**	**15**	**9**	**24**	**29**	**15**	**9**	**24**	**32**	

NOTES:

A. See Table 5 concering Science Core requirements. These courses can be taken in either Fall or Winter term. A list of courses offered is available from the Registrar's Office.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 13 : THIRD YEAR SCIENCE

		WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
				Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership		6	1	3	-	3	3	-	-	-	-	
HIE271B: Introduction to Military History and Thought		6	1	-	-	-	-	3	-	3	6	
Science Courses: These numbers are approximations. For details on individual programmes (Honours, Double Major, Major, and Minor) and course descriptions see the entries under the respective Departments.	**Honours:**	54 (60)	9 (10)	15	(?)	15	15	12 (+)	(?)	12 (+)	12 (+)	**A**
	Double Major:	54	9	15	(?)	15	15	12	(?)	12	12	**A**
	Major:	48 (54)	8 (9)	12 (+)	(?)	12 (+)	12 (+)	12	(?)	12	12	**A**
SLEFR3		-		-	4	4	2	-	4	4	2	
ATH301:		-		-	2	2	-	-	2	2	-	
PMT 300 Series:		-	-	-	2	2	-	-	2	2	-	**B**
Total	**Honours:**	**66 (72)**	**11 (12)**	**18**	**8 (+)**	**26**	**20**	**15 (+)**	**8 (+)**	**23 (+)**	**17 (+)**	
	Double Major:	**66**	**11**	**18**	**8 (+)**	**26**	**20**	**15**	**8 (+)**	**23**	**17**	
	Major:	**60 (66)**	**10 (11)**	**15 (+)**	**8 (+)**	**23 (+)**	**17 (+)**	**15**	**8 (+)**	**23**	**17**	

NOTES:

A. Students should consult the yearly listing of courses offered provided by the Registrar's Office. Students wishing to obtain a minor must obtain the Department Head's approval for the minor. Extra courses are permitted but require the approval of the Dean of Science.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 14 : THIRD YEAR CHEMICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271B: Introduction to Military History and Thought	6	1	-	-	-	-	3	-	3	6	
MAE315: Applied Mathematics for Chemical and Materials Engineers	12	2	3	-	3	3	3	-	3	3	
CCE301: Fluid Mechanics and Heat Transfer	9	1.5	2	-	2	2	2	-	2	2	
CCE303A: Energy and Fuels Engineering	6	1	3	-	3	3	-	-	-	-	
CCE311: Applied Thermodynamics	10	1.5	2	-	2	2	3	-	3	3	
CCE317B: Kinetics and Surface Science	8	1	-	-	-	-	4	-	4	4	
CCE321: Engineering Laboratory	7	1	-	3	3	3	-	4	4	4	
CCE337B: Seminar	0	0	-	-	-	-	-	0.5	0.5	-	
CCE341: Organic Chemistry	14	2	3	2	5	5	2	2	4	4	
CCE345A: Materials Science: Metallurgical Laboratory	3	0.5	-	3	3	3	-	-	-	-	
CCE353A: Materials Science: Metallurgy	6	1	3	-	3	3	-	-	-	-	
CCE385B: Biochemistry and Microbiology for Environmental Science and Engineering	6	1	-	-	-	-	3	-	3	3	
MEE321B: Heat Engines Laboratory	(2)	-	-	-	-	-	-	(2)	(2)	(2)	**A**
SLEFR3:	-	-	-	4	4	2	-	4	4	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**93**	**14.5**	**19**	**16**	**35**	**29**	**20**	**14.5**	**34.5**	**31**	

NOTES:

A. MEE321B is part of CCE321 part II. Marks will be combined and reported in CCE321.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 15: THIRD YEAR CIVIL ENGINEERING5

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
CEE303A: Strength of Materials	8	1	3	2	5	5	-	-	-	-	
CEE305B: Structural Theory	7	1	-	-	-	-	3	2	5	5	
CEE311B: Engineering Materials and Introduction to Steel and Timber Design	7	1	-	-	-	-	3	2	5	5	
CEE317A: Civil Engineering Analysis I	6	1	2	2	4	4	-	-	-	-	
CEE319B: Civil Engineering Analysis II	5	0.5	-	-	-	-	2	1	3	3	
CEE343A: Hydrology	5	1	2	1	3	3	-	-	-	-	
CEE355A: Soil Mechanics	8	1	3	2	5	5	-	-	-	-	
CEE360A: Geomatics I	7	1	2	2	4	4	-	-	-	-	
CEE362B: Geomatics II	6	1	-	-	-	-	2	2	4	4	
CEE363B: Survey Field School*	6	1	-	-	-	-	-	-	-	-	
CEE385A: Introduction to Environmental Engineering	7	1	3	1	4	4	-	-	-	-	
CEE387B: Highway Design	7	1	-	-	-	-	3	2	5	5	
MEE315B: Fluid Mechanics	7	1	-	-	-	-	3	2	5	5	
SLEFR3:	-		-	4	4	2	-	4	4	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**A**
Total	**92**	**13.5**	**18**	**18**	**36**	**30**	**16**	**19**	**35**	**29**	

NOTES:

* The duration of the Winter Term is 12 weeks followed by a two week examination period. The two-week survey field school is held immediately after the examinations.

A. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 16 : THIRD YEAR COMPUTER ENGINEERING
(Academic Year 2004-2005 only - changes anticipated for 2005-2006)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271B: Introduction to Military History and Thought	6	1	-	-	-	-	3	-	3	6	
MAE302: Differential Equations and complex Analysis	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	A
MAE305: Differential Equations, Boundary Value Problems and Complex Variables	14	2	3	1	4	4	3	1	4	4	
CSE365A: Computer Program Design	8	1	3	2	5	5	-	-	-	-	
EEE307B: Computer Interfacing Techniques	8	1	-	-	-	-	3	2	5	5	
EEE321B: Object-Oriented Techniques	8	1	-	-	-	-	3	2	5	5	
EEE341B: Electronic Devices and Circuits	8	1	-	-	-	-	3	2	5	5	
EEE343A: Basic Network Analysis	8	1	3	2	5	5	-	-	-	-	
EEE345A: Logic Design	8	1	3	2	5	5	-	-	-	-	
EEE351A: Computer Organization and Assembly Language	8	1	3	2	5	5	-	-	-	-	
EEE361B: Digital Design and HDL Modelling	8	1	-	-	-	-	3	2	5	5	
SLEFR3:	-		-	4	4	2	-	4	4	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	B
Total	90	12	18	17	35	29	18	17	35	32	

NOTES:

A. 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.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 17 : THIRD YEAR ELECTRICAL ENGINEERING
(Academic Year 2004-2005 only - changes anticipated for 2005-2006)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271B: Introduction to Military History and Thought	6	1	-	-	-	-	3	-	3	6	
MAE302: Differential Equations and complex Analysis	(14)	(2)	(3)	(1)	(4)	(4)	(3)	(1)	(4)	(4)	**A**
MAE305: Differential Equations, Boundary Value Problems and Complex Variables	14	2	3	1	4	4	3	1	4	4	
EEE301B: Applied Electromagnetics	8	1	-	-	-	-	3	2	5	5	
EEE307B: Computer Interfacing Techniques	8	1	-	-	-	-	3	2	5	5	
EEE311B: Signals and Systems	8	1	-	-	-	-	3	2	5	5	
EEE331A: Energy Conversion	8	1	3	2	5	5	-	-	-	-	
EEE341B: Electronic Devices and Circuits	8	1	-	-	-	-	3	2	5	5	
EEE343A: Basic Network Analysis	8	1	3	2	5	5	-	-	-	-	
EEE345A: Logic Design	8	1	3	2	5	5	-	-	-	-	
EEE351A: Computer Organization and Assembly Language	8	1	3	2	5	5	-	-	-	-	
SLEFR3:	-		-	4	4	2	-	4	4	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**90**	**12**	**18**	**17**	**35**	**29**	**18**	**17**	**35**	**32**	

NOTES:

A. 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.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 18 : THIRD YEAR MECHANICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE301A: Organizational Behaviour & Leadership	6	1	3	-	3	3	-	-	-	-	
HIE271B: Introduction to Military History and Thought	6	1	-	-	-	-	3	-	3	6	
MAE327: Differential Equations, Boundary Value Problems and Complex Variables	9	1.5	2	0.5	2.5	2.5	2	0.5	2.5	2.5	
MEE301B: Machine Design	8	1	-	-	-	-	3	1.5	4.5	4.5	
MEE303B: Engineering Design	8	1	-	-	-	-	3	1.5	4.5	4.5	
MEE311B: Fluid Mechanics - I	8	1	-	-	-	-	3	1.5	4.5	4.5	
MEE331A: Strength of Materials	8	1	3	1.5	4.5	4.5	-	-	-	-	
MEE333A: Metallurgy and Engineering Materials	8	1	3	1.5	4.5	4.5	-	-	-	-	
MEE335A: Introduction to Manufacturing Processes	4	0.5	1	2	3	3	-	-	-	-	
MEE345A: Applied Mechanics	8	1	3	1.5	4.5	4.5					
MEE351A: Thermodynamics I	8	1	3	1.5	4.5	4.5	-	-	-	-	
MEE353B: Thermodynamics II	8	1	-	-	-	-	3	1.5	4.5	4.5	
MEE383B: Measurement Devices and Systems	8	1	-	-	-	-	3	1.5	4.5	4.5	
SLEFR3:	-		-	4	4	2	-	4	4	2	
ATH301:	-	-	-	2	2	-	-	2	2	-	
PMT 300 Series:	-	-	-	2	2	-	-	2	2	-	**A**
Total	**97**	**13**	**18**	**16.5**	**34.5**	**28.5**	**20**	**16**	**36**	**33**	

NOTE:

A. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 19 : FOURTH YEAR ARTS
(Academic Year 2004-2005 and 2005-2006 only - changes anticipated for 2006-2007)

		WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
				Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics		6	1	-	-	-	-	3	-	3	6	
POE316A: Introduction to International Relations		6	1	3	-	3	6	-	-	-	-	**A**
Arts Electives: courses to be taken over Fall and Winter Terms.	**Honours:**	36	6	9	-	9	18	9	-	9	18	**B**
	Major:	30	5	6	-	6	12	9	-	9	18	**B**
Science Core		6 (12)	1 (2)	3	-	3	6	(3)	-	(3)	(6)	**C**
SLEFR4		-		-	5	5	2	-	5	5	2	
ATH401:		-		-	2	2	-	-	2	2	-	
PMT 400 Series:		-	-	-	2	2	-	-	2	2	-	**D**
Total	**Honours:**	**54 (60)**	**9 (10)**	**15**	**9**	**24**	**32**	**12**	**9**	**21**	**26**	
	Major:	**48 (54)**	**8 (9)**	**12**	**9**	**21**	**26**	**12**	**9**	**21**	**26**	

NOTES:

A. All students in 4th year must take POE316A. However, students who have already taken the course must replace it with another elective.

B. For details on individual programme requirements and course descriptions see the entries under the respective Departments. Students should consult the yearly listing of courses offered provide 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.

C. See Table 5 concering Science Core requirements. These courses can be taken in either Fall or Winter term. A list of courses offered is available from the Registrar's Office.

D. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 20: FOURTH YEAR ARTS - BUSINESS ADMINISTRATION
(Academic Year 2004-2005 only - changes anticipated for 2005-2006)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
POE316A: Introduction to International Relations	6	1	3	-	3	6	-	-	-	-	
BAE410A: Information Systems	6	1	3	-	3	6	-	-	-	-	
BAE430B: Labour Relations and Topics in Human Resources Management	6	1	-	-	-	-	3	-	3	6	
BAE440A: International Management (Honours only)	6	1	3	-	3	6	-	-	-	-	**A**
BAE450B: Advanced Topics in Management	6	1	-	-	-	-	3	-	3	6	**A**
BAE452: Business Policy	12	2	3	-	3	6	3	-	3	6	
Elective (Arts or Science)	6	1	3	-	3	6	-	-	-	-	**B**
Science Core	(6)	(1)	(3)	-	(3)	(3)	-	-	-	-	**C**
SLEFR4	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**D**
Total Honours:	**54 (60)**	**9**	**15**	**9**	**24**	**32**	**12**	**9**	**21**	**26**	
Total Major:	**48 (54)**	**8**	**12**	**9**	**21**	**26**	**12**	**9**	**21**	**26**	

NOTES:

A. Students with at least 80% in Business Administration subjects may be able to take BAE490 Thesis with permission of the Department and drop BAE440A and BAE450B.

B. A list of courses for the major and electives can be obtained from the Registrar's Office. The list includes courses for minors.

C. See Table 5 concering Science Core requirements. These courses can be taken in either Fall or Winter term. A list of courses offered is available from the Registrar's Office.

D. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 21 : FOURTH YEAR SCIENCE

		WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
				Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics		6	1	-	-	-	-	3	-	3	6	
POE316A: Introduction to International Relations		6	1	3	-	3	6	-	-	-	-	
Science Courses: These numbers are approximations. For details on individual programmes (Honours, Double Major, Major, and Minor) and course descriptions see the entries under the respective Departments.	**Honours:**	48 (54)	8 (9)	12 (+)	(?)	12 (+)	12 (+)	12	(?)	12	12	**A**
	Double Major:	54	9	15	(?)	15	15	12	(?)	12	12	**A**
	Major:	36-48	6-8	9 (+)	(?)	9 (+)	9 (+)	9 (+)	(?)	9 (+)	9 (+)	**A**
SLEFR4		-		-	5	5	2	-	5	5	2	
ATH401:		-		-	2	2	-	-	2	2	-	
PMT 400 Series:		-	-	-	2	2	-	-	2	2	-	**B**
Total	**Honours:**	**54 (60)**	**9 (10)**	**12 (+)**	**9 (+)**	**21 (+)**	**14 (+)**	**15**	**9 (+)**	**24**	**20**	
	Double Major:	**60**	**10**	**15**	**9 (+)**	**24**	**17**	**15**	**9 (+)**	**24**	**20**	
	Major:	**42-54**	**7-9**	**9 (+)**	**9 (+)**	**18 (+)**	**11 (+)**	**12 (+)**	**9 (+)**	**21(+)**	**17 (+)**	

NOTES:

A. Students should consult the yearly listing of courses offered provided by the Registrar's Office. Students wishing to obtain a minor must obtain the Department Head's approval for the minor. Extra courses are permitted but require the approval of the Dean of Science.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 22 : FOURTH YEAR CHEMICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
HIE289A: The Impact of Science and Technology on Society and the Environment	4	0.5	2	-	2	4	-	-	-	-	
CCE401: Nuclear Science and Engineering	8	1	2	-	2	2	2	-	2	2	
CCE405: Mass Transfer Operations	8	1	2	-	2	2	2	-	2	2	
CCE407A: Reaction Engineering	6	1	3	-	3	3	-	-	-	-	
CCE409B: Combustion and Explosion Engineering	6	1	-	-	-	-	3	-	3	3	**A**
CCE413B: Systems Analysis: Modelling and Optimization	6	1	-	-	-	-	3	-	3	3	
CCE415A: Control Systems and Instrumentation	6	1	3	-	3	3	-	-	-	-	
CCE417: Design Project	9	1.5	-	2	2	2	-	4	4	4	
CCE421: Engineering Laboratory	6	1	-	3	3	3	-	3	3	3	
CCE425: Materials Engineering: Polymers and Material Selection	9	1.5	3	-	3	3	1	1	2	2	
CCE427: Corrsion and Electrochemical Power Sources	10	1.5	3	-	3	3	2	-	2	2	
CCE437B: Seminar	0	0	-	-	-	-	-	0.5	0.5	-	
CCE441A: Materials Engineering Laboratory	5	0.5	1	3	4	5	-	-	-	-	
CCE485B: Waste Treatment Processes	(6)	(1)	-	-	-	-	(3)	-	(3)	(3)	**A**
SLEFR4:	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**89**	**13.5**	**19**	**17**	**36**	**32**	**16**	**18**	**34**	**29**	

NOTES:

A. Students can choose either CCE409B or CCE485B.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 23 : FOURTH YEAR CIVIL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
HIE271B: Introduction to Military History and Thought	6	1	-	-	-	-	3	-	3	6	
HIE289A: The Impact of Science and Technology on Society and the Environment	4	0.5	2	-	2	4	-	-	-	-	
CEE403A: Introduction to concrete and Reinforced Concrete Design	6	1	2	2	4	4	-	-	-	-	
CEE405A: Structural Analysis	8	1	3	2	5	5	-	-	-	-	
CEE415B: Reinforced Concrete Design	8	1	-	-	-	-	3	2	5	5	
CEE417A: Steel Design	7	1	3	1	4	4	-	-	-	-	
CEE443A: Urban Hydraulics	6	1	2	1	3	3	-	-	-	-	
CEE457B: Foundations Earthworks and Slope Stability	10	1.5	-	-	-	-	4	2	6	6	
CEE485B: Sanitary and Environmental Engineering	10	1.5	-	-	-	-	4	2	6	6	
CEE489A: Transportation and Planning	8	1	3	2	5	5	-	-	-	-	
CEE493: Civil Engineering Project	13	2	1	2	3	3	1	3	4	4	
SLEFR4:	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**A**
Total	**92**	**13.5**	**16**	**19**	**35**	**30**	**18**	**18**	**36**	**35**	

NOTE:

A. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 24 : FOURTH YEAR COMPUTER ENGINEERING
(Academic Year 2004-2005 only - changes anticipated for 2005-2006)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
HIE289A: The Impact of Science and Technology on Society and the Environment	4	0.5	2	-	2	4	-	-	-	-	
CSE341B: Introduction to Database Systems	8	1	-	-	-	-	(3)	(2)	(5)	(5)	**C**
EEE403A: Electronic Circuits	8	1	3	2	5	5	-	-	-	-	**B**
EEE431B: DSP Hardware	8	1	-	-	-	-	3	2	5	5	**B**
EEE435A: Principles of Operating Systems	8	1	3	2	5	5	-	-	-	-	
EEE453A: Digital VLSI Design	8	1	3	2	5	5	-	-	-	-	**B**
EEE457: Computer Engineering Design Project	12	2	-	1	1	1	-	4	4	4	
EEE459A: Engineering Human-Computer Interaction	(8)	(1)	(3)	(2)	(5)	(5)	-	-	-	-	**C**
EEE461A: Digital Communications for Computer Engineers	8	1	3	2	5	5	-	-	-	-	**B**
EEE466A: Distributed Applications	(8)	(1)	(3)	(2)	(5)	(5)	-	-	-	-	**C**
EEE469B: Computer Organization	8	1	-	-	-	-	3	2	5	5	
EEE473B: Computer Communications	8	1	-	-	-	-	3	2	5	5	
EEE492A: Software Processes and Work Products	(8)	(1)	(3)	(2)	(5)	(5)	-	-	-	-	**C**
EEE495B: Digital Systems Architecture	8	1	-	-	-	-	3	2	5	5	**B**
EEE499B: Real-Time Embedded System Design	(8)	(1)	-	-	-	-	(3)	(2)	(5)	(5)	**C**
SLEFR4:	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**D**
Total	**94**	**12.5**	**17**	**20**	**37**	**32**	**15**	**21**	**36**	**32**	

NOTES:

A. One course to be selected.

B. Students selecting Hardware option must take courses marked 'B'

C. Students selecting Software option must take the ones marked 'C'

TABLE 25 : FOURTH YEAR ELECTRICAL ENGINEERING
(Academic Year 2004-2005 and 2005-2006 only - changes anticipated for 2006-2007)

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
HIE289A: The Impact of Science and Technology on Society and the Environment	4	0.5	2	-	2	4	-	-	-	-	
EEE403A: Electronic Circuits	8	1	3	2	5	5	-	-	-	-	
EEE407B: Control Systems I	8	1	-	-	-	-	3	2	5	5	
EEE411A: Communication Theory	8	1	3	2	5	5	-	-	-	-	
EEE417A: Electromagnetic Propagation and Radiation	8	1	3	2	5	5	-	-	-	-	
EEE429A: Electric Machines and Power	8	1	3	2	5	5	-	-	-	-	**A**
EEE431B: DSP Hardware	8	1	-	-	-	-	3	2	5	5	
EEE433B: Satellite and Mobiles Communication	8	1	-	-	-	-	3	2	5	5	**B**
EEE441B: Microwave Circuits, Devices and Systems	8	1	-	-	-	-	3	2	5	5	**B**
EEE447B: Robotics	(8)	(1)	-	-	-	-	(3)	(2)	(5)	(5)	**B**
EEE449B: Power Electronics	(8)	(1)	-	-	-	-	(3)	(2)	(5)	(5)	**B**
EEE453A: Digital VLSI Design	(8)	(1)	(3)	(2)	(5)	(5)	-	-	-	-	**A**
EEE455: Electrical Engineering Design Project	12	2	-	1	1	1	-	4	4	4	
EEE473B: Computer Communications	(8)	(1)	-	-	-	-	(3)	(2)	(5)	(5)	**B**
SLEFR4:	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**C**
Total	**86**	**10.5**	**14**	**18**	**32**	**27**	**15**	**21**	**36**	**32**	

NOTES:

A. One course to be selected.

B. Two courses to be selected.

C. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

TABLE 26 : FOURTH YEAR MECHANICAL ENGINEERING

	WEIGHT	CREDIT	Fall Term Periods/Week				Winter Term Periods/Week				NOTES
			Lecture	Lab./Tut.	Total	Study	Lecture	Lab./Tut.	Total	Study	
PSE401B: Military Professionalism & Ethics	6	1	-	-	-	-	3	-	3	6	
HIE289A: The Impact of Science and Technology on Society and the Environment	4	0.5	2	-	2	4	-	-	-	-	
MEE405B: Computer-Aided Design and Manufacturing for Mechanical Engineers (not offered in English 04-05)	7	1	-	-	-	-	3	1	4	4	**A**
MEE411A: Fluid Mechanics - II	8	1	3	2	5	5	-	-	-	-	
MEE413B: Fluid Mechanics - III	8	1	-	-	-	-	3	2	5	5	
MEE421A: Heat Transfer	8	1	3	2	5	5	-	-	-	-	
MEE431A: Stress Analysis	8	1	3	2	5	5	-	-	-	-	
MEE433B: Mechanical Behaviour of Advanced Materials	7	1	-	-	-	-	3	1	4	4	**A**
MEE443B: Feedback Control of Electro-mechanical Systems	8	1	-	-	-	-	3	2	5	5	
MEE445A: Modelling and Simulation of Dynamic Systems	8	1	3	2	5	5	-	-	-	-	
MEE451A: Combustion Engines	7	1	3	1	4	4	-	-	-	-	
MEE457B: Compressible Flow (not offered in 04-05)	(7)	(1)	-	-	-	-	(3)	(1)	(4)	(4)	**A**
MEE461B: Aeronatical and Space Propulsion	(7)	(1)	-	-	-	-	(3)	(1)	(4)	(4)	**A**
MEE467B: Aircraft Performance	(7)	(1)	-	-	-	-	(3)	(1)	(4)	(4)	**A**
MEE471: Engineering Project	10	1.5	-	3	3	3	-	4	4	4	
SLEFR4:	-	-	-	5	5	2	-	5	5	2	
ATH401:	-	-	-	2	2	-	-	2	2	-	
PMT 400 Series:	-	-	-	2	2	-	-	2	2	-	**B**
Total	**89**	**12**	**17**	**21**	**38**	**33**	**15**	**19**	**34**	**30**	

NOTES:

A. Two courses to be selected: both in the Winter term.

B. Professional Military Training (PMT) is delivered in a variety of formats, including two lecture/lab periods per week, on weekends, and on weeknights as appropriate. See PMT section for a detailed breakdown of PMT activity per year.

DEPARTMENT OF BUSINESS ADMINISTRATION

Professor, Head of the Department - J. Brimberg, BEng, MEng, PEng, MBA, PhD
Professor, Director of Special Academic Projects and co-appointed to the Mechanical Engineering Department - B.W. Simms, CD, rmc, BEng, MASc, PhD, PEng
Professor, Chair of the MBA programme - W.J. Hurley, BSc, MBA, PhD
Professor - A.L. Jenkins, BA, MA, MBA, PhD, PEng
Professor - A. St. Pierre, BSc (informatique), BSc (comptables), MBA, EdD, CMA, CGA
Professor - M. Amami, BSc, Lic.Sc.Eco., PhD, Ing
Adjunct Professor - J.S. Cowan, BSc (Math & Physics), MSc (Physiology), PhD (Physiology)
Associate Professor - T. Dececchi, BEng, MBA, PhD, PEng
Associate Professor - W.J. Graham, BA, LLB, MBA, PhD
Associate Professor - P. Roman, CD, rmc, BEng, PEng, PhD
Assistant Professor - Major R.E. Alexander, CD, rmc, BA, MBA
Assistant Professor - Major J.P.S. Leblanc, CD, cmr, plsc, BSc, MEng
Assistant Professor - N. Essaddam, BAdm, MBA, PhD
Assistant Professor - M. -P. Marelli, BA, MA, MBA
Assistant Professor - F. Yousoffzai, BA, MSc (Economics), PhD
Adjunct Assistant Professor – D.A. Detomasi, BA, MA, PhD
Lecturer - M.B.K. Shepherd, BA, MA
Computer Specialist - P. M. Anderson, BSc, MSc

PROGRAMME OBJECTIVES

The study of business administration involves a number of functional areas including accounting, information systems, finance, marketing, operations management and human resource management. These functional areas are developed from a number of basic disciplines. For example, marketing relies on the disciplines of microeconomics, statistics and psychology, finance relies on mathematics and statistics, operations management also relies on mathematics and statistics, 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 is essential to the development of effective decisions, policies and strategies.

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

PROGRAMME STRUCTURES

3-YEAR BACHELOR OF ARTS (CONCENTRATION IN BUSINESS ADMINISTRATION)

The Division of Arts offers, through the auspices of the Division of Continuing Studies, a 3-Year General Bachelor of Arts with a concentration in Business Administration. The degree is not open to ROTP/RETP Cadets.

The program emphasizes a breadth of exposure and is grounded in the elements of the military profession. This is represented through a core of courses that must be taken regardless of discipline.

30 credits must be completed, and of these 30:
- At least 15 must be earned through RMC, including six in the chosen discipline.
- At least 10 must be at the senior level
- At least 20 must be in Arts

At least 12 must be in Business Administration, and of these 12:
- At least six must be at the senior level
- At least six of the twelve must be earned through RMC.

Note that a credit may fulfill several requirements at the same time, ex: a course could be in Arts (including Business Administration), at the senior level and taken through RMC.

The BA Program includes a compulsory core. Of the 30 credits required, the following 11 credits are mandatory.

- HIE208 Canadian Military History: A study in War and Military History, 1867-2000, or another course in Military History, such as HIE205;
- POE 206 The Canadian Forces and Modern Society, Civics, Politics and International Relations, or POE205, or POE316 Introduction to International Relations;
- HIE 475 Science and War: The Impact of Military Technology
- PSE 402 Leadership and Ethics
- BAE101 Management: Principles and Practices in a

Canadian Defence Setting, or BAE100 Principles of management in a Defence Setting;
- At least two credits in English Literature and Grammar.
- At least one credit in Canadian History
- At least one more credit in Military Psychology and Leadership (PSE 123 for example)
- At least two credits in Mathematics, Computer Science, Chemistry or Physics

Six additional credits of electives in Arts, Science or Technology are also required.

3-YEAR BACHELOR OF ARTS (CONCENTRATION IN BUSINESS ADMINISTRATION)

The Business Administration Concentration:

BAE204	Financial Accounting (2credits)
BAE220A	Introduction to Information Technology (1 credit)
BAE242B	Quantitative Methods I (1 credit) [1]
BAE300B	Finance (1 credit)
BAE304A	Management Accounting (1 credit)
BAE318A	Marketing Fundamentals (1 credit) [2] (formerly BAE216B)
BAE330A	Organizational Theory (1 credit)
BAE344B	Operations Management (1 credit)
BAE430B	Labour Relations and Topics in Human Resources Management (1 credit) [3]

Note 1: Students at a distance may replace BAE242B by BAE244.

Note 2: BAE216B will be renumbered as BAE318A and will be the equivalent of 1 senior credit.

Note 3: Students at a distance may replace BAE430B with BAE240, which will be the equivalent of 1 senior credit.

i) Students will also be required to take 1 elective (1 credit) in Business Administration.

ii) Students will also be required to take ECE103 (1 credit) and ECE104(1 credit) (at a distance) or ECE102 (2 credits, on-site at RMC)

iii) ECE206A and ECE224A have been removed from the list of required courses. However, these two courses are highly recommended as general electives, and will be the equivalent of senior credits.

Please note that those who have registered in the BA programme offered through DCS prior to Sept. 2003 have the option of completing their studies following an earlier description of the degree and of its core credits or the new one, which integrates the new description and the university level courses of OPME or their equivalent.

4-YEAR BUSINESS ADMINISTRATION (HONOURS AND MAJOR) PROGRAMME

First Year: All courses are common for all students in the Arts Programme.

Second Year: "Honours or Major in Business Administration" Students must enrol in the Business Administration programme at the beginning of the Second Year.

Third Year: "Honours or Major in Business Administration" The programme of studies begins to be specialized in the area of Business Administration.

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

BUSINESS ADMINISTRATION PROGRAMME REQUIREMENTS

Honours or Major in Business Administration: for students who entered Business Administration in September 2002 or later.

Students from First Year Arts, with at least a D average, may take either the Honours or Major in Business Administration programme starting in Second Year. The programme of courses for both the Honours and Major is shown below. The requirements for Second Year only are shown in Table 4.

To earn an Bachelor of Arts (Honours Business Administration) degree, a student must successfully complete the Honours programme and must maintain a minimum B average in 300 and 400 level Business Administration courses and must attain a minimum overall B- average in their 4th Year. Students in the Honours programme must maintain at least an overall B- average in each year of the programme to remain in the Honours programme.

Students graduating with a Bachelor of Arts (Honours Business Administration) who attain at least an A- average in their 300 and 400 level courses will have their transcripts annotated "with First Class Distinction". Students graduating with a Bachelor of Arts (Honours Business Administration) who attain at least a B- average in their 300 and 400 level courses will have their transcripts annotated " with Distinction".

All other students will be granted a Bachelor of Arts (Major Business Administration) degree.

Students graduating with a Bachelor of Arts (Major Business Administration) who attain at least an A- average in their 300 and 400 level courses will have their transcripts annotated "with First Class Distinction". Students graduating with a Bachelor of Arts (Major Business Administration) who attain at least a B- average in their 300 and 400 level courses will have their transcripts annotated "with Distinction".

4-YEAR BUSINESS ADMINISTRATION (HONOURS AND MAJOR) PROGRAMME

Business Administration Honours Programme:

- Business Admin.18 courses
  - BAE 204: Financial Accounting
  - BAE 220A: Intro to Information Technology
  - BAE 242B: Quantitative Methods I
  - BAE 300B: Finance
  - BAE 304A: Management Accounting
  - BAE 318B: Marketing Fundamentals(formerly BAE216)
  - BAE 320A: Business Law
  - BAE 330A: Organizational Theory
  - BAE 342A: Quantitative Methods II
  - BAE 344B: Operations Management
  - BAE 410A: Information Systems
  - BAE 418A: Intermediate Marketing(formerly BAE316)
  - BAE 430B: Labour relations & Topics in Human Resources Management
  - BAE 440A: International Management (New)
  - BAE 450B: Advanced Topics in Management
  - BAE 452: Business Policy

- Economics 2 courses

ECE 206A: Macroeconomic Theory and Policy I
ECE 224A: Microeconomics I

- Electives 3 courses

POE332A: Public Administration in Canada is strongly recommended as an elective.

Students with at least 80% in Business Administration subjects may be able to take

BAE 490: Thesis, with permission of the Department and drop BAE 440A and BAE450B.

TOTAL 45 courses (includes 22 course Common Arts Core)

Business Administration Major Programme: same programme as the Honours, except drop BAE440A and ECE 206A.

4-YEAR BUSINESS ADMINISTRATION (HONOURS AND MAJOR) PROGRAMME

Business Administration Minor Programme:

Core: 5 courses

- BAE220A: Introduction to Information Technology
- BAE300B: Finance
- BAE304A: Management Accounting
- BAE318B: Marketing Fundamentals (formerly BAE216)
- BAE344B: Operations Management

Electives: 3 courses – any other Business Administration 200, 300 or 400 series courses

The Minor is open to Students from all Divisions.

* NOTE: Science Students taking a Minor in Business Administration will be able to count CSE101B: Introduction to Algorithms, towards the Minor.

COURSE DESCRIPTIONS

BAE101: Management: Principles and Practices in a Canadian Defence Setting (AAF101: Principes et pratiques de la gestion dans le contexte de la défense canadienne)

Offered only by the Division of Continuing Studies
Replaces BAE100 as of Fall 2004.

Providing a broad introduction to management – including its principles and practices – in a Defence setting, this course identifies the mechanisms affecting the management of military and civilian personnel at the institutional level (i.e. within both the CF and DND at large), and covers topics in organization, roles and responsibilities, resources and capabilities, operational activities, and business planning. The course also provides an overview about the role of the individual manager and the associated principal tasks of

planning, organizing, leading, decision-making, and controlling in a variety of dynamic circumstances.

Note: This course has minimum computer system requirements. For further details, please visit http://www.rmc.ca/academic/continuing/sysreq/index_e.html/

0-0-9 1 credit

BAE204: Financial Accounting (AAF204 : Comptabilité générale)

Pre-requisites: MAE106, ENE110 and ECE102 (or their equivalents) OR MAE106, BAE100 (or BAE101)

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. Major 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. Time permitting; the accounts of the federal government will also be introduced.

3-0-6 2 credits

BAE220A: Introduction to Information Technology (AAF220A: Introduction aux technologies de l'information)

Also offered through the Division of Continuing Studies
Pre-requisites: MAE106, ENE110 and ECE102 (or their equivalents) OR MAE106, BAE100 (or BAE101)

This course is intended for students who will use Information Technology (IT) in the workplace. It is not intended for computer or systems professionals. The course will provide students with an introduction to the fundamentals of IT and its applications in an organizational setting. Students will be expected to have basic computer skills such as the ability to use a modern integrated office software package. Students who lack these skills will be required to take part in a skills lab. Topics include: Computer Hardware, Computer Software, Networking, Data Management, Uses of IT in Organizations, Development of Information Systems, Ethics and Information Technology.

3-0-6 1 credit

BAE240: Human Resource Management AAF 240 - Gestion des ressources humaines adaptée à l'environnement militaire

(Renumbered as BAE430)

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

Pre-requisites: MAE106, MAE108, ENE110 and ECE102 (or their equivalents) OR MAE106, MAE108 (or equivalent coursework in Mathematics), BAE100 (or BAE101).

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 1 credit

BAE244: Quantitative Methods Applied to Defence Management

Only offered through the Division of Continuing Studies.
Pre-requisites: MAE106, MAE108, ENE110 and ECE102 (or their equivalents) OR MAE106, MAE108 (or equivalent coursework in Mathematics), BAE100 (or BAE101).

This course introduces the use of quantitative methods in managerial decision-making. Emphasis will be placed upon analyzing and drawing conclusions from data sets and on the use of specific techniques in making managerial decisions. Topics covered will include probability, probability models, statistical inference, single and multiple regressions, decision analysis, risk and forecasting. Computer based spreadsheets modelling and solution techniques will be used extensively throughout the course.

Note: This course has minimum computer system requirements. For further details, please visit http://www.rmc.ca/academic/continuing/sysreq/index_e.html/

0-0-9 1 credit

BAE246: Financial Accounting with Application to Defence

Only offered through the Division of Continuing Studies.

Pre-requisite: BAE204

This course is an introductory course in accounting. It is intended to provide the student with a general understanding of financial reports and how they are prepared and used. Accordingly, the course will emphasize not only the procedures of accounting, but also the underlying principles and concepts of accounting and their application in a variety of contexts, including Defence.
Note: This course has minimum computer system requirements. For further details, please visit http://www.rmc.ca/academic/continuing/sysreq/index_e.html

0-0-9 1 credit

GEE283A: Engineering Economics (IGF283A: Génie et économie)

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; cost-benefit analysis in the public sector.

2-0-4 0.5 credit

BAE300B: Finance (AAF300B: Finance)

Pre-requisite: BAE204, BAE242 OR BAE204, BAE244

This course introduces the students to principles of financial decision-making. Topics include the theory of present value and interest, risk, capital markets, and valuation, and decision-making within the firm including the financing decision, and capital budgeting. The emphasis is on the application of the principles to solve business, military and administrative problems.

3-0-6 1 credit

BAE 304A: Management Accounting (AAF304A : Comptabilité de gestion)

Also offered through the Division of Continuing Studies.
Pre-requisite: BAE204, BAE242 OR BAE204, BAE244

This course introduces students to the fundamentals of management accounting within the organization. The early part of the course examines basic terms, concepts and systems of management accounting before moving on to more specific topics such as activity based costing, budgeting, variance analysis, and cost allocation. The course emphasizes the use of accounting information for planning and control within the organization and the appropriate use of accounting information for other types of decision making such as pricing and product profitability decisions. The role of management accounting in systems supporting quality programmes and just in time delivery is considered. Other types of decision making using accounting information such as capital budgeting and transfer pricing are examined as time permits. Consideration will be given to the behavioural and motivational impact of various management accounting systems.

3-0-6 1 credit

BAE318B: Marketing Fundamentals (AAF318B : Principes fondamentaux de la commercialisation)

(Formerly BAE216)
Also offered through the Division of Continuing Studies.
Pre-requisites: BAE204, BAE220, BAE242 OR BAE244, BAE246 BAE100 (or BAE101).

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 knowledge of differential calculus or microeconomics is helpful.

3-0-6 1 credit

BAE320A: Business Law (AAF320A : Droit commercial)

Pre-requisite: BAE204, BAE220, BAE242 OR BAE100 (or BAE101), BAE244, BAE246

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. Greater emphasis will be placed on the law of tort and contract.

3-0-6 1 credit

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

Pre-requisite: PSE112 (or equivalent), ECE102 (or equivalent), BAE220

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 1 credit

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

Pre-requisite: BAE242

This course continues the study of the disciplines of operations research and management science and their application to business, military and administrative problems. Topics include linear programming, integer programming, networks and computer simulation. 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 1 credit

BAE344B: Operations Management (AAF344B: Gestion des opérations)

Pre-requisite: BAE242, BAE330 (or their equivalents)

This course presents a qualitative overview and introduces quantitative methods used in planning and managing operations in the service and production sector of the economy. Topics include: design, process selection, capacity planning, project control, quality control, response to customer, cost/benefit analysis, facility layout, inventory and supply chain management.

3-0-6 1 credit

BAE360: Human Factors

Not offered in Academic Year 2004-2005
Pre-requisite: BAE242, BAE330 (or their equivalents)

Human factors is a rapidly growing field. Ten years ago, it would have been difficult to find anyone outside of the human factors profession who could tell you the meaning of the term ergonomics. Today, good human factors design has become a major marketing tool that can provide a competitive advantage for those who choose to design with the "human" in mind. This course explores both sides of the human-machine interface. It includes a study of a broad range of human attributes from cognitive processes to anthropometry (measurement of the human body). Based on an understanding of these attributes, we turn our attention to the machine and examine basic design principles and practices that ensure the machine interface takes human abilities and weaknesses into consideration. The third major component of the human-machine system is the environment in which they work. The course looks at a few key environmental issues that can affect performance. As a final topic, we will look at human computer interaction and how the same fundamental human factor design principles can be applied to what is becoming perhaps the most common type of human-machine system.

1 credit

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

Pre-requisite: BAE304, BAE330 (or their equivalents)

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 organizations. 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 1 credit

BAE418B: Intermediate Marketing (AAF418B : Commercialisation intermédiaire)

This course also offered by the Division of Continuing Studies.
Pre-requisite: ECE102 (or the equivalent), BAE318 (formerly BAE216).

This course builds on the marketing basics by showing how marketing strategy is directly influenced by a firm's competitiveness and other macro-environmental factors. In addition, this course emphasizes the importance of customer orientation and strategic market planning, as well as introduces the subject of global marketing. The course will examine how all the elements of the marketing mix can be utilized to best achieve the firm's goals as well as the selection of target markets. The course will also examine how to respond to changes in the firm's environment.

3-0-6 1 credit

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

Pre-requisite: BAE204, BAE318, BAE330

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 1 credit

BAE440A: International Management (AAF440A: Gestion Internationale)

Pre-requisite: BAE320, BAE344
Co-requisite: BAE410, BAE418

This course will focus upon the opportunities and threats with which a firm must contend to become globally competitive and to be able to effectively operate within an international setting. A particular emphasis will be placed on multinational corporations, that is, companies that have significant interests across nations. Course topics include consideration of: the international macro-environment, including its economic, political, legal, technological and social elements; the role of culture, including the challenges faced when managing, motivating and leading persons across a variety of cultures; and international strategic management, including strategic planning, organizing international operations and decision-making in an international context.

3-0-6 1 credit

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

Pre-requisite: BAE320, BAE344
Co-requisite: BAE410, BAE418

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.

3-0-6 1 credit

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

Pre-requisite: BAE300, BAE304, BAE320, BAE344
Co-requisite: BAE410, BAE418

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.

3-0-6 2 credits

BAE490: Thesis (AAF490: Thèse)

Pre-requisite: Permission of the Department Head
Co-requisite: BAE410, BAE418, BAE452

This two-term course is available only to students of Business Administration who have an average of at least A- in 3rd year Business Administration courses. Students who take the course may substitute it in place of BAE 450B and BAE 440B. Before enrolling in the course a student must obtain the approval of a professor in the Department of Business Administration who will supervise the thesis. The topic of the thesis will be mutually agreed upon by the student and the professor and should be in one of the areas covered in one or more of the Business Administration core courses. The thesis topic should not be directly related to the major project of the course BAE452: Business Policy.

3-0-6 2 credits

DEPARTMENT OF ENGLISH

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

P**erceptive 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 of 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 modern 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 programs. These courses fall into three main groupings.

- *British Literary Tradition:* These courses deal with the works of major English writers from 1550-1945, 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-focussed courses are: The Literature of War and Forms of Drama.

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 Department 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 degree stream: Honours, Major, and First-Class Honours. Students normally apply for entry into the English degree program at the end of their second year and are encouraged to take as least one full senior English course in addition to ENE200 in their second year as one of their Arts Electives in order to create greater flexibility in course selection in third and fourth year.

During the third year of study, students wishing to pursue Honours in fourth year will apply to their department. Students wishing to apply to Honours standing should achieve at least a B in their 300- and 400-level courses, although individual cases may be accepted on a probationary basis at the discretion of the Department Head.

Senior Course Structure: When reading course descriptions and degree requirements, note that most senior offerings are divided into two courses of one semester each, with the "A" group taught in the fall term and the "B" group in the winter term. A full-course credit 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 program with the Department Head at the time they are applying to enter the English degree stream.

In all cases, the successful completion of the four-year English degree programs are those defined in the College Calendar:

FIRST-CLASS HONOURS STANDING IN ENGLISH REQUIREMENTS:

- Fulfilment of the Honours standing requirements.

- At least an A- average in the senior English courses taken (those above ENE200).

HONOURS

Students apply for entry into the Honours programme during their third year. To complete the honours degree in English, students must take 10 full or 20 single-semester courses apart from the required core subjects.

They must successfully complete the following obligatory courses:

- ENE110

- ENE 200
- ENE326A/324B
- ENE304 or ENE412A/414B
- ENE428
- ENE476A/478B

In addition, students must select 4 full-courses or 8 single-semester courses in English at the 300 or 400 level chosen from the year's selection.

Students must also fulfil the following requirements.

i) they must maintain a B average in all of the accumulated senior English courses – those above ENE200.

ii) they must maintain a B- average in all of their academic courses in 4th year.

MAJOR

Students wishing to enter this degree programme normally do so at the end of second year. The major degree in English requires 8 full or 16 single-semester courses in English at the 300 or 400 level. To receive the Major degree in English, students must successfully complete the following courses.

- ENE110

- ENE200

- ENE326A/324B

- One of 304, 412A/414B, or 476A/478B, depending on the year's offering, or the student can defer this selection to 4th year

- ENE428

- 3 full-courses or 6 single-semester courses in English at the 300 or 400 level

MINOR IN ENGLISH

A minor in English requires a total of 4 full-year courses or 8 single-semester courses beginning with ENE110 or ENE100

ENE110	= 2
ENE200	= 2
ENE3XX or 4XX	= 1
ENE3XXX or 4XXX	= 1
ENE3XXX or 4XXX	= 1
ENE3XXX or 4XXX	= 1

COURSE DESCRIPTIONS

Note: The specific content and the scheduling of the courses listed below are subject to change. For 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 particular will concentrate on correcting grammar and punctuation, organizing ideas, formulating persuasive arguments, and preparing research 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, lyric 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 poetry, short stories, two novels, one Shakespeare play, and one modern play.

Texts as assigned by instructors.

3 - 0 - 3 2 credits

ENE101: Literature and Composition I

Offered through the Office of Continuing Studies.

1 credit

ENE102: Literature and Composition II

Offered through the Office of Continuing Studies.

1 credit

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 provide instruction in the techniques of expository writing and to foster an understanding and enjoyment of literature. The first term in particular will concentrate on correcting grammar and punctuation, organizing ideas, formulating persuasive arguments, and preparing research 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, lyric 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 poetry, short stories, two novels, one Shakespeare play, and one modern play.

Texts as assigned by instructors.

3 - 0 - 6 1 credit

ENE120: French Canadian Literature Translation

Offered through the Office of Continuing Studies.

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

Pre-requisite: ENE100 or ENE110 (or equivalent)

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 pattern 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 1 credit

ENE304: English Renaissance Literature

(Offered in 2004-05 and alternate years)

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 form and genre in the period. The intention of the course 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 on such topics as marriage, single life and friendship; and selected metaphysical poets, such as John Donne, who revolted against the conventionalism of earlier Renaissance poets.

3 - 0 - 6 1 credit

ENE314A: Gender and Literature

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course aims to introduce students to the various ways literature reflects, constructs, reinforces, and challenges gender roles. The course will explore masculinity and femininity, suggesting that they are always socially constructed and historically specific by examining literature from the Middle Ages to the present. In order to do so, students will explore several different feminist approaches to literature and culture. Ultimately, the course will show that understanding gender as socially constructed rather than biologically given is empowering for society as a whole.

This course will also be offered through the Continuing Studies Division.

3 - 0 – 6 1 credit

ENE316B: The Literature of Film Noir

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

One of the most important genres of film that was born in the early 1940s, Film Noir, grew out of the popularity and growth of American hard-boiled fiction that began in the late 1920s with the work of Dashiell Hammett. In many instances, Film Noir borrowed its plots, narrative structure, vocabulary, types, imagery, and sheer energy from this dynamic literary genre. This course aims to analyze the process of adaptation that took place by looking at a selection of films noirs and the literary texts they came from as well as the social, political, and cultural background to the classic period of film noir, 1941-1958. In addition, the students will get a grounding in film vocabulary and analysis.

3 - 0 – 6 1 credit

ENE324B: Literary Principles

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 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 1 credit

ENE326A: Cultural Backgrounds to Literature

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 1credit

ENE332A: The Literature of War: The First World War

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course deals 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 course 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 1 credit

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

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 seminar on an assigned text and to write a term essay based on that seminar.

3 - 0 - 6 1 credit

ENE350A: Canadian Literature: Beginnings to 1945

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

Through a survey of English-Canadian fiction and poetry from the beginnings to the mid-twentieth century, this course attempts to identify shared perspectives, attitudes, ideas, and techniques characteristic of our own distinctive literature. 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 1 credit

ENE352B: Canadian Literature: 1945 to the Present

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

Through a survey of English-Canadian fiction, drama, and poetry from the mid-twentieth century to the present, this course endeavours to identify shared perspectives, attitudes, ideas and techniques characteristic of our unique literature. While designated as the complement to ENE350A, it is helpful but not necessary to take both courses together. No less than their predecessors, modern and contemporary writers like Findley, Davies, Laurence, Munro and Reaney encourage us to reflect on urgent questions of personal and national identity and survival: who we are, where we come from and where we are going. Atwood, Purdy 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 1 credit

ENE384A: Post-Colonial Literature of Africa, South Asia, and The West Indies

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course focuses on the post-colonial societies of Africa, South Asia, the West Indies and Latin America. Though these societies are spread over three continents, all of them are similar in having indigenous traditions which have been profoundly challenged and changed by European colonialism in the 19th and 20th centuries. Not surprisingly, the departure of the colonial powers did not mark the end of the European influence or of the identity crisis induced in these societies by colonialism. Fascinating and significant perspectives on these post-colonial traumas are offered by contemporary writers from these societies. Hence, students in this course will be encouraged to examine post-colonial literary works from Africa, South Asia, the West Indies and Latin America and to assess how writers in these societies have depicted the throes of revolution, the pain of exile, the struggle for

freedom, the waning of colonialism and the anguish of alienation. Students will be required to participate in group discussions, make presentations, submit well-researched essays and write exams.

3 - 0 - 6 1 credit

ENE386B: The Tale of Mystery and Imagination

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course offers a critical and analytical approach to one of the most popular forms of literature in the nineteenth and twentieth centuries. Students will explore patterns of logical enquiry in numerous narrative forms. Students will encounter many variations of what the American writer Edgar Allan Poe (1841) called the tale of ratiocination (as well as the tale of mystery and imagination) in the works of such writers as Poe, Doyle, Collins, Stevenson, Christie, Hammet, Chandler, MacDonald and le Carré. Students will be expected to analyse and critically evaluate what they read in order to distinguish between the different incarnations of the tale of mystery and imagination – the classic British detective story, the "hard-boiled". American detective story, the thriller and the story of espionage – as well as to zero in on the social-political-psychological milieu that gave rise to them. Students will be required to participate in group discussions, make presentations, submit well-researched essays and write exams. Students will also be encouraged to engage in creative writing.

3 - 0 – 6 1 credit

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

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 1 credit

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

(Offered in 2004-05 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 1 credit

ENE426: Advanced Directed Study

For students in Fourth Year Honours English at the discretion of the Department Head.
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 2 credits

ENE428: Shakespeare

Mandatory for students enrolled in Honours English. Also opened to other interested students. Normally taken in the Fourth Year.

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course will be focussed 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 2 credits

ENE 434A: Twentieth Century British Literature: Poetry & Drama

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

In this course, you will study selected poems and plays of representative modern and post-modern British poets and dramatists - Hardy, Housman, Yeats, Shaw, Owen, Lawrence, Eliot, Auden, Thomas, Larkin, Hughes, Heaney, Pinter, Stoppard - and assess how they have grappled with a variety of themes: the pros and cons of empire-building, the evils of colonialism, the pain of exile, the anguish of alienation, the quest for identity, the struggle for freedom, the lust for money and power, the love for life and God. You will also have an opportunity to understand how these writers struggle and come to terms with the varied socio-political events and issues such as the loss of empire, the Cold War, the emergence of a new "world order", the imminence of dystopia, the exploration of space, the advance of science and technology. You will be encouraged to approach the writers and their works historically and critically.

3 - 0 - 6 1 credit

ENE 436B: Twentieth Century British Literature: Short Story & Novel

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

In this course, you will study selected short stories and novels of representative modern and post-modern British writers - Kipling, Conrad, Woolf, Forster, Joyce, Lawrence, Orwell, Greene, Burgess, le Carré - and assess how they have grappled with a variety of themes: the pros and cons of empire-building, the evils of colonialism, the pain of exile, the anguish of alienation, the quest for identity, the struggle for freedom, the lust for money and power, the love for life and God. You will also have an opportunity to understand how these writers struggle and come to terms with the varied socio-political events and issues such as the loss of empire, the Cold War, the emergence of a new "world order", the imminence of dystopia, the exploration of space, the advance of science and technology. You will be expected to scrutinize the writers and their works historically and critically.

3 - 0 - 6 1 credit

ENE442A: English Dramatic Forms

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 1 credit

ENE444B: Twentieth-Century Dramatic Literature

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 focussed 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 dramatic selections for the course will be made from British plays by Sean O'Casey, Samuel Beckett, and Harold Pinter; American plays by Edward Albee, Arthur Miller and Lorraine Hansberry; European plays by Berthold Brecht and Friedrich Dürrenmatt; and African plays by Wole Soyinka and Athol Fugard. We will also study a selection of exciting contemporary Canadian plays from playwrights such as Judith Thompson, Erika Ritter, Tomson Highway, David Fennario, David French, and John Gray.

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 minor. There will also be a final exam.

3 - 0 - 6 1 credit

ENE446B: Art of Extremity

(Offered in 2004-05 and alternate years.)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course is an examination of the way writers, artists, and filmmakers have reacted to a variety of extreme situations since the early 20th century such as love, war, alienation, and genocide. Through critical analysis and a comparative approach, students will evaluate the way such works of art become provocative chronicles and the conscience of their times.

3 - 0 - 6 1 credit

ENE448B: Literature and Ethics

(Offered in 2004-05 and alternate years.)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course seeks to introduce to the students a specific way of reading a text; that is, it will develop a notion of ethical criticism, which will allow them to analyze the encounter between the writer's ethos with their own. This kind of reading places a responsibility, not only on the readers toward the text and the author, but also on the ethical quality of their own readings. The ethical value of the texts and stories we tell each other, therefore, is highlighted. The course will be developed through an introduction to the concept of ethics and how various periods of history have developed their own ideologies, values and ethics, and how these are manifested in literature and the other arts. A study of a wide variety of texts from the ancient Greeks to contemporary cinema will offer the students ample opportunity to exercise their critical faculties.

3 - 0 - 6 1 credit

ENE456A: The Literatures of Multicultural North America: Canada

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course introduces students to the concepts of bilingualism, biculturalism, multiculturalism, pluralism, and the way in which Canadian federal government policies have fostered the growth of hyphenated literatures. The students will analyze texts written by people from different cultural 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 1 credit

ENE462A: Classic American Literature, Beginnings to 1945

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course deals with American writing from the mid-nineteenth century to the mid-twentieth century. Through the nineteenth century, authors explored the American experience and emerging American identity by declaring their cultural independence from Europe. Their writings 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 important innovations in poetry and prose. After the First World War many of these works were part of international culture, in which American writing, movies, and technology played an important part. Poets to be studied include Emerson, Frost, 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, Fitzgerald's The Great Gatsby, and Faulkner's The Sound and the Fury.

3 - 0 - 6 1 credit

ENE464B: American Literature Since 1945

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course deals with the period in which the United States has been the most important international power in the world. Many of the texts to be studied reflect both directly and indirectly the political, economic, and cultural forces that have preoccupied American authors as they looked at the world at large and looked inward at the American psyche. Some of the preoccupations in these writings include the paranoia stemming from the Cold War, the splits in American society caused by race 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 Dream, as traditional frontiers for American expansion closed. Poets to be studied include Robert Lowell, Allen Ginsberg, James Dickey, and Adrienne Rich. Core novels include Warren's All the King's Men, Ellison's Invisible Man, Bellow's Sieze the Day, Kerouac'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 1 credit

ENE469A: The War Film

(Offered in 2004-05 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course is an exploration of the development of the war film in North America and Europe since the beginning of the 20th century. Through critical analysis and a comparative approach, students will evaluate how this film genre represents WWI, WWII, the Korean War, and the Vietnam War. The films from each conflict will be analyzed in the social and political climate of the times as well as in relation to the economics of the film industry in Hollywood.

3 - 0 - 6 1 credit

ENE474: Chosen Topics in Literary Studies

Pre-requisite: ENE200 (completed, concurrent, or equivalent)

This course is designed so that professors in the Department of English will be able to share with the students the results of their research in a particular area of literary studies that does not form part of the regular honours stream. Topics will vary with the interests and research of the faculty.

3 - 0 - 6 2 credits

ENE476A: British Literature during the Romantic Period

(Offered in 2003-04 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

The backbone of this course is the study of the work of the six great British romantic poets, Blake, Wordsworth, Coleridge, Shelley, Keats, and Byron. Careful attention will be paid to the short lyric poems, and we will read parts of the longer narrative poems. Students will be encouraged to explore the common ideas which emerge in these poets, and the differing ideas of "romanticism" which are present. The prose of some of these authors will also be examined. Finally, the course will include the study of two novels, by Austen and Shelley.

3 - 0 - 6 1 credit

ENE478B: British Literature of the Victorian Period

(Offered in 2003-04 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

The purpose of this course is to make students conversant with the literature of the Victorian period (1830 - 1901). We will read novels, poetry, and non-fictional prose. One theme of the course will be the role of this period as a transition between the romantic period and the beginnings of modernism in the 1890s. Some of the intellectual currents we will study are the spread of evangelical Christianity, the influence of utilitarianism, and the effects of scientific reasoning on the interpretation of the Bible. Special attention will be paid to the new roles and freedoms which developed for women during this period, and the way in which issues of social classes enter into the literature of the period.

3 - 0 - 6 1 credit

ENE480A: Commonwealth Literature: Africa, Caribbean, and Canada

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 1 credit

ENE482B: Commonwealth Literature: Australia, New Zealand, India

(Offered in 2003-2004 and alternate years)
Pre-requisite: ENE200 (completed, concurrent, or equivalent)

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 1 credit

DEPARTMENT OF FRENCH STUDIES

Associate Professor and Head of the Department - M. Benson, BA, BEd, MA, PhD
Professor - G. Quillard, BA, MA (Litt), MA (Lit), PhD
Associate Professor - G.J.A. Monette, BA, MA(Ens), MA(Litt), PhD
Assistant Professor - P.-A. Lagueux, BA, MA, PhD
Assistant Professor - F.-E. Boucher, BA, MA (Litt), PhD
Assistant Professor – C. Savoie, BA, MA, PhD

GENERAL

The Department of French Studies offers a programme that focuses on French literature in the francophone world 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 Department Head.

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

PROGRAMME OBJECTIVES

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 analyze. 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 analytical study of literary works helps to assess situations with a critical mind.

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 shape 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 analyze. Such abilities are extremely useful for people in management and other positions of responsibility.

PROGRAMME STRUCTURE

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 Studies. 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 (part A is given in the fall; part B 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 degree programme.
- At least eight full courses or (16 one-term courses) selected from the offerings of the French Studies Department (excluding courses in Spanish). FRF152, FRF262, FRF344A, and FRF346B. One full course (or 2 one-term courses) in French literature and one full course (or 2 one-term courses) in French-Canadian literature.

The Honours French Studies stream requires:

- Completion of the four-year Humanities degree programme.
- At least ten full courses (or 20 one-term courses) selected from the offerings of the French Studies Department (excluding courses in Spanish). Included in these courses must be FRF152, FRF262, FRF344A and FRF346B, and one full course (or 2 one-term courses) in French literature and one full course (or 2 one-term courses) in French-Canadian literature.

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- average in all their academic courses in Fourth Year.

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

- Fulfillment of the Honours standing requirements above.
- An average of at least A- 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 with at least a B- average for the courses.

COURSE DESCRIPTIONS

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

Compulsory course for French-speaking First Year Science/Engineering 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 – 6 2 Credits

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 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 2 Credits

FRF160: Cours de composition et d'introduction aux études littéraires Partie I

Offered through the Office of Continuing Studies.

1 Credit

FRF161: Cours de composition et d'introduction aux études littéraires Partie II

Prerequisite: FRF 160 or equivalent
Offered through the Office of Continuing Studies.

1 Credit

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

This course is intended for Second, Third and Fourth Year Engineering and Science students who speak and write 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 portrays 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 1 Credit

FRF202A: L'image des Canadiens français à travers la littérature canadienne-française du XXe siècle I

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts who speak and write French fluently.

Literary works written before 1960 (novels, poetry, plays) will be used to illustrate the main themes of French-Canadian literature and the way in which the French-Canadian community portrays itself. The main stages in the evolution of this portrayal will be studied. Students will also be introduced to the main aesthetic and critical trends in French Canada prior to 1960.

3 - 0 - 6 1 Credit

FRF204B: L'image des Canadiens français à travers la littérature canadienne-françaises du XXe siècle II

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts who speak and write French fluently.

This course continues FRF202A, looking at literary works written after 1960.

3 - 0 - 6 1 Credit

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

Compulsory course for French-speaking Second Year Arts students.
Prerequisite: FRF152 or equivalent

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 2 Credits

Note : FRF262, or its equivalent, must successfully be completed before a senior course (300 and 400 level) may be taken, or it may be taken concurrently with a senior course.

FRF306A: Littérature et civilisation canadiennes-françaises I

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

This course provides an overview of the cultural evolution and the main literary trends in French Canada from 19th century to the Second World War.

3 - 0 - 6 1 Credit

FRF308B: Littérature et civilisation canadiennes-françaises II

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

This course provides an overview of the cultural evolution and the main literary trends in French Canada from the Second World War to the present day.

3 - 0 - 6 1 Credit

FRF309: Littérature et civilisation canadiennes-françaises

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 1 Credit

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

(Offered in 2003-2004 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 1 Credit

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

(Offered in 2003-2004 and every second year thereafter.)
Prerequisite: FRF316A or equivalent.

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 1 Credit

FRF320A: Civilisation de la francophonie I

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Third and Fourth Year students in Arts.

This course provides an overview of French culture (l'Hexagone) through the study of short literary works and other documents. Writing exercises are a component of this course.

3 - 0 - 6 1 Credit

FRF322B: Civilisation de la francophonie II

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Third and Fourth Year students in Arts.

This course follows up on FRF320A by providing an overview of francophone culture outside of France (Belgium, Haiti, French Antilles, Sub-Saharan French Africa, Maghreb, etc.).

3 - 0 - 6 1 Credit

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

(Offered in 2003-2004 and every second year thereafter.)
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 1 Credit

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

(Offered in 2003-2004 and every second year thereafter.)
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 1 Credit

FRF340A - Variétés linguistiques canadienne-française et française

(Offered in September 2003 and every second year thereafter)

The aim of this course is to compare the characteristics of spoken French in Canada by analyzing the historical, political, economic and social contexts underlying linguistic variants. Students will be asked to describe the nature of "joual" and its influence in literature and in everyday speech. They will be able to recognize the potential of anglicisms to pose a danger to the language while offering possible enrichments. Lastly, importance will be placed on the necessity of establishing norms specific to French spoken in Canada, and on the usefulness of a Quebec French descriptive dictionary.

3 – 0 – 6 1 Credit

FRF344A: Stylistique française I

(Offered yearly.)
Compulsory course for third year students in the French Studies programme.
This course is intended for Third and Fourth Year students in Arts. Prerequisite: FRF262 or equivalent.

Students will acquire the knowledge necessary to appreciate and analyze stylistic effects and to improve their writing style. A wide range of documents (newspaper articles, speeches, advertising, literary texts, etc.) will be analyzed. Writing exercises will teach the student to adopt the style best suited to the function of the texts they produce.

3 - 0 - 6 1 Credit

FRF346B: Stylistique française II

(Offered yearly.)
Prerequisite: FRF344A or equivalent.
Compulsory course for third year students in the French Studies programme.
This course is intended for Third and Fourth Year students in Arts.

Students will acquire the knowledge necessary to analyze stylistic effects, especially word play; to analyze the structure of literary texts; and to improve their writing style. Literary texts, especially short stories, will be analyzed. In this course, students will be required to finish short stories by illustrating different narrative points of view and different styles. As well, they will be expected to compose a short story.

3 - 0 - 6 1 Credit

FRF348A: Historical and linguistic approach to the French language I

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Third and Fourth Year students in Arts.

This course introduces the student to historical linguistics and the classification of languages, and goes on to explore the origins of the French spoken in France and the French spoken in Canada. Then, with the aid of the major twentieth-century linguistic theories (structuralism, functionalism, generative grammar), the student will become familiar with

the terminology and the nature of descriptive linguistics and French grammar.

3 - 0 - 6 1 Credit

FRF350B: Historical and linguistic approach to the French language II

(Offered in 2004-2005 and every second year thereafter.)
Prerequisite: FRF348A
This course is intended for Third and Fourth Year students in Arts.

This course will examine the major fields of modern linguistics: phonology and phonetics, derivational and inflexional morphology, semantics, lexicography, and syntax.

3 - 0 - 6 1 Credit

FRF352A: Le roman français au XIXe siècle et ses antécédents

(Offered in 2003-2004 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 1 Credit

FRF354B: Le roman français au XXe siècle et ses antécédents

(Offered in 2003-2004 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 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 1 Credit

FRF366A: Étude de l'histoire et des formes de la poésie française du Moyen Âge à Baudelaire

(Offered in 2004-2005 and every second year thereafter)

The course is a study of the evolution of French poetry in Europe from the Middle Ages to Baudelaire, 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.

3 - 0 - 3 1 Credit

FRF368B: Étude de l'histoire et des formes de la poésie française de Baudelaire à nos jours

(Offered in 2004-2005 and every second year thereafter)

The course is a study of the evolution of French poetry in Europe from Baudelaire to the present day. The main trends and notable works will be examined in relation to the art and thinking associated with each period.

3 - 0 - 3 1 Credit

FRF372A: Histoire du théâtre médiéval et classique

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year Arts students.

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

3 - 0 - 6 1 Credit

FRF374B: Histoire du théâtre moderne

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year Arts students.

The course will focus on contemporary theatre in the 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 the aesthetics of modern theatre.

3 - 0 - 6 1 Credit

FRF376A: La littérature française du Moyen Âge I

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

After a brief consideration of important social and historical elements and an overview of the principles of medieval French, this course will provide an intensive study of French medieval literature from its origins (Serments de Strasbourg) until the 13th century, dealing principally with the epic form (Chanson de Roland), the novel of courtly love and knightly quest (Romans de la table ronde, Roman du Graal) and with the beginnings of a new form of literature, that of the emerging classe bourgeoise. Various aspects of medieval life and customs (society, pastimes, food, war, clothing, etc.) will complement our studies.

3 - 0 - 6 1 Credit

FRF378B: La littérature française du Moyen Âge II

(Offered in 2004-2005 and every second year thereafter.)
Prerequisite: FRF376A
This course is intended for Second, Third and Fourth Year students in Arts.

This course follows FRF376A and addresses French literature of the 13th, 14th and 15th centuries. More specifically, we will be studying the inception of theatre as a literary form (religious plays, works of Adam de la Halle, Farce de maître Pathelin), various forms of lyrical poetry (chanson de toile, jeu-parti, etc.), and important longer works such as Le roman de Renart and Le roman de la rose. The end of the Middle Ages brings us to the work of the man considered to be the first modern French poet: François Villon.

3 - 0 - 6 1 Credit

FRF380A: Les grands moralistes français des XVIe et XVIIe siècles

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

A study of the great French moralists of the 16th and 17th centuries, such as Montaigne, Pascal, La Rochefoucauld, La Bruyère, Vauvenargues.

3 - 0 - 6 1 Credit

FRF382B: Les grands moralistes français du XVIIIe siècle

(Offered in 2004-2005 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

A study of the great French moralists of the 18th century, especially Voltaire, Rousseau and Chamfort, and their influence on 19th century literature.

3 - 0 - 6 1 Credit

FRF386A: La littérature française du siècle des lumières I

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

An introduction to French thought and literature of the 18th century: the Age of Reason. Works of the great authors of this period will be studied: Fontenelle, Fénelon, Montesquieu (Lettres persanes, De l'esprit des lois) and Diderot (Le neveu de Rameau, Encyclopédie).

3 - 0 - 6 1 Credit

FRF388B: La littérature française du siècle des lumières II

(Offered in 2003-2004 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

Continuation of FRF386A. This course will specifically look

at the seminal works of the two most important writers of the period: Voltaire (Lettres philosophiques, Zadig, Candide, etc) and Rousseau (Discours sur l'inégalité, Contrat social, Émile, etc.)

3 - 0 - 6 1 Credit

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 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 body.

3 - 0 - 6 1 Credit

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 body.

3 - 0 - 6 1 Credit

FRF405: Civilisation canadienne-française

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 1 Credit

FRF416A: Stylistique comparée de l'anglais et du français I

(Offered in 2004-2005 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 1 Credit

FRF418B: Stylistique comparée de l'anglais et du français II

(Offered in 2004-2005 and every second year thereafter.)
Prerequisite: FRF416A or equivalent.
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 1 Credit

FRF426: Études dirigées avancées

(Offered yearly)
This course is intended for students in Fourth Year Honours French Studies. It must be approved by the Department Head.

The course given on a tutorial basis by one member of the department involves the writing of a thesis.

3 - 0 - 6 2 Credits

FRF452A: Le roman canadien d'expression française avant 1940

(Offered in 2005-2006 and every second year thereafter.)
This course is intended for Second, Third and Fourth-Year Arts students.

After its first tentative steps in the 19th century, the French-Canadian novel won acclaim in the 20th Century. This course provides an overview of this evolution.

3 - 0 - 6 1 Credit

FRF454B: Le roman canadien d'expression française après 1940

(Offered in 2005-2006 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.

3 - 0 - 6 1 Credit

FRF462B – Pratiques littéraires des femmes

(Offered in January 2006 and every second year thereafter)
This course is intended for Second, Third and Fourth year Arts students.

Study of women writers in France and Quebec, taking into account theories of production and reception, formal characteristics of the works and critical thought stemming from these practices. Students will be expected to place major authors and works in the context of literary history, to describe and analyze formal and aesthetic forces at work in these writings, and to formulate a personal critical reflection on women writers.

3-0-6 1 Credit

FRF466A: La poésie des prédecesseurs

(Offered in 2005-2006 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

This course will study the poetic works written in French Canada before 1937. It will show that the French-Canadian poetic tradition slowly distinguished itself from the literature of France and will study the characteristics of this new tradition. The works of the early 20th century will receive particular attention.

3 - 0 - 6 1 Credit

FRF468B: La poésie des aînés

(Offered in 2005-2006 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

This course will study the works of Saint-Denys Garneau, Grandbois, Hébert et Lasnier. It will show that the works of these four poets have launched a new poetic language that will become a beacon for contemporary French-Canadian poetry.

3 - 0 - 6 1 Credit

FRF470A: Théâtre canadien-français I

(Offered in 2005-2006 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

After an overview of the history of drama in French Canada, this course will study the real development of this literary genre from 1950 to 1970. The plays of some major playwrights will receive particular attention.

3 - 0 - 6 1 Credit

FRF472B: Théâtre canadien-français II

(Offered in 2005-2006 and every second year thereafter.)
This course is intended for Second, Third and Fourth Year students in Arts.

This course will study dramatic production in French Canada since 1970.It will show the diversity and originality of that production through the works of important playwrights.

3 - 0 - 6 1 Credit

FRF482A: Civilisation canadienne-française de 1760 à 1880

(Offered in 2004-2005 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 1 Credit

FRF484B: Civilisation canadienne-française de 1880 à nos jours

(Offered in 2004-2005 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 1 Credit

FRF486A: Émergence d'une autonomie littéraire I

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

This course will show that, from 1534 to the end of the 18th century, French-Canadian literature gradually laid the groundwork for the attainment of full literary autonomy in the 20th century.

3 - 0 - 6 1 Credit

FRF488B: Émergence d'une autonomie littéraire II

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

This course will show that, at the end of the 19th century and the beginning of the 20th, French-Canadian literature is trying to find solutions to fundamental problems of formal and thematic natures. The solutions arrived at will afterwards allow it to gain its full autonomy.

3 - 0 - 6 1 Credit

FRF492A: La littérature de la francophonie antillaise et africaine

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

This course will focus on the literature of Francophone communities outside France and Québec. It will 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 other Francophone cultures.

3 - 0 - 6 1 Credit

FRF494B: La littérature de la francophonie nord-américaine et arabe

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

The course will present works from the Acadian, Franco-Ontarian and Arabic literature.

3 - 0 - 6 1 Credit

FRF496A: La sociolinguistique et la francophonie I

(Offered in 2005-2006 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 governing the different varieties of French.

3 - 0 - 6 1 Credit

FRF498B: La sociolinguistique et la francophonie II

(Offered in 2003-2004 and every second year thereafter.)
Prerequisite: FRF49A or equivalent.

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 deals in particular with the different variants of French in specific areas (for example: the relationships between language and power and between language and social organization).

3 - 0 - 6 1 Credit

ESF302A: Introduction to Spanish I

This course is intended for Second, Third and Fourth Year students.
It provides an introduction to the study of Spanish civilization and language.

This course is given in Spanish and French and requires a linguistic profile of BBB in French as a Second Language

3 - 0 - 6 1 Credit

ESF304B: Introduction to Spanish II

(Prerequisite: ESF300A or equivalent).
Continuation of ESF300A.

This course is given in Spanish and French and requires a linguistic profile of BBB in French as a Second Language

3 - 0 - 6 1 Credit

ESF402A: Intermediate Spanish I

(Prerequisite: ESF302B or equivalent)
This course is intended for Fourth Year students. It provides students with a furthering of their knowledge of oral and written Spanish and of Hispanic culture.

This course is given in Spanish and French and requires a linguistic profile of BBB in French as a Second Language

3 - 0 - 6 1 Credit

ESF404B: Intermediate Spanish II

(Prerequisite: ESF400A or equivalent)
Continuation of ESF400A.

This course is given in Spanish and French and requires a linguistic profile of BBB in French as a Second Language

3 - 0 - 6 1 Credit

MILITARY AND STRATEGIC STUDIES PROGRAMME

Chairman and Dean of Arts: J. J. Sokolsky, BA, MA, PhD

PROGRAMME OBJECTIVES

This interdisciplinary programme is unique in North America at the undergraduate level. The Military and Strategic Studies (MSS) programme offers students an opportunity to acquire a sound grounding in military history, strategic thought, and international relations, as well as in Canadian government, politics and economics, English or French Studies, and military psychology and leadership. It leads to a Bachelor of Arts degree in Military and Strategic Studies, as a Major or at the Honours level. The MSS degree provides a solid basis for graduate studies and a professional career.

Officer Cadets are encouraged to take at least one MSS course in their second language. Students with the requisite language profile are free to take all or a combination of courses in either official language while earning their degrees.

In addition to their course work, Officer Cadets enrolled in the MSS programme are encouraged to participate in the various extracurricular activities of the programme, including field trips to Ottawa, Washington, New York, USMA, USNA, and NATO HQ and several Model UN and NATO simulations at leading North American universities.

DEGREE REQUIREMENTS

To earn a degree in Military and Strategic Studies students must pursue one of two patterns of study:

a. Military and Strategic Studies; or,

b. Military and Strategic Studies, with a Minor in Military Psychology and Leadership (MPL), Business Administration, Economics, English, or French Studies.

HONOURS

1. The following are requirements for an Honours Degree in MSS, a 42-credit degree including the core courses in Arts and Science:

a. 15 credits, comprised of the following mandatory courses:

HIE 202: Introduction to Canadian Military History (2 credits)
HIE 270: Introduction to Military History (2 credits)
HIE 380: Peacekeeping and Peacemaking (2 credits)
HIE 470: Strategy and Strategists (2 credits)
POE 316A: Introduction to International Relations (1 credit)
POE 317B: Introduction to Contemporary Strategic Studies (1 credit)
POE 460A: International Conflict Analysis (1 credit)
POE 462B: Current Strategic Issues (1 credit)
PSE 312A: Military Psychology and Combat (1 credit)
MSE 424/426: Thesis/Advanced Directed Studies (2 credits)

A minimum of 5 other credits for subject-field courses, of which 2 must be at the 400 level, approved by the PIC MSS.

b. Maintain a B average in all mandatory Honours courses identified in a. above.

c. Maintain a B- average in all academic courses in fourth year.

2. The following are requirements for a Major in MSS, a 40-credit degree including the core courses in Arts and Science:

a. 13 credits, comprised of the following mandatory courses:
HIE 202: Introduction to Canadian Military History (2 credits)
HIE 270: Introduction to Military History (2 credits)
HIE 380: Peacemaking and Peacemaking (2 credits)
HIE 470: Strategy and Strategists (2 credits)
POE 316A: Introduction to International Relations (1 credit)
POE 317B: Introduction to Contemporary Strategic Studies (1 credit)
POE 460A: International Conflict Analysis (1 credit)|
POE 462B: Current Strategic Issues (1 credit)
PSE 312A: Military Psychology and Combat (1 credit)

A minimum of 3 other credits for subject-field courses, of which 1 must be at the 400 level, approved by the PIC MSS.

b. The MSS Major may not be earned as a double major with History or Politics.

c. There is no Minor in MSS.

3. Minors in MPL, Business Administration, Economics, English, or French Studies may be earned together with an Honours or a Major MSS Degree. Students pursuing one or more of these Minors will complete 8 credits in their Minor program, in addition to the core courses in Arts and Science.

DEPARTMENT OF HISTORY

Professor Emeritus - R.A. Preston, BA, MA, PhD, DipED, FRHistS
Professor Emeritus - D.M. Schurman, BA, MA, PhD
Associate Professor and Head of the Department - M.A. Hennessy, BA, MA, PhD
Professor - N.F. Dreisziger, BA, MA, DipREES, PhD
Professor - E.J. Errington, BA, BEd, MA, PhD
Professor - R.G. Haycock, BA, MA, 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
Professor - F. Gendron, BA, MA, PhD
Associate Professor - R.A. Prete, BA, MA, PhD
Associate Professor - J. Lamarre, BA, MA, PhD
Associate Professor - R. Legault, BA, MA, PhD
Assistant Professor - Lieutenant-Colonel D. Bashow, OMM, CD, BA, MA
Assistant Professor - Major G.M. Boire, CD, BA, MA, bems ESG
Assistant Professor - Major D.E. Delaney, CD, BA, MA
Assistant Professor – J.L. Kenny, 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:

a. 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;

b. 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

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

ENTRY AND QUALIFICATIONS

PROGRAMME STRUCTURE:

The Department introduced a new degree in 2002 and has revised the requirements for degrees in History for students commencing studies in 2002/03. All students pursuing a degree in History are still required to complete the "core" curriculum, as outlined in Tables 1, 3, 5 and 8 at the beginning of this Calendar and in the Academic Regulations. However, the program of study for students entering 1st year Arts or those entering 2nd year on or after September 2002 who intend to pursue a degree in History will be different than those already in the program.

FOURTH YEAR STUDENTS OF HISTORY

The programme of study for history students entering into their 4th year in September 2003 will remain as outlined in the 2001-2002 Calendar. These students will be pursuing either an Honours or general degree in the Humanities (History) and are reminded that they must complete the following requirements:

HONOURS:
10 full (two term) History courses approved by the department, including
- HIE/F102 - Canada
- HIE/F202 - Introduction to Canadian Military History
- HIE/F270 - An Introduction to Military History
- HIE/F384 - Modern Europe
- HIE/F424 or HIE/F426 - Thesis or Advanced Directed Studies
- maintain a B average in 300 and 400 level history courses;
- maintain a B- average in all academic courses in their 4th year

GENERAL:
8 full (two term) History courses approved by the department, including
- HIE/F102 - Canada
- HIE/F202 - Introduction to Canadian Military History
- HIE/F270 - An Introduction to Military History
- HIE/F384 - Modern Europe

MINOR IN HISTORY:
4 full (two-term) History courses; maintaining at least a B- average in these courses

FIRST, SECOND AND THIRD YEAR STUDENTS OF HISTORY

The Department offers two degrees in History: a major, and for those who wish advanced studies and have the entry requirements, an honours in History. In addition, students in other programs may take a minor in History.

Particular requirements have been calculated on the basis of "credits". A one-term course earns one credit; a two course earns two credits.

MAJOR:
a) completion of a 40 credit program in the Humanities, including the core curriculum
b) a minimum of 16 credits in History, approved by the department, including
- HIE/F102 - Canada
- HIE/F202 - Introduction to Canadian Military History
- HIE/F270 - An Introduction to Military History
- HIE/F384 - Modern Europe
- at least 4 other history credits at the 400 level
* it is highly recommended that students take HIE384 in 2nd year.

DOUBLE MAJOR: Students wishing to complete a double major, one of which is in History, are required to complete the 16 credits as above, and meet the requirements for a major as set out in the second discipline.

HONOURS:
Students majoring in History who wish to pursue an Honours degree in History will apply to the Department in the 2nd term of their 3rd year. Eligibility to enter the Honours programme includes a B- average in 3rd third year, maintaining a B average in all History courses to date and the permission of the Department.

In addition to meeting the requirements for a major in History, Honours students are required to:

a) complete 4 additional History credits, including HIE/F424/426 - Thesis and Advanced Directed Studies (for a total of 20 History credits)

b) maintain an overall B average in History courses beyond HIE/F 202 (ie, for HIE/F270 and 300 and 400 level courses)
c) maintain a B- average in all academic courses in the 4th year
d) students who maintain an A- average in all History courses beyond HIE/F 202 (ie, HIE/F270 and 300 and 400 level) and attain a B- average in their 4th year of study will earn Honours with First Class Standing.

MINOR IN HISTORY: (open to students in any program at RMC)
a) 8 credits in History
b) maintain B- average in level History courses.

CORE CURRICULUM

The Department offers a number of courses that are required as part of the core curriculum. In many instances, these courses can also be counted towards requirements for a degree or minor in History.

Core history courses for students in the humanities and social sciences

HIE/F102 - Canada
HIE/F202 - Introduction to Canadian Military History

(For students in Business Administration HIE/F203B replaces HIE/F 202. It is strongly recommended that those wishing a minor in History, or who wish to maintain flexibility to change degree programs take HIE/F202.)

HIE/F270 for students in history, military and strategic sciences

(For all other arts students HIE/F271A/B replaces HIE/F270. It is strongly recommended that those wishing a minor in History take HIE/F270)

Core history courses for students in science and engineering.

HIE/F207A - Canada
HIE/F203B - Introduction to Canadian Military History
HIE/F271A/B - Introduction to Military History and Thought

MILITARY AND STRATEGIC STUDIES

See separate entry for Military & Strategic Studies Programme

COURSE DESCRIPTIONS

The Department offers both one term and two term courses. See the section on "Course Outline" earlier in this calendar, for an explanation of lettering and numbering of courses. It should be noted that senior courses (300 and 400 series) are designed for students pursuing a degree in History, but are open to students in other degree programmes. Courses listed in the 300 series are open to students in 2nd, 3rd and 4th year. Courses listed in the 400 series are open to students in 3rd and 4th year.

Certain courses are offered only in alternate years. Students are encouraged to choose courses in advance and take into consideration, as far as possible the courses that will be offered in the following year(s).

HIE102: Canada (HIF102: Le Canada)

For students in the First year Arts.

An introduction to the history of Canada which traces some of the political, economic, social and cultural development and interactions which helped to create the modern nation of today.

Note: Students taking this course cannot also take HIE/F207A or HIE/F 104 for credit.

3 - 0 - 6 Credits:12

HIE104: Survey of Post-Confederation Canada (HIF104: Étude du Canada après la confédération)

Offered through the Division of Continuing Studies.
Note: Students taking this course cannot also take HIE/F102 for credit.

HIE202: Introduction to Canadian Military History (HIF202: Introduction à 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. Term one will cover the period to the end of the 19th century; term two will concentrate on the late 19th and 20th centuries.

Note: Students taking this course cannot also take HIE/F203B for credit.

3 - 0 - 6 Credits:12

HIE203B: Introduction to Canadian Military History (HIF203B: Introduction à l'histoire militaire du Canada)

Mandatory for students in Science, Engineering and Business Administration.

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.

Note: Students taking this course cannot also take HIE/F202 for credit.

3 - 0 - 6 Credits: 6

HIF205: L'histoire militaire du Canada (Des origines à 1899)

Offered through the Division of Continuing Studies.

HIE207A: Canada (HIF207A: Le Canada)

Mandatory for students in Science and Engineering.

A survey of Canadian history from the pre-Contact era to the 1980s. Key themes will include the diversity of the Canadian experience, Canada's place in the North Atlantic World, the development of the Canadian economy, and the evolution of the state as a force in the economic and social life of colonial and post-colonial Canada. The course will also explore how Canada's past has been presented in popular culture and public history.

Note: Students taking this course cannot also take HIE/F102 or HIE/F104 for credit.

3 - 0 - 6 Credits: 6

HIE208: Canadian Military History: A Study in War and Military History, 1867 to the present. (HIF208: La Guerre et l'histoire militaire: Étude de la guerre et de l'histoire militaire, 1867 jusqu'à nos jours.)

Offered through the Division of Continuing Studies.
Note: Students taking this course cannot also take HIE/F 202, 203B, or 205 for credit

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

Mandatory for students taking Honours or a Major 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.

Note: Students taking this course cannot also take HIE/F271A/B for credit.

3 - 0 - 6 Credits: 12

HIE271A/B: Introduction to Military History and Thought (HIF271A/B: Introduction à l'histoire et la pensée militaires)

Mandatory for all students who do not take HIE/F270.

This course is an introduction to military history and thought from the Napoleonic era to the present. In addition to an examination of the major (and some of the minor) conflicts of the era, the course will consider the impact of social and technological changes on the conduct of war. The student also will be introduced to the principal writers on themes and in military thought.

Note: Students taking this course cannot also take HIE/F270 for credit.

3 - 0 - 6 Credits: 6

HIE272: A Brief History of Air Warfare

Offered through the Division of Continuing Studies.

HIE289A: The Impact of Science and Technology on Society and the Environment (HIF289A: L'impact de la science et de la technologie sur la société et l'environnement)

Mandatory for students in Engineering.

A lecture course on the impact of modern science and technology on society and the environment 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.

2 - 0 - 4 Credits: 4

HIE301: Aboriginal Peoples of Canada: A History (HIF301: Histoire des peuples autochtones du Canada)

Offered through the Division of Continuing Studies.

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

(Offered in 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 Credits: 6

HIE314B: The United States, 1865 to the present (HIF314B: Les États-Unis, de 1865 à nos jours)

(Offered in alternate years)

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

3 - 0 - 6 Credits: 6

HIE326: Selected Issues in History (HIF326: Questions d'histoire)

This directed reading course is open to 3rd and 4th year Arts students (normally students in History) who wish to pursue a particular area of historical interest that is not available through regular departmental offerings. This will only be available in exceptional circumstances and requires the recommendation of a supervisor and the permission of the chair of the department.

3 - 0 - 6 Credits: 12

HIE340A: Military History of the First World War (HIF340A: L'histoire militaire de la Première Guerre mondiale)

(Offered in 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 Credits: 6

HIE342B: Military History of the Second World War (HIF342B: L'histoire militaire de la Deuxième Guerre mondiale)

(Offered in alternate years.)
Also offered through the Division of Continuing Studies.

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 Credits: 6

HIE345: The Canadian Way of War (HIF345: L'approche canadienne à la guerre)

Offered through the Division of Continuing Studies.

This one semester course will examine the "Canadian" way of War in the colonial and early national period, by focusing on one particular campaign: the French Indian Wars, 1754-1760; the War of 1812; or the North West Rebellion of 1885. Students will examine the tactical, operational and strategic dynamics of a particular conflict through a combination of classroom lectures, presentations, discussions and an actual battlefield tour.

Note: This special battlefield course is intended for officer professional development. It will be taught by a member of the faculty of RMC and by a field grade officer capable of applying current doctrine, terrain analysis and operational art to the historical study.

Offered only periodically and with the permission of the Department.

3 - 0 - 6 Credits: 6

HIE356A: War and Tradition in the Islamic World

(Offered in 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 Credits: 6

HIE358B: War and Peace in the Modern Islamic World

(Offered in 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 Credits: 6

HIE370A: The Diplomacy of Europe's Global Ascendancy: International History, 1815-1870 (HIF370A: La Diplomatie de la montée mondiale de l'Europe: Histoire internationale 1815-1870)

(Offered in alternate years.)

A lecture course concentrating on the major political, economic, and social developments in international history between 1815 and 1870. Emphasis will be placed upon the foreign policies of the European Great Powers, as well as the United States, China, and Japan, the advent of the Concert of Europe, the "Eastern Question", emerging colonial rivalries, differing national and imperial strategic requirements, and the impact of the German wars of unification.

3 – 0 – 6 Credits: 6

HIE371A: War and the Military Profession

Offered through the Division of Continuing Studies.

HIE372B: The Diplomacy of Great Power Rivalry: International History, 1870-1914 (HIF372B: La Diplomatie de Rivalité des Grandes Puissances: Histoire Internationale, 1870-1914)

(Offered in 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 Credits: 6

HIE374A: From World War to World War: International History 1914-1945 (HIF374A: De Guerre Mondiale à Guerre Mondiale: Histoire Internationale 1914-1945)

(Offered in alternate years.)

A lecture course concentrating on the major political, economic and social developments in international history between 1914 and 1945. Emphasis will be placed upon the

origins of the First World War, the development of war aims and peace terms, inter-alliance relations, the Paris Peace Settlement, interwar diplomacy, the "appeasement" debate, and the diplomacy of the Second World War.

3 - 0 - 6 Credits: 6

HIE379B: Cold War, Limited War, and Diplomacy: International History, 1945 - 1991 (HIF 379B: La Guerre froide, la guerre limitée, et la diplomatie: l'histoire internationale 1945-1991)

(Offered in alternate years.)
Also offered through the Division of Continuing Studies.

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 Europe and the Far East, and the formation of NATO and the Warsaw Pact. The origins of the Cold War, the rise 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 international politics will also be discussed.

3 – 0 – 6 Credits: 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 or coalition partners. Special attention will be paid to the roles and the missions undertaken by the Canadian Armed Forces in the post-1945 era.

3 - 0 - 6 Credits: 12

HIE382: An Introduction to Issues in Peacekeeping and Peacemaking (HIF382: Introduction aux problèmes du maintien et de l'imposition de la paix)

Offered through the Division of Continuing Studies.

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

Mandatory for students taking Honours or a Major in History.

A survey of European history from 1500 to the present. This course examines the political, social and economic history of Europe over the past five hundred years. Special attention will be paid to such wider phenomena as the Renaissance, the Reformation, the Enlightenment, the Industrial Revolution, colonialism and the impact of war.

Students majoring in history are strongly encouraged to take this course in their second year.

3 - 0 - 6 Credits: 12

HIE385: Modern Britain

(Offered in 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 this course.)

3 - 0 - 6 Credits: 12

HIE386A: Eastern Europe to 1918

(Offered in alternate years.)

A study of the history of East Central and Eastern Europe — the lands between the German and Russian realms — from medieval times to the end of the First World War. Aside from examining the evolution of the major national groups of the region, 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 Credits: 6

HIE387A: Russia to 1917

(Offered in 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 this course.)

3 - 0 - 6 Credits: 6

HIE388B: Eastern Europe from 1919 to 1989

(Offered in alternate years.)

The evolution of Eastern Europe from the post-World War I peace settlements to the collapse of the Soviet Empire. The course will survey the newly emerged independent states after 1918; internal problems and foreign interference in the region; social, ethnic, and intra-regional conflicts; the impact of World War II; the rise and demise of Soviet-style communism. (It is recommended that HIE386A, Eastern Europe be taken prior to taking this course.)

3 - 0 - 6 Credits: 6

HIE389B: The History of the USSR

(Offered in 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 this course.)

3 - 0 - 6 Credits: 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 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 Credits: 6

HIE392B: European Imperialism - Nineteenth and Twentieth Centuries (HIF392B: L'impérialisme européen - les XIXe et XXe siècles)

(Offered in 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 or coincident with this course.)

3 - 0 - 6 Credits: 6

HIF400: L'héritage militaire du Canada français

(Offered in 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 Credits: 12

HIE403B: Social History of Canada (1870-1980) (HIF403B: Histoire sociale du Canada (1870-1980))

This seminar will analyse selected issues in the development of Canada from 1870 till 1980. Topics will include industrialization, immigration, social movements, reform, urbanization, regionalism, cultural conflict, social effects of war and the changing cultural definitions of Canada.

3 – 0 – 6 Credits: 6

HIE405A: History of the relations between Canada and the United States (HIF405A: Histoire des relations entre le Canada et les États-Unis)

An analysis of various themes in the Canadian-American relationship from the beginning of European colonization until the present. Based on readings and discussion in class. The course will consider the mutual influences exercised by these two countries on their respective political, economic, social, cultural and intellectual development.

3 – 0 – 6 Credits: 6

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

Also offered through the Division of Continuing Studies.

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 Credits: 6

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

* Also offered through the Office of Continuing Studies.*

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 defense policy and the use of the armed forces as an instrument of national policy.

3 - 0 - 6 Credits: 6

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

(Offered in 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 Credits: 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 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.

3 - 0 - 6 Credits: 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 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 to 1919, be taken prior to this course.)

3 - 0 - 6 Credits: 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 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 Credis: 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.)

Credits: 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.)

Credits: 12

HIF432: Histoire diplomatique et militaire de l'Amérique latine

(Offered in alternate years.)

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

3 - 0 - 6 Credits: 12

HIE444: History of intelligence since 1870

Using historical case studies from the Franco-Prussian War onwards, this course examines the methodologies of intelligence operations, including issues of deception, human and technical intelligence gathering, counter-intelligence, and more. These case studies will include the operations of a number of states including the United States, Great Britain, France, Prussia/Germany, Tsarist/Soviet Russia, and Israel.

3 - 0 - 6 Credits: 12

HIE448: The Rise of Modern Communism and Fascism

(Offered in alternate years.)

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

3 - 0 - 6 Credits: 12

HIE454: War, Peace and Diplomacy: Issues in the Foreign Policies of the Great Powers since 1815 (HIF454: La guerre, la paix et la diplomatie: les grands dossiers des politiques étrangères des grandes puissances depuis 1815)

(Offered in alternate years.)

A seminar course on the conduct of Great Power relations since the Congress of Vienna in which students will investigate various themes and topics in international history since 1815. The themes and topics will include: personality and policy-making; the diplomacy of the First and Second World Wars; civil-military relations and the development of national strategy; disarmament and peace-making; the early Cold War; and the later Cold War.

3 - 0 - 6 Credits: 12

HIF455A: Les origines historiques des crises de notre temps

This seminar examines the historical background of selected world crises. Relying on a combination of primary and secondary sources, it will analyse how economic, ethnic, social, cultural, military and diplomatic factors have shaped over time the policies of the nations involved in these crises.

3 – 0 – 6 Credits: 6

HIE456: Issues in Women, War and Society

(Offered in alternate years.)

An exploration, through seminars of selected themes and issues in the history of women, war and society from the 17th century to the present. Particular attention will be paid to women's changing involvement in war and revolution in the 18th and 19th century; the rise of "modern" military institutions; women's involvement in World War I and II; debates about gender integration in the late 20th century.

3 - 0 - 6 Credits: 12

HIF460A: La Révolution française

(Offered in alternate years.)

A 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 rights. The students will give presentations and critique primary documents of the revolution.

3 - 0 - 6 Credits: 6

HIF462B: Napoléon et le Premier Empire

(Offered in alternate years)

This course will consider the first empire and the rise of imperialism. It will consider the seven coalitions raised by England and the grand battles of the regime: Aboukir, Trafalgar, Austertitz, 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 its attempts to stop the emperor and the destruction of the French Revolution.

3 - 0 - 6 Credits: 6

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

A study of the most important interpreters of warfare from classical thinkers (Thucydides and Sun-Tzu) to the present. Also considered will be airpower and its proponents; 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 guerilla war; disarmament and arms control and the international law of war.

3 - 0 - 6 Credits:12

HIE471B: History of Air Warfare

This seminar course will explore air power and air warfare from the earliest days of powered flight to the present. It will focus primarily on the development of the idea of air power and on the organization and employment of air power and aerospace power in war and peace. The major themes that will be explored will include: the unique attributes of air power; the importance of air superiority; the contrast between offence and defense in air warfare; the role of "auxiliary aviation"; the command relationship between air and surface forces; and the morality and legality of air warfare.

3 – 0 – 6 Credits: 6

HIE472: Naval History: The Ages of Sail and Steam

(Offered in 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. In addition, 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.

3 - 0 - 6 Credits: 12

HIE473 : Naval History : The Ages of Sail and Steam

Offered through the Division of Continuing Studies.

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

* Also offered through the Office of Continuing Studies.*

An examination of the impact of technology on war, 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 Credits: 6

HIE475: Science and War: The Impact of Military Technology (HIF475: La Science et la Guerre: L'impact de la technologie militaire)

Offered through the Division of Continuing Studies.

Note: Students taking this course cannot also take HIE/F 474 for credit.

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 conflicts. This course will trace the development of thinking about guerrilla warfare as well as the evolution of its practice.

3 - 0 – 6 Credits: 6

HIF477B: Introduction historique au terrorisme

This is an introduction to terrorism and counter-terrorism in a variety of historical contexts. Among other things, it will consider the origins, complexities and basic elements of terrorism, as well as the various approaches taken to control this "poor man's weapon".

3 - 0 - 6 Credits: 6

HIE480: War, Revolution and the Rise of Modern China

(Offered in 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 Credits: 12

HIE482: War and the Emergence of Modern Japan

(Offered in 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 Credits: 12

HIF491A: Les crises internationales et le droit

An historical examination of origins, development and resolution of a number of major international crises, including the Falklands War (1982), flight KE007 (1983), the taking of American hostages in Tehran (1979), the Rainbow Warrior bombing (1985), the Achille Lauro hijacking (1985), the Iraq-Kuwait War (1990) and the Palestinian issue (2000). In particular, students will consider and analyse the legal positions of the parties involved, their actions during the crisis and the contribution of the law to solving the problem.

3 – 0 – 6 Credits: 6

HIF492B: Crimes et criminels de guerre: Droit pénal international

(Offered in alternate years.)

A study of war crimes, crimes against humanity, and of the reactions of the international community. This will include a review of the principles developed from the Nuremburg, Tokyo, The Hague and Arusha Tribunals; a study of the Goering, Yamashita, Eichmann, Barbie, Lischka, Calley, Finta, Demjanjuk, Papon and Blaskic trials; and an examination of the international penal court project.

3 - 0 - 6 Credits: 6

HIF494A: La France moderne jusqu'à 1848

(Offered in 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 Credits: 6

HIF496B: La France contemporaine

(Offered in 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 Credits: 6

NOTE:

Students in History (either Honours or a Major Program) may – with the permission of the department - take up to three one term courses outside the department to be counted towards their degree. The following courses have been cross listed :

ECE/F316A : Canadian Economic History
POE/F312A : Classical Political Philosophy
POE/F314A : Modern Political Philosophy

POE/F412B - American Foreign and Defense Policy
Note: Students taking this course as a History credit cannot also be credited for HIE/F418B.

POE/F416A - Contemporary Canadian External Relations and Defence Policy
Note: Students taking this course as a History credit cannot also be credited for HIE/F408B.

DEPARTMENT OF MILITARY PSYCHOLOGY AND LEADERSHIP

Associate Professor and Head of the Department - R.C. St. John, BA, MA, PhD
Associate Professor - M. M .D. Charbonneau, BEng, MA, PhD
Associate Professor - A.A.M. Nicol, BSc, MA. PhD
Assistant Professor - K. Taktek, BA, MSc, PhD
Lecturer - Major C. Blanchette, CD, BA, MSc
Lecturer - Major R. Porter, CD, BA, MSc

PROGRAMME OBJECTIVES

As a department of the Faculty of Arts, the Military Psychology and Leadership Department teaches: (a) a mandatory programme of studies that is part of the core curriculum taken by all Officer Cadets during their four years at the College, and (b) a psychology minor programme to Arts students who wish to pursue this option. The primary pedagogical objective of the Military Psychology and Leadership Department is to offer a high quality, theoretically based programme of study in militarily relevant courses which contribute to the analytical and professional development of students.

MANDATORY PROGRAMME

The Military Psychology and Leadership Department recognizes the need to provide leadership education, raise social consciousness and positively impact the psychological, philosophical and moral development of students. To achieve these goals, the Department offers mandatory courses as part of the core curriculum required by students in First, Third, and Fourth Years of study. The focus and scope of each is described below.

First Year. Meeting the increasingly unique and complex challenges of an officer in the Canadian Forces requires a combination of conceptual, technical, interpersonal, and professional skills which were not required only a short while ago. To prepare officers for their future leadership responsibilities, the psychology programme promotes an appreciation of human behaviour by providing separate introductory courses for arts and Science/Engineering students that focus on basic psychological phenomena such as learning, perception, memory, personality and emotion. Beyond self-awareness, an officer must be able to determine

the appropriate type and degree of influence required for effective leadership of individuals and groups. Students examine human behaviour in organizational and social contexts by studying such topics as values, attitudes, obedience, aggression, racial and gender relations, and prejudice. More on the First Year courses is provided in the Course Description section under Course Number 112 for arts students and 123 for Science/Engineering students.

Third Year. An important element of successful leadership is 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 developed in Third Year by Course Number 301 which has been designed to help students understand leadership theory, human motivation, power and politics, organizational culture, and managing resistance to change. More on this Third Year course is provided in the Course Description section (see Course Number 301).

Fourth Year. An officer's ability to function will be greatly impaired if his/her leadership is perceived to lack integrity. Thus, the Department focuses on the necessity for personal integrity, the importance of human dignity, and the need to reflect continually on one's own values and professional conduct in Fourth Year. The department reinforces these concepts in Course Number 401 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. More on this Fourth Year course is provided in the Course Description section. (see Course Number 401).

The following table lists the Military Psychology and Leadership Department courses included in the core curriculum for Arts and Engineering and Science students:

	Arts Students	**Engineering or Science Students**
Yr 1	PSE112 Intro to Psychology	PSE123B Fundamentals of Human Psychology
Yr 2	no requirement	no requirement
Yr 3	PSE301A Organizational Behaviour and Leadership	PSE301A Organizationa Behaviour and Leadership
Yr 4	PSE401B Military Professionalism and Ethics	PSE401B Military Professionalism and Ethics

MINOR PROGRAMME

The minor programme in Military Psychology and Leadership offers an opportunity to examine in greater detail issues raised in the core curriculum. The objectives of the minor programme are to: (a) provide a theory-based programme of study that is applicable to all military occupations; and (b) offer a programme of studies that enhances the major programmes of studies offered by other departments in the Arts Division.

The minor programme focuses on the application of psychology in particular, and behavioural science in general, to the military workplace and military operations. Thus, the courses of the minor programme examine topics like motivation, leadership, self-awareness, group processes, cultural issues, interviewing and counselling, occupational and operational stress, combat psychology, human resource management, persuasion and influence, human-machine interaction, and research methodology. A minor concentration in Military Psychology and Leadership is an excellent complement to all RMC programmes as well as an exceptional means of developing students' leadership ability and understanding of human behaviour.

In order to complete a minor programme from the department of Military Psychology and Leadership a student must complete a minimum of eight half courses from the courses offered by the Military Psychology and Leadership Department, one of which must be Research Methodology in Psychology.

For the minor to appear on the student's transcript, an overall B- average must be achieved in at least of six of the half courses taken.

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

PSE123B: Fundamentals of Human Psychology (PSF123B: Notions fondamentales de la psychologie humaine)

* Also offered through the Office of Continuing Studies.*

Compulsory for all students in the First Year Science/Engineering 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

PSE214B: Research Methodology in Psychology (PSF214B: Méthodes de recherche en psychologie)

For students in Second and Third Year Arts.

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

PSE228A/B: Group Dynamics (PSF228A/B: Dynamique de Groupe)

* Also offered through the Office of Continuing Studies*

For students in Second Year and Third Year Arts.

The objective of the course 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)

* Also offered through the Office of Continuing Studies.* Compulsory for all students in the Third Year.

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 organizational 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

PSE306A/B: Human Resource Management (PSF306A/B: Gestion des ressources humaines)

For students in the Third or Fourth Year.

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; quality of working life; occupational stress; and assessing the utility of HRM activities.. Students will be expected to demonstrate their comprehension of relevant HRM issues by completing projects in these areas.

3 - 0 - 6 Weight: 6

PSE312A/B: Military Psychology and Combat (PSF312A/B: Psychologie militaire et combat)

Also offered through the Division of Continuing Studies.

The course gives students the opportunity to examine the psychological dimensions of military operations. The course begins with an overview of the field of military psychology and then focuses on selected topics like military socialization, combat stress, sleep deprivation, fear and courage, and psychological operations. At the end of the course, students will be able to describe the impact of these psychological factors on performance during military operations.

3 – 0 – 6 Weight: 6

PSE320A/B: Sociology of the Armed Forces (PSF320A/B: Sociologie des forces armées)

(Not offered every year.)
For students in the Third or Fourth Year Arts. Elective for students taking a minor in Psychology.

This course uses perspectives and research from military sociology to introduce the student to the evolving character of military institutions within Canada. The following topics will be covered: the nature and role of the military in contemporary society, external change impacts (e.g., technological, political, economic, demographic, socio-legal and socio-cultural factors) and their consequences for military organization, models of military service, and special problems in the military system (e.g., recruitment and retention, diversity, media relations, the family, quality of life, mid-career transition). Emphasis will be placed on the Canadian military and on Canadian research literature.

3 - 0 - 6 Weight: 6

PSE324A/B: Cross-Cultural Psychology (PSF324A/B: Psychologie interculturelle)

(Not offered every year.)
For students in Second, Third, or Fourth-Year Arts.

Modern military operations typically involve multinational contingents comprised of units from a wide variety of cultures. The purpose of the course is to gain an understanding of the diversity that exists in the world and within Canada. This course provides an overview of some of

the differences that exist across cultures and why these differences may exist. Topics to be covered include acculturation, stereotypes, prejudice, cross-cultural research, values, beliefs, gender roles, conflict and negotiation, communication, and intercultural training.

3 - 0 - 6 Weight: 6

PSE332A/B: Introduction to Interviewing and Counseling (PSF332A/B: Initiation à l'entrevue et au Counseling)

For students in the Third or Fourth Year Arts.2

The goal of this course is to introduce students to counseling theory and skills that they can later apply as leaders and managers. This course will give students an opportunity to study theoretical perspectives on counseling and to apply these theories in situations that require interviewing and helping skills. After examining a number of theoretical concepts in counseling, the course will focus on the preparation and conduct of counseling interviews, solution-oriented interviews, active listening, verbal and non-verbal communication, problem solving and facilitating attitudes used in counseling interviews. A mix of psychological theory, case studies and practical applications will be presented throughout the course.

3 - 0 - 6 Weight: 6

PSE346A/B: Persuasion and influence (PSF346A/B: Persuasion et influence)

(Not offered every year.)
For students in the Third or Fourth Year. Elective for students taking a minor in Psychology.

The goal of this course is to provide students with knowledge on the theories and concepts of persuasion and influence, from both social psychology and leadership perspectives. Main course topics include communicator's characteristics, receiver's characteristics, cognitive and social factors, attitude formation and change, behaviour modification and interpersonal communication. Also, different influence strategies will be presented.

3 - 0 - 6 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

PSE454A/B: Advanced Leadership and Motivation (PSF454A/B: Leadership avancé et motivation)

For students in Third or Fourth Year.

The general objective of this course is to explore leadership theory and practice in depth, building on the concepts introduced in PSE301A, 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

PSE462A/B: Human Factors in Applied Military Science
(PSF462A/B: Facteurs humains en science militaire appliquée)

For students in the Third or Fourth Year Arts.

This course will introduce students to the broad problems in human-machine interactions and interfacing. This will involve studying human capabilities as applied to engineering and design. Topics will also include the measurement of human and machine capabilities, the effects of noise on performance, and the effects of sustained operations on performance. The various techniues used to enhance human effects of sustained operations on performance. The various techniques used to enhance human performance will also be discussed and evaluated. Aids to memory, perception, discrimination, and detection will be examined and demonstrated in class. Students will also be introduced to the use of computers in psychological settings.

3 - 0 - 6 Weight: 6

PSE464A/B Directed Sudies in Military Psychology and Leadership
(PSF464A/B Études dirigées en psychologie militaire et leadership)

For students in the Third and Fourth year.

Specialized study on an approved subject in one of the areas studies in Military Psychology and Leadership, but not available in other courses offered by the department. The method of instruction (i.e., lecture, seminar, tutorial, directed reading, etc.) will be determined by student needs and faculty availability.

Directed Readings Only 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 Dean of Arts - J.J. Sokolsky, BA, MA, PhD
Professor of Politics and Head of Department - H. Hassan-Yari, BA, MA, PhD
Professor of Politics and Vice Dean, Division of Continuing Studies –
P. Constantineau, BA, MA, PhD
Professor of Economics - P.J.S. Dunnett, BSc, MA, PhD
Professor of Economics - L.C. McDonough, rmc, BA, MA, PhD
Professor of Politics - A.J. Whitehorn, BA, MA, PhD
Professor of Politics - J.S. Finan, BA, MA, PhD
Professor of Geography - L.Y. Luciuk, BSc, MA, PhD
Professor of Economics - P.J. Paquette, BCom, MA, PhD
Associate Professor of Economics - G. Lepore, BSc, MA, PhD
Associate Professor of Politics - J.D. Young, BA, SpécScpol, MScSoc, PhD
Associate Professor of Geography - G. Labrecque, BA, LLL, MA, PhD
Associate Professor of Politics – Lieutenant-Colonel D.M. Last, BA, MA, MMAS, PhD
Associate Professor of Politics - N. Schwartz-Morgan, BA, MA, MA, PhD
Associat Professor of Politics – S. Robertson, BA, MA, PhD
Assistant Professor of Economics - U.G. Berkok, BA, MA, PhD
Assistant Professor of Politics - A. Ousman, BA, MA, PhD
Assistant Professor of Economics, A. Khazri, BA, MA, PhD
Assistant Professor of Politics and Chair Canada Research – J. Boulden, BAH, MA, LLM, PhD
Assistant Professor of Politics – Lieutenant-Colonel D. La Carte, BA, MA
Assistant Professor, Director of Office of Military Legal Education - Lieutenant-Colonel M.B. Philippe, CD, LL.B, LL.M
Assistant Professor of Military Legal Education – Lieutenant Naval P. Goldman

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 analyse 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, including the services of the Writing Centre, made available to them during their first two years of study to develop these skills.

POLITICAL SCIENCE

Courses in political science focus on a broad spectrum of domestic and international social issues whose resolution has political implications.

Political science courses cover a range of issues from the following fields of study:

a. Canadian Government;
b. International Relations;
c. Comparative Politics;
d. Political Theory;
e. Public Administration and Policy

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.

a. 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 POE328A and POE330B provide an overview of all aspects of Canadian government, POE416A concentrates on defence and foreign affairs.

b. In POE316A students are introduced to the theory and practice of international relations, while in POE317B contemporary strategic studies are covered. This is followed by POE412 which focus on contemporary foreign and defence policies of the United States. POE/F460/462 deals with international conflict analysis from the political, economic, social and military perspectives. All aspects of terrorism are discussed in POE/F458, while POE413 analysis the nuclear issues.

c. 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 POE320A and POE322B students are introduced to theories of comparative politics and their application. POE424A focuses on the theories of modernization and political development in the Third World, while POE426B involves case studies of selected countries.

d. 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 POE106, 312A, 314B, 328A, and POE418A and POE420B, which deals with political "isms" (i.e. socialism, liberalism, capitalism, etc).

e. 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.

The Department of Politics and Economics also provides courses in Geography. Courses in Geography survey the evolution of the world's existing regions, 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, geopolitical aspects of international law and maritime boundaries. As in politics courses, 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.

All aspects of national and world geography are covered by a range of courses. In GOE202 students study basic concepts of political geography. Four major regions of the world are studied in GOE305A and GOE307B while GOE418B analyses different approaches to cultural and historical geography.

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, ECE206A, ECE308B, ECE224A 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, students may select the appropriate number from the following courses:

Canadian Economic History (ECE316A), International Economic Problems (ECE318B), Industrial Organization (ECE320A), Statistical Analysis for Social Scientists II (ECE372B). The Development of Economic Ideas (ECE312B), Economics of the Environment (ECE442A), Cost Benefit Analysis of Environmental Issues (ECE444B), Topics in Microeconomics (ECE450A), Topics in Macroeconomics (ECE452B) and Money, Financial Institutions and Markets (ECE300B), Public Finance I and II (ECE410A, ECE412B), International Economics I and II (ECE416A, ECE418B) and Economics of Defence (ECE424B). Direct Readings in Economics Seminar (ECE492B). 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 economics degree programme at the College.

DEGREE IN POLITICAL SCIENCE

PROGRAMME REQUIREMENTS

Students successfully completing their First Year in Arts are eligible for entry into the programme leading to an Honours or Major Degree in Political Science. The First Year political science courses are part of the core compulsory courses and will count toward the degree requirements noted below. In consultation with the Department Head, students will select courses each year, which fulfil the degree requirements, which are best suited to student interest.

HONOURS IN POLITICAL SCIENCE

Minimum of 42 credits, 17 of them being mandatory
(1 course = 1 term = 1 credit)
Minimum of 20 courses in Politics
Minimum B average standing in all 300 and 400 level Politics courses;
Overall B – average in Fourth Year of study.

CORE COURSES

POE/F106 : Canadian Civics and Society / Société et institutions canadiennes
GOE/F202A/B: Introduction to Political Geography / Introduction à la géographie politique
POE/F312A : Classical Political Philosophy / Philosophie politique classique

POE/F314B : Modern Political Philosophy / Philosophie politique moderne
POE/F316A : Introduction to International Relations / Introduction aux relations internatonales
POE/F317B : Introduction to Contemporary Strategic Studies / Introduction aux études stratégiques contemporaines
POE/F320A : Comparative Politics I (Theory and Method) / Politique comparée I (théorie et méthode)
POE/F322B : Comparative Politics II (Country Case Studies) / Politique comparée II (études de cas)
POE/F328A : The Canadian Constitution, Federalism and Regionalism / La Constitution canadienne, fédéralisme et régionalisme
POE/F332A : Public Administration in Canada/ Administration publique au Canada
POE/F416A/B : Contemporary Canadian External Relations and Defence Policy / La politique étrangère et de la défense du Canada

At least 8 other Politics courses of which 4 at the 400 level (in addition to POE/F416A/B).

Minimum B average in all 300 and 400 level Politics courses and an overall B- average in the Fourth year of study.

OPTIONAL COURSES

To take at least 5 credits amongst the following :

POE/F330B : Canadian Political Parties and Public Opinion / Les parties politiques, les élections et l'opinion publique au Canada
POE/F334B : Canadian Public Policy Making / Prise de décision du gouvernement canadien, théorie et pratique
POE/F412B : Contemporary American Foreign & Defence Policy / La politique étrangère et de défense des États-Unis
POE418A: Major Political Ideologies
POE420B: Contemporary Political Ideologies
POE/F423A/B: Middle East Issues/Problèmes du Moyen-Orient
POE413: Nuclear Weapons & International Relations
POE/F424A : Theories of Modernization and Political Development / Théories de la modernisation et du développement politique
POE/F426B : Selected Case Studies of Third World Countries / Études de cas de pays du Tiers-Monde
POF428A : Théorie politique contemporaine
POF430A/B : Théorie politique avancée
POE/F450B : Space Policy / Politique de l'espace
POE/F458A/B : Post Cold War Terrorism/Le terrorisme de l'après-Guerre mondial
POE/F460A : Comptemporary Analysis of International Conflicts/Analyse des conflits internationaux contemporains
POE/F462B : Current Strategic Issues/Actualité stratégique
POE/F488A/B: The Law of Armed Conflict / Le droit des conflits armés
POE/F490: Directed Readings / Lectures dirigées

OPTIONAL CROSS-LISTED COURSES

Maximum of 2 credits selected from amongst the following:

GOE/F305A : World Regional Geography: Europe and/or the Americas / Géographie des régions du monde : Europe et/ou Amériques
GOE/F307B : World Regional Geography: Asia and/or Africa / Géographie des régions du monde: Asie et/ou Afrique
GOE418A/B: Approaches to Cultural and Historical Geography
GOF420A/B : Fondements géopolitiques du droit international
ECE/F206A: Macroeconomic Theory and Policy I / Macroéconomique: théorie et politique I
ECE/F208B: Macroeconomic Theory and Policy II / Macroéconomique: théorie et politique II
ECE/F224A: Microeconomic Theory and Policy I / Microéconomique: théorie et politique I
ECE/F226B: Microeconomic Theory and Policy II / Microéconomique: théorie et politique II
ECE/F270A : Statistical Analysis for Social Science I / Analyse statistique à l'intention des étudiants en sciences sociales I
ECE/F272B : Statistical Analysis for Social Science II / Analyse statistique à l'intention des étudiants en sciences sociales II
ECE/F312B : The Development of Economic Ideas / L'évolution des idées économiques
ECE/F316A : Canadian Economic History / Histoire économique du Canada
ECE/F410A : Public Finance I / Finance publique I
PSE/F301A: Organisational Behaviour and Leadership / Comportement organisationnel et leadership (mandatory for all 3rd year students)
BAE/330A/AAF330A: Organizational Theory / Théorie de l'organisation (optional because of PSE/F301A)
HIE/F380 : Peacekeeping & Peacemaking / Maintien et imposition de la paix
HIE/F406A : Canadian External Relations / La politique extérieure du Canada
HIE/F408B : Canadian Defence Policy / La politique de défense du Canada
HIE/F417 : US Foreign Policy / La politique étrangère des États-Unis

HIF432 : Histoire diplomatique et militaire de l'Amérique latine

Minimum B average in all 300 and 400 level courses in the Programme and an overall B- average in the Fourth year of study.

MAJOR

Requires 40 credits
(1 course = 1 term = 1 credit)
Starting in September 2004

16 credits in Politics, the following of which are Core courses:

CORE COURSES

POE/F106 : Canadian Civics and Society / Société et institutions canadiennes
GOE/F202A/B: Introduction to Political Geography / Introduction à la géographie politique
POE/F312A : Classical Political Philosophy / Philosophie politique classique
POE/F314B : Modern Political Philosophy / Philosophie politique moderne
POE/F316A : Introduction to International Relations / Introduction aux relations internationales
POE/F320A : Comparative Politics I / Politique comparée I
POE/F328A : The Canadian Constitution, Federalism and Regionalism / La Constitution canadienne, fédéralisme et régionalisme
POE/F416A/B : Contemporary Canadian External Relations and Defence Policy / La politique étrangère et de la défense du Canada

OPTIONAL COURSES

Minimum of 8 other Politics credits of which 4 should be at the 400 level.

POE/F317B: Introduction to Contemporary Strategic Studies / Introduction aux études stratégiques contemporaines
POE/F322B: Comparative Politics II (Country Case Studies) / Politique comparée II (études de cas)
POE/F330B: Canadian Political Parties and Public Opinion / Les parties politiques, les élections et l'opinion publique au Canada
POE/F332A : Public Administration in Canada / Administration publique du Canada
POE/F334B : Canadian Public Policy Making, Theory and Practice / 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
POE418A: Major Political Ideologies
POE420B: Contemporary Political Ideologies
POE/F423A/B: Middle Eastern Issues/Problèmes du Moyen-Orient
POE413A: Nuclear Weapons & International Relations
POE/F424A : Theories of Modernization and Political Development / Théories de la modernisation et du développement politique
POE/F426B : Selected Case Studies of Third World Countries / Études de cas de pays du Tiers-Monde
POF428A : Théorie politique contemporaine
POF430B : Théorie politique avancée
POE/F450B : Space Policy / Politique de l'espace
POE/F458A/B: Post Cold War Terrorism/Le terrorisme de l'après-Guerre mondial
POE/F460A : Analysis of Contemporary Strategy and Conflict/Analyse de conflit et stratégie contemporains
POE/F462B : Current Strategic Issues/Actualité stratégique
POE/F488A/B: The Law of Armed Conflict / Le droit des conflits armés
POE/F490: Directed Readings / Lectures dirigées

MINOR IN POLITICAL SCIENCE

Arts students may take a Minor in Political Science. The requirements for the Minor are 8 courses in the discipline. The First Year course in Political Science (POE/F106) can count toward the Minor as well as two courses from the core of the student's Major programme. Students choosing to minor in Political Science must maintain a minimum of a B- average in their three best courses of the Minor.

DEGREE IN ECONOMICS

PROGRAMME REQUIREMENTS

Students successfully completing their First Year in Arts are eligible for entry into the programme leading to an Honours or Major Degree in Economics. The First Year economics courses are part of the core compulsory courses and will count toward the degree requirements noted below. In consultation with the Department Head, students will select courses each year which fulfil the degree requirements which are best suited to student interest.

HONOURS IN ECONOMICS

Minimum of 20 courses in Economics. Minimum B average standing in all 300 and 400 level courses in the programme and an overall B- average in Fourth Year of study.

Minimum of 42 credits
(1 course = 1 term = 1 credit)
Starting in September 2004

CORE COURSES - 13 CREDITS

MAE/F106A: Discrete Mathematics with Probability/Mathématiques discrètes avec probabilité
MAE/F108B: Elements of Differential Calculus/Éléments de calcul différentiel
MAE/F208A : Elements of Integral Calculus (Linear Algebra)/Élements de calcul intégral et d'algèbre linéaire
ECE/F102 : Elements of Economics / Éléments de la science économique
ECE/F206A: Macroeconomic Theory and Policy I / Macroéconomique: théorie et politique I
ECE/F224A: Microeconomics I / Microéconomie I
ECE/F270A: Statistical analysis for Social Scientists I / Analyse statistique à l'intention des étudiants en sciences sociales I
ECE/F308B: Macroeconomic Theory and Policy II / Macroéconomique: théorie et politique II
ECE/F326B : Microeconomics II / Microéconomie II
ECE/F372B : Statistical analysis for Social Scientists II / Analyse statistique à l'intention des étudiants en sciences sociales II
ECE/F424A/B: The Economics of Defence / Économie de la défense
ECE/F492B: Economics Seminar/Seminaire d'économique

OPTIONAL COURSES

A minimum of 6 credits, from the following:

ECE/F300A/B: Money, Financial Institutions and Markets / Monnaie, banques et institutions financiers
ECE/F312A/B: The Development of Economic Ideas/L'évolution des idées économiques
ECE/F316A/B: Canadian Economic History / Histoire économique du Canada
ECE/F318A/B: International Economic Problems / Problèmes économiques internationaux
ECE/F320A/B: Industrial Organization / Organisation industrielle
ECE/F410A : Public Finance I : The Role of Government in the Economy / Finance publiques I: Le rôle gouvernement dans l'économie
ECE/F412B: Public Finance II: The Canadian Fiscal System / Finances publiques II: Le système fiscal canadien
ECE/F416A: International Economics I: International Trade / Économie internationale I: Le commerce international
ECE/F418B: International Economics II: The International Financial System / Économie internationale II: Le système financier international
ECE/F442A: Economics of the Environment / Économie de l'environnement
ECE/F446B: Cost Benefit Analysis of Environmental Issues / Analyse économique des problèmes environnementaux
ECE/F450A/B: Topics in Microeconomic Analyis/Sujets en microéconomique
ECE/F452A/B: Topics in Macroeconomic Analysis/Sujets en macroéconomique
ECE/F490A/B: Directed Readings in Economics /Études dirigées en économique

A maximum of one credit chosen from the following:

BAE/AAF300B : Finance/Finance
BAE/AAF342A : Quantitative Methods II/Méthodes quantitatives II
BAE/AAF430B : Labour Relations and Topics in Human Resources Management/Relations de travail et sujets en gestion de resources humaines
POE/F332A/B : Public Administration in Canada/Administration publique du Canada

Any other course approved by the Deparment/N'importe quel autre cours apprové par le département

MAJOR

Requires 40 credits – Minimum 16 credits in Economics
(1 course = 1 term = 1 credit)
Starting in September 2004

CORE COURSES –11 CREDITS

MAE/F106A: Discrete Mathematics with Probability/Mathématiques discrètes avec probabilité
MAE/F108B: Elements of Differential Calculus/Éléments de calcul différentiel
MAE/F208A : Elements of Integral Calculus (Linear Algebra)/Élements de calcul intégral et d'algèbre linéaire
ECE/F102 : Elements of Economics / Éléments de la science économique
ECE/F206A: Macroeconomic Theory and Policy I / Macroéconomique: théorie et politique I
ECE/F224A: Microeconomics I / Microeconomie I
ECE/F270A: Statistical analysis for Social Scientists I / Analyse statistique à l'intention des étudiants en sciences sociales I
One of the following two
ECE/F208B: Macroeconomic Theory and Policy II / Macroéconomique: théorie et politique II
ECE/F326B : Microeconomics II / Microéconomie II Plus
ECE/F424B: The Economics of Defence / Économie de la défense

ECE492B : Economics Seminars/Séminaires d'économique

OPTIONAL COURSES
Minimum of 4 credits from the following:

ECE/F300A/B: Money; Financial Institutions and Markets / Monnaie, banques et institutions financières
ECE/F312A/B: The Development of Economic Ideas/L'évolution des idées économiques
ECE/F316A/B: Canadian Economic History / Histoire économique du Canada
ECE/F318A/B: International Economic Problems / Problèmes économiques internationaux
ECE/F320A/B: Industrial Organization / Organisation industrielle
ECE/F410A: Public Finance I: The Role of Government in the Economy / Finances publiques I: Le rôle du gouvernement dans l'économie
ECE/F412B: Public Finance II: The Canadian Fiscal System / Finances publiques II: Le système fiscal canadien
ECE/F416A: International Economics I: International Trade / Économie internationale I: Le commerce international
ECE/F418B: International Economics II: The International Financial System / Économie internationale II: Le système financier international
ECE/F442A: Economics of the Environment / Économie de l'environnement
ECE/F446B: Cost Benefit Analysis of Environmental Issues / Analyse économique des problèmes environnementaux
ECE/F450A/B: Topics in Microeconomics/Sujets en Microéconomique
ECE/F452A/B: Topics in Macroeconomics/Sujects en Macroéconomique
ECE/F490A/B: Directed Readings in Economics / Études dirigées en économique

Maximum of one credit from the following:

BAE/AAF300B : Finance/Finance
BAE/AAF342A : Quantitative Methods II/Méthodes quantitatives II
BAE/AAF430B : Labour Relations and Topics in Human Resources Management/Relations de travail et sujets au gestion de resources humaines
POE/F332A/B : Public Administration in Canada/Administration publique du Canada

Any other course approved by the Deparment/N'importe quel autre cours apprové par le département

DOUBLE MAJOR
Minimum of 16 credits in Economics. The 16 credits are the same as per Major. The requirements of the other major to be defined by the department.

MINOR IN ECONOMICS
Arts students may take a Minor in Economics. The requirements for the Minor are 8 courses in the discipline. The First Year course in Economics can count toward the Minor as well as two courses from the core of the student's Major programme. Students choosing to minor in Economics must maintain a minimum of a B- average in their three best courses of the Minor.

CORE COURSES
ECE/F102 : Elements of Economics / Élements de la science économique
ECE/F206A: Macroeconomic Theory and Policy I / Macroéconomique: théorie et politique I
ECE/F224A: Microeconomics I / Microéconomie I
ECE/F270A: Statistical analysis for Social Scientists I / Analyse statistique à l'intention des étudiants en sciences sociales I

At least one of:
ECE/F208B: Macroeconomic Theory and Policy II / Macroéconomique: théorie et politique II
ECE/F326B: Microeconomics II / Microéconomie II

OPTIONAL COURSES
2 other credits in Economics at the 300-400 level

COURSE DESCRIPTIONS

ECE102: Elements of Economics (ECF102: Éléments de la science 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

ECE206A: Macroeconomic Theory and Policy I (ECF206A: 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

ECE224A: Microeconomics I (ECF224A: Microéconomique I)

This course is intended to provide theoretical and practical knowledge of markets. 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 microeconomic concepts and models to the recognition and analysis of social and business issues.

3 - 0 - 6 Weight: 6

ECE270A: Statistical Analysis for Social Scientists I (ECF270A: Analyse statistique à l'intention des étudiants en sciences sociales I)

For students of the Second, Third or Fourth Year taking Arts.

This is an introductory course in statistics designed for students in Social Science. Topics include visual and statistical descriptions of data, sampling and sampling distributions, and the estimation of sample statistics. Problem solving is emphasized using hypothesis testing and confidence intervals on means, proportions and differences. Variance tests are also analysed.

3 - 0 - 6 Weight: 6

ECE300A/B: Money, Financial Institutions and Markets (ECF300A/B: 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

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

ECE312A/B: The Development of Economic Ideas (ECF312A/B: 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 Marginalist School will start the course. Potential topics include Marxian economics, institutional economics and social planning.

3 - 0 - 6 Weight: 6

ECE316A/B: Canadian Economic History (ECF316A/B: Histoire économique du Canada)

For students of the Second, Third or 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

ECE318A/B: International Economic Problems (ECF318A/B: Problèmes économiques internationaux)

The course will examine the following topics: world trade patterns and commodity markets, theory and structure of tariffs, customs unions, balance of payments, foreign investment, international monetary system, and inter-national aid.

3 - 0 - 6 Weight: 6

ECE320A/B: Industrial Organization (ECF320A/B: Organisation industrielle)

For students of the Third and Fourth Year taking Arts.

Industrial Organization examines the structure, conduct and performance of industry. Topics to be covered will include: industry concentration, economics of scale, patents, vertical integration and barriers to entry, the goals of the firm, the growth of the firm, multi-nationals, advertising, price formation and government influences on industrial organization.

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 markets characterized by monopolistic competition, oligopoly, and price discrimination. 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

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 or Fourth Year taking Arts.

This course follows Statistical Analysis for Social Scientists I. The course discusses survey planning, sample design, and questionnaire design. Statistical analysis focuses on simple and multiple regression methods. Instruction will also be given in the use of computer resources both for the collection of data as well as data analysis. Students will be given the opportunity to conduct a small project which will include model specification, data collection, examination, display, and model analysis.

3 - 0 - 6 Weight: 6

ECE410A: Public Finance I: The Role of Government in the Economy (ECF410A: Finances publiques I: Le rôle du gouvernement dans l'économie)

For students of the Third and Fourth Year taking Arts.

This course examines the role of government in the allocation of resources in a mixed economy. Topics studied include: the rationalization of government intervention in market economies due to Market Failure, the theory of Public Goods, Externalities, Public Choice, Fiscal Federalism, and intergovernmental transfers, the pricing and investment decisions of public enterprises, the principles of benefit-cost analysis, the size and growth of the public sector and of the public debt. Always, an attempt is made to relate the discussion to the Canadian context.

3 - 0 - 6 Weight: 6

ECE 412B: Public Finance II: The Canadian Fiscal System (ECF412B: Finances publiques II: Le système fiscal canadien)

For students of the Third and Fourth Year taking Arts.

This course examines the theory of taxation and the features of the Canadian tax system. Topics studied include: the tax base, the efficiency aspects of taxation, including optimal taxation, the principles of equity in taxation, the incentive

effects of taxation, and the incidence of taxes. The practice of taxation in Canada include a review of personal income taxes, consumption taxes, corporate taxes, and taxes on wealth and property. Time permitting, narrower selected topics in taxation will be examined.

3 - 0 - 6 Weight: 6

ECE416A: International Economics I: International Trade (ECF416A: Économie internationale I : Le commerce international)

For students of the Third and Fourth Year taking Arts.

The foundations of international trade theory and of commercial policy are examined. Topics studied include: the classical theory of international trade, the Heckscher-Ohlin model and tests and extensions of the model, alternative theories of comparative advantage, the theory and practice of tariffs and non-tariff barriers to trade, the theory and practice of economic integration, and the effect of trade on economic growth and vice versa. Attention will be paid to Canada's role and position in the world trading system.

3 - 0 - 6 Weight: 6

ECE418B: International Economics II: The International Financial System (ECF418B: Économie internationale II : Le système financier international)

For students of the Third and Fourth Year taking Arts.

The theory and practice of international finance are examined. Topics studied include: the Balance of Payments, the theory of exchange rate determination and exchange rate systems, the role of arbitrage, balance-of-payments adjustment under alternative exchange rate systems, macroeconomic policy in an open economy, and the international monetary system.

3 - 0 - 6 Weight: 6

ECE424A/B: Economics of Defence (ECF424A/B: 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

ECE442A: Economics of the Environment (ECF442A: Économie de l'environnement)

For students of the Third or Fourth Year taking Arts.
Prerequisite: Introduction to Economics (ECE102).

Operational decisions, whether by the private sector or the public sector, are increasingly becoming dependent upon the satisfaction of a number of environmental concerns. This course is an introduction to the major elements of environmental analysis and policy instruments used by the public sector. Topics include the notions of dynamic efficiency and sustainability, property rights and externalities, environmental legislation, measures of costs and benefits, and pollution controls.

3 - 0 - 6 Weight: 6

ECE446B: Cost-Benefit Analysis of Environmental Issues (ECE446B: Analyse économique des problèmes environnementaux)

For students of the Third or Fourth Year taking Arts.
Prerequisite: Introduction to Economics (ECE102).

Two central issues in any cost-benefit problem are the appropriate measures of costs and benefits to use, and the identification of all costs and benefits. This course discusses a number of theoretical issues in cost benefit analysis including risk and the appropriate discount rate, in particular as they relate to environmental studies. The specificity of each cost benefit study as well as the general principles of analysis are reinforced by studying numerous examples of environmental cost benefit analysis. Cost effectiveness analysis is also considered and its use in the examination of command and control policies are studied.

3 - 0 - 6 Weight: 6

ECE450A/B: Topics in Microeconomic Analysis (ECF450A/B: Sujets en microéconomique

For students of the Third and Fourth Year taking Arts.
Prerequisites: ECE/ECF206A, ECE/ECF308B, ECE/ECF224A, ECE/ECF326B

This course covers a limited number of selected problems from the theory of the firm (profit – cost duality, different market structures, applied functional forms) the theory of the consumer (utility – expenditure duality, uncertainty, inter-temporal choice) and the theory of Games (cooperative, non-cooperative). Specific topics may change to reflect problems of current interest to students and instructor but the analysis will focus on advanced analytical methods.

3 – 0 – 6 Weight 6

ECE452/A/B: Topics in Macroeconomic Analysis (ECF452A/B : Sujets en macroéconomique

For students of the Third and Fourth Year taking Arts.
Prerequisites: ECE/ECF206A, ECE/ECF308B, ECE/ECF224A, ECE/ECF326B

This course reconsiders the fundamental models of macroeconomic with is an introduction to dynamics. Possible models are the basic Keynesian and IS-LM models with simple lag structures, a simple rational expectations open economy model, a model of inflation and unemployment, and models that introduce the basic ideas of bifurcation and chaos. Dynamic specifications are analysed using spreadsheet methods.

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

ECE 492 B Economics Seminar (ECE 492B) Séminaire en économie

For students of the Fourth Year taking Arts
Prerequisites: ECE/ECF206A, ECE/ECF308B, ECE/ECF224A, ECE/ECF326B

This seminar course requires each student to undertake research paper on an approved subject. Students will prepare and present a project proposal, will present their final papers, and will comment and critique work presented by their peers.

3 – 0 – 6 Weight 6

POE106: Canadian Civics and Society (POF106: Société et institutions canadiennes)

Core Course 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 as found in Canada.

3 - 0 - 6 Weight: 12

POE205: Canadian Civics and Society (POF205: Société et institutions canadiennes)

Core course for students in Engineering and Science.

An introduction to the main trends of political thought, the elements of political analysis, and the concepts used in the study of political science as found in Canada.

3 - 0 - 3 Weight: 6

POE312A: Classical Political Philosophy (POF312A: Philosophie politique classique)

For students of the Second, Third or Fourth Year taking Arts.

This course is a critical examination of the major political theorists ascribed to Classical Political Philosophy. The works studied include Thucydides' Peloponnesian War, Xenophon's Memorabilia, Plato's Republic, Aristotle's Politics, Machiavelli's The Prince and Discorsi.

3 - 0 - 6 Weight: 6

POE314B: Modern Political Philosophy (POF314B: Philosophie politique moderne)

A sequel to POE312A. It is strongly recommended that it be taken before POE314B, but it is not required.

This course is a critical examination of the main works of the major political theorists ascribed to Modern Political Philosophy. The works studied include Hobbes' Leviathan, Locke's Second Treatise on Civil Government, Hume's Treatise of Human Nature, Rousseau's On the Origin and Foundations of Inequality among Men and On the Social Contract, Kant's Grounding of the Metaphysics of Morals and Towards Perpetual Peace, Marx and Engels' Communist Manifesto, Mill's On Liberty, and Nietzsche's On the Genealogy of Morals.

3 - 0 - 6 Weight: 6

POE316A: Introduction to International Relations (POF316A: Introduction aux relations internationales)

* Also offered through the Office of Continuing Studies.*
For students of the Second, Third or Fourth Year taking Arts. Core course for all students.

This course is designed to introduce students to the field of international relations. It will permit students to understand the basic concepts in the field needed to analyse developments in international politics. At the same time, the main analytical approaches in the discipline will be offered in such a way that students will be able to evaluate various approaches and to assess their utility in explaining events, processes and institutions in international politics. A core consideration in the course will be the development of an awareness of how states define and meet security requirements and issues in international relations.

3 - 0 - 6 Weight : 6

POE317B: Introduction to Contemporary Strategic Studies (POF317B: Introduction aux études stratégiques contemporaines)

Mandatory for students in Third and Fourth Year in Arts.

This course is designed to introduce students to contemporary strategic studies. The focus will be on contemporary strategic issues. Developments in the international system since the end of World War II and the end of the Cold War will provide the context for the consideration of contemporary and future developments in the international system.

3 - 0 - 6 Weight : 6

POE320A: Comparative Politics I (Theory and Method) (POF320A: Politique comparée I (Théorie et méthode))

For students of the Second, Third or Fourth Year taking Arts.

The course will commence with an overview of the many different and competing theories of comparative politics, and will evaluate the strengths and weaknesses of each framework. In so doing, discussion will take place on the key issues in comparative politics. The course will also explore the increasing variety of measures employed in comparisons of the major regions and countries of the world. During the latter portion of the course, each student will select one country as a brief case study.

3 - 0 - 6 Weight: 6

POE322B: Comparative Politics II (Country Case Studies) (POF322B: Politique comparée II (Études de cas))

For students of the Second, Third or Fourth Year taking Arts. POE320A is a pre-requisite.

Building upon the first semester course POE320A which reviewed the many theoretical frameworks available for analysis in comparative politics, the winter semester course utilizes a country by country case study approach. Amongst the countries to be covered in depth are the United States, the United Kingdom, Russia (the former Soviet Union), Canada and Mexico.

3 - 0 - 6 Weight: 6

POE328A: The Canadian Constitution, Federalism and Regionalism (POF328A: La Constitution canadienne, fédéralisme et régionalisme)

For students of the Second, Third or Fourth Year taking Arts.

The course will commence with an overview of the demographic (particularly regional) makeup of Canada and will then proceed to offer a brief review of the historical roots of Confederation. The main component features of the contemporary Canadian constitution will be explored, along with the current dynamics of Canadian federalism. The course will close with an analysis of the current strains and stresses (e.g. from Quebec and the West) confronting the federation and the future of the Canadian federation.

3 - 0 - 6 Weight: 6

POE330B: Canadian Political Parties, Elections and Public Opinion (POF330B: Les partis politiques, les élections et l'opinion publique au Canada)

For students of the Second, Third or Fourth Year taking Arts.

This course will explore the historical, ideological and organizational developments of Canadian political parties. Amongst the themes to be explored are the complexities of the evolving party system and the relative impact of key demographic and attitudinal factors affecting the operation of parties. The course will offer case studies of the most important elections in the contemporary era and will conclude with an analysis of the most recent federal election campaign. Throughout the course, note will be made of the shifting landscape in Canadian and Quebec public opinion and how it impacts on elections and parties.

3 - 0 - 6 Weight: 6

POE332A/B: Public Administration in Canada (POF332A/B: Administration publique du Canada)

For students of the Third of 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, Theory and Practice (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 public policies is also analyzed.

3 - 0 - 6 Weight: 6

POE412A/B: Contemporary American Foreign and Defence Policy (POF412A/B: La politique étrangère et défense des États-Unis)

For students of the Third or Fourth Year taking Arts.

A study of major policy trends in United States foreign and defence policy from the Nixon administration to the present. Beginning with a brief review of the Cold War years, the course will consider such topics as: the impact of the Vietnam War, detente, trends in nuclear and conventional weapons and strategy in the 1970s and 80s, arms control and United States Foreign Policy in the post Cold war era. 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

POE413A: Nuclear Weapons & International Relations

In English only

Since 1945, nuclear weapons have had a profound impact upon international relations. This course deals with the technology, strategy and politics of nuclear weapons. It examines how the superpowers and other nuclear weapons states approached their role in national security during the Cold War and how this has changed in the post-Cold War era. It looks at the major nuclear powers as well as current issues regarding the potential spread of nuclear weapons capabilities to more countries. To what extent have previous concepts of deterrence given way to notions of preventative defence and what will this mean for contemporary global security environment? The course also provides students with

techniques for the evaluation of expected nuclear weapon effects and the ways in which these techniques may be used to determine the relative strength of nuclear states in the international system

3 – 0 – 6 Weight ?

POE416A/B: Contemporary Canadian External Relations and Defence Policy (POF416A/B: La politique étrangère et défense du Canada)

* Also offered through the Office of Continuing Studies.*
For students of the Third or Fourth Year taking Arts.

A study of major trends in Canadian external relations and defence policy from the Trudeau government to the present. 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 relations with international organizations and peacekeeping in the post Cold war era. Also covered will be the process, politics and organization of the Departments of Foreign Affairs and International Trade, and National Defence.

3 - 0 - 6 Weight: 6

POE418A: Major Political Ideologies

In English only
For students of the Third or Fourth Year taking Arts.

This course will focus upon the major political ideologies and belief systems. The class will discuss in-depth the major classic ideologies of the nineteenth and twentieth centuries, commencing with the oldest two, conservatism and liberalism, and then proceeding to include socialism, communism, nationalism, fascism and anarchism. Emphasis throughout the course will be on reading materials from spokespersons of each doctrine. Amongst the authors to be discussed are Burke, Locke, Mill, Marx, Lenin, Mao Tse-tung, Hitler, Mussolini, Tolstoy and Gandhi. The political dialogue amongst the various ideologues is a basis for understanding the different political systems of the world and conflict in the modern era. This course is an ideal background to taking POE420B.

3 - 0 - 6 Weight: 6

POE420B: Contemporary Political Ideologies

In English only
For students of the Third or Fourth Year taking Arts.
POE418A is a pre-requisite.

Building upon the fall semester course on major classical ideologies (POE418A), this course will focus on contemporary doctrines and ideologies advocated during the second half of the twentieth century. These will involve recent variants of the seven classic ideologies and will include the New Left, neo-conservatism, neo-liberalism, neo fascism, contemporary nationalism, feminism, environmentalism and the future of ideology. Emphasis throughout the course will be on reading materials from spokespersons of each doctrine. The political debate and dialogue amongst the various ideologues are a basis for understanding the different political systems of the world and conflict in the modern era.

3 - 0 - 6 Weight: 6

POE423A/B: Middle Eastern Issues (POF423A/B): Problèmes du Moyen-Orient

For students of the Third and Fourth year taking Arts.

The course will study major trends in Middle Eastern political history of its people and Empires; ethnic groups; religions and ideologies; religious and secular nationalism; colonialism, imperialism and national liberation movements; unfinished creation of modern States; political and economic development; water, oil and natural resources; civil society, social forces and agents of change; revolution, coup, conflicts and transfer of arms.

3 – 0 – 6 Weight: 6

POE424A: Theories of Modernization and Political Development (POF424A: Théories de la modernisation et du développement politique)

For students of the Third or Fourth Year taking Arts.

The course will provide an introduction to the major theories of social change, modernization and political development. Most of the world's population is affected by the dramatic social, economic, political and cultural changes occurring in the developing countries. Amongst the political concepts studied are the nature of traditional society, the processes of

urbanization and democratization, elements of political instability ranging from coup d'état to revolution. An assessment will also be offered of the different measures of development. Throughout the course, examples will be drawn from across the third world. It is expected that this course will be followed by POE424B on selected regional and country case studies from the third world.

3 - 0 - 6 Weight: 6

POE426B: Selected Case Studies of Third World Countries (POF426B: Études de cas de pays du Tiers-monde)

For students of the Third or Fourth Year taking Arts.
POE424A is a pre-requisite.

The course will draw upon the first semester course POE424A which provided an introduction to theories of modernization and political development. The winter term course will focus on regional and country case studies from the third world. It is expected that the countries studied in depth will vary tosome degree from one year to the next. Amongst the countries usually to be studied in depth are: China, India, Indonesia, Iran, Turkey, Egypt, Nigeria, South Africa, Argentina, Brazil, Mexico and Cuba.

3 - 0 - 6 Weight: 6

POF428A/B: Théorie politique contemporaine

In French Only
For students in Third and Fourth Year Arts.

Designed as the sequel to POF312A and POF314B –Philosophie politique classique et moderne (Classical and Modern Political Philosophy) - , this course offers an introduction to the main issues currently in the discussion in the field of political theory. To this end, an approach that blends the introduction to some of the most influential authors (M. Weber, C. Schmitt, R. Aron, F. A. von Hayek, H. Arendt, L. Strauss, C. Lefort, J. Habermas, J. Rawls, C. Taylor) with a discussion of the main currents in 20th Century political theory (liberalism vs. communitarianism, positivism vs. normativism etc.) will be adopted.

3 - 0 - 6 Weight: 6

POF430A/B: Théorie politique avancée

In French Only
For students in Third and Fourth Year Arts.

Designed as a sequel to POF428A. Though it is not required, it is strongly recommended that students take this course before taking POF430B. In this course a thematic approach is taken. The major contributions to the problems and issues which are currently uppermost in the discussion in political theory are reviewed, for instance: globalization, nationalism, multiculturalism, democracy, legality and legitimacy, identity, citizenship, feminism, the social problem etc.

3 - 0 - 6 Weight: 6

POE450B: Space Policy (POF450B: Politique de l'espace)

* Also offered through the Office of Continuing Studies.*
For students of the Fourth Year taking Arts or Science.

Space policy, strategy, doctrine and planning, space law, space agreements and conventions, use of space for civilian surveillance of space, surveillance from space, peaceful use of space, civilian and military space agencies, international cooperation in space operations, assured access to space, DND space requirements, operations, space education and training. Canadian aerospace industry, Canada's role and future in space.

3 - 0 - 6 Weight: 6

POE458A/B: Post Cold War Terrorism (POF458A/B): Le terrorisme de l'après-Guerre mondial

Post Cold War Terrorism is a course designed to acquaint students withthe phenomenon of terrorism and to provide a broad understandin of why terrorism exists in the contemporary international system. Students will consider amond other topics, the philosophy of terrorism, the political context of terrorism and the technology of terrorism.

POE460A: Analysis of Contemporary International Conflicts (POF460A) : Analyse des conflits internationaux contemporains)

In the broadest context, this course considers the role of strategy and warfare in contemporary national and international society. Readings and Seminars are designed to offer students a wide range of perspectives on strategy and conflict in the post-modern world. Students will key on contemporary strategic issues relating to military and foreign affairs. Students must have successfully obtained credit in POE 316 as a prerequisite to taking this course.

3 - 0 - 6 Weight: 6

POE462B : Current Strategic Issues POF462B: Actualité stratégique

For Third and Fourth Year students taking Arts.

In the broadest context, this course considers the role and significance of strategy and warfare with respect to current strategic issues . Readings and Seminars are designed to offer students a wide range of perspectives on strategy and conflict in the post-modern world and to permit students to openly express their views. Students will key on contemporary strategic issues relating to military and foreign affairs. Students must have successfully obtained credit in POE 316 as a prerequisite to taking this course.

3 - 0 - 6 Weight: 6

POE488A/B: The Law of Armed Conflict (POF488A/B: Le droit des conflits armés)

* Also offered through the Office of Continuing Studies.*
For students of the Fourth Year taking Arts or Science.

This course aims at giving the students a solid knowledge of the rule of law in regards to the use of force in international and non-international armed conflicts. We will examine the correct interpretation of these rules under international law and explain their applicability in operational situations. We will examine the rules pertaining to the human treatment of persons under a foreign power's authority, the legal obligations pertaining to personal property and the rules regulating the use of weapons. More specifically, we will explore the notion of combatants, prisoners of war, the treatment of civilians, and the obligation of limiting damage and unnecessary suffering, as well as special cases such as children-soldier and mercenaries.

(1 senior military credit)

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

GOE202A/B: Introduction to Political Geography GOF202A/B: (Introduction à la géographie politique)

Mandatory course for Second Year students in Political Science, open to students in Arts.

Appreciating the geographical arena within which political life unfolds, and the geopolitical influences, resources, and possibilities which that environment presents for political action, are key elements in understanding the political behaviour of actors, ranging in scale from the individual to the group on to the nation state and international organizations. This course presents an overview of the field of political geography and explores the centripetal and centrifugal dimensions of personal space, territoriality, regionalism, population growth and resource distribution, environmental degradation, boundary disputes, the rise and fall of nation states and civilizational conflicts.

3 - 0 - 6 Weight : 6

GOE302A/B: Canadian Geography

In English only
For students in Second, Third, and Fourth Year Arts.

An introduction to the historical, cultural and political geography of Canada with a special emphasis on heartland-hinterland relations, regionalism, ethnic and immigration history, and the emerging multicultural nature of Canadian society.

3 - 0 - 6 Weight: 6

GOE305A: World Regional Geography: Europe and/or the Americas (GOF305A: Géographie régionale du monde: Europe et/ou Amériques)

For students in Second, Third, and Fourth Year Arts.

An introduction to the geography of Europe and/or Americas, the study of the "geographic personalities" of Europe and America's major countries, and of emerging geopolitical interactions both within these regions and with other major world regions.

3 – 0 - 6 Weight : 6

GOE307B: World Regional Geography: Europe and/or the Africa (GOF307B: Géographie régionale du monde: Europe et/ou Afrique)

For students in Second, Third, and Fourth Year Arts.

An introduction to the geography of Asia and/or Africa involving an examination of the "geographic personalities" of Asia and Africa's nation-states and of emerging geopolitical interactions both within these regions and with other major world regions.

3 – 0 - 6 Weight : 6

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

GOE404B: Issues in Contemporary Geopolitics (GOF404B: Questions actuelles en géopolitique)

A lecture course intended to allow students of the Third and Fourth 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

GOE418A/B: 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

GOF420A/B: Fondements 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

GOF422A/B: Géographie politique du Canada

In French only
For Third and Fourth Year students taking Arts. GOF304A or 306B is a pre-requisite.

Study of the natural, historical, cultural and economic factors which determine Canada's present political geography. Special attention will be directed to border zones and to the question of territorial integrity.

3 - 0 - 6 Weight: 6

GOE470: Problems in Political Geography: Focus on Europe and Former Soviet Union

Offered through the Office of Continuing Studies.

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

The following courses are offered through the Office of Continued Studies:

POE110: Introduction to Modern Peacekeeping

POE201: Introduction to Politics and Government (POF201: Introduction à la politique)

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

POE203: Maritime Political Geography (POF203: Géographie Politique maritime)

Offered through the Office of Continuing Studies.

POE206 – Canadian Forces and Modern Society: Politics, Civic Instruction and International Relations
POF 206 – Les forces canadiennes et la société moderne : La politique, l'instruction civique et les relations internationales

Offered through the Office of Continuing Studies.

POE319: Terrorism, Theories and Strategies (POF319): Térrorisme, Théories et Stratégies

Offered through the Office of Continuing Studies.
Ce cours est offert en français uniquement

Ce cours se veut une analyse du terrorisme selon une approche théorique et stratégique. Les concepts et l'évolution du terrorisme dans le temps feront partie des thèmes exploités. Il s'intéresse aux rapports entre le terrorisme et la guerre sous toutes ses formes ainsi qu'aux méthodes, aux politiques et à la guerre antiterroristes. Le cours vise à rendre les étudiants aptes à synthétiser le terrorisme grâce à l'assimilation des faits politiques et stratégiques liés à ce phénomène.

ECE103: (formerly ECE1021) Elements of Microeconomics

Offered through the Office of Continuing Studies.

This course is an introduction to the methods of economics, the central problems of every economic society, the elements of supply and demand, the functions of the price system, the theory of production, and the firm.

ECE104: (formerly ECE1022) Elements of Macroeconomics

Offered through the Office of Continuing Studies.

This course is an introduction to Macroeconomics: national income accounting and the terminology used in macroeconomics are presented together with actual data from the Canadian economy. The way in which fiscal and monetary policies can be implemented and their potential effects on the macroeconomy are also discussed.

DEPARTMENT OF MATHEMATICS AND COMPUTER SCIENCE

Professor Emeritus - S.D. Jog, BSc, MSc, MSc, PhD
Professor of Physics and Dean of Science Division – R.F. Marsden, rmc, BSc, PhD
Professor and Vice-Principal, Continuing, Integrated and Satellite Programs, Director of Learning Management at the Canadian Defence Academy - A.J. Barrett, CD, rmc, BSc, MSc, PhD
Professor and Dean of Graduate Studies and Research - B.J. Fugère, BSc, MSc, PhD
Professor and Head of the Department - G. Labonté, 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 - R. Godard, Lic ès Sci, Dr 3rd Cycle, PhD
Professor - P. Gravel, ndc, BMath, MMath, PhD
Professor - L.E. Haddad, Lic ès Sci, MSc, PhD
Professor - G. Isac, LSc, DSc
Professor - R.E. Johnson, BSc, MS, PhD
Professor - R.M. Shoucri, BSc, MSc, MSc, PhD, PEng
Professor - D.L. Wehlau, BSc, MA, PhD
Associate Professor - G.E. Simons, BMath, MSc, PhD
Associate Professor - S.M. Thomas, BSc, MSc, PhD
Assistant Professor - P. Baille, Lic ès Sci, Dr 3rd Cycle, PhD
Assistant Professor - Y. Liang, BSc, MSc, PhD
Assistant Professor - B.G. Ong, BSc, SM, PhD, PEng
Assistant Professor – C. Tardif, BSc, MSc, PhD
Lecturer – Lieutenant Commander M. Bourassa, BEng, MSc
Lecturer – Major L. Massey, BSc, MSc
Lecturer – Captain T. Moreau, BEng, MASc

COURSES OF STUDY

The department offers BSc programs in Mathematics and Computer Science at the honours level, and at the major level in Mathematics or in Computer Science. Courses prescribed for these programs are given in tables and lists I to V below.

SECOND YEAR:

See table 7 in the Course Outlines section.

TABLE I. HONOURS MATHEMATICS AND COMPUTER SCIENCE

FIRST YEAR	
Fall	*Winter*
MA101	MA101
MA129A	CSE/INF101B
ENE100	ENE100
PH103	PH103
CC101	CC101
	PS123B

SECOND YEAR	
Fall	*Winter*
HI207A	HI203B
MA201/3	PO205B
MA229A	MA201/3
MA232A	MA209B
Physics	MA204B
CSE/INF250A	Sci/Eng Elective

THIRD YEAR	
Fall	*Winter*
PS301A	HI271B
MA302/5	MA302/5
MA334A/B	CSE/INF341B
CSE/INF301A/B	CSE/INF323A/B
CSE/INF321A/B	Math/Comp elect
EEE/GEF351A	

FOURTH YEAR	
Fall	*Winter*
PO316A	PS401B
MA404	MA404
CSE/INF444A/B	Math/Comp elect
EEE/GEF435A	Math/Comp elect
SCE/F420	SCE/F420
Math Elective	

II. DOUBLE MAJOR IN MATHEMATICS AND BUSINESS ADMINISTRATION

i) Courses required by the Department of Mathematics and Computer Science

MA201 ou MA203, MA209A/B, MA229A/B, MA232A/B, MA236A/B, MA305(1) or MA302(1), MA334A/B, MA340A/B, MA404(1).

In this programme, BAE300A/B and BAE342A/B are accepted as equivalent to mathematics courses.

ii) The courses required by the Department of Business Administration are all the courses in their Major in Administration except for the following changes: the courses BAE242A and BAE450B are not required, and the first term of ECE102 will be taken as a prerequisite to ECE224A/B.

III. DOUBLE MAJOR IN COMPUTER SCIENCE AND BUSINESS ADMINISTRATION

i) Courses required by the Department of Mathematics and Computer Science

MA201 (203), MA209A/B, MA229A/B, CSE250A/B, CSE321A/B, CSE323A/B, CSE341A/B, EEE321A/B, EEE435A/B, CSE444A/B.

In this programme, BAE410A/B is considered acceptable as a Computer Science course.

ii) The courses required by the Department of Business Administration are all the courses in their Major in Administration except for BAE220A, BAE242A and BAE450B which are not required. The first term of ECE102 will be taken as a prerequisite to ECE224A/B.

IV. MATHEMATICS MAJOR

FIRST YEAR	
Fall	*Winter*
MA101	MA101
MA129A	CSE/INF101B
ENE100	ENE100
PH103	PH103
CC101	CC101
	PS123B

SECOND YEAR	
Fall	*Winter*
HI207A	HI203B
MA201/3	PO205B
MA229A	MA201/3
MA232A	MA209B
Physics	MA204B
Sci/Eng Elective	

THIRD YEAR	
Fall	*Winter*
PS301A	HI271B
MA302/5	MA302/5
MA334A/B	Sci/Eng Elective
CSE/INF301A/B	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective

FOURTH YEAR	
Fall	*Winter*
PO316A	PS401B
MA404	MA404
Math Elective	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective

V. COMPUTER SCIENCE MAJOR

FIRST YEAR	
Fall	*Winter*
MA101	MA101
MA129A	CSE/INF101B
ENE100	ENE100
PH103	PH103
CC101	CC101
	PS123B

SECOND YEAR	
Fall	*Winter*
HI207A	HI203B
MA201/3	PO205B
MA229A	MA201/3
MA232A	MA209B
CSE/INF250A	Sci/Eng Elective
Sci/Eng Elective	

THIRD YEAR	
Fall	*Winter*
PS301A	HI271B
MA302/5	MA302/5
MA334A/B	Sci/Eng Elective
CSE/INF301A/B	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective

FOURTH YEAR	
Fall	*Winter*
PO316A	PS401B
MA404	MA404
Math Elective	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective
Sci/Eng Elective	Sci/Eng Elective

COURSE DESCRIPTIONS

An explanation of the conventions concerning the naming and numbering of courses may be found at the Course Outlines section of this calendar. The course descriptions are grouped in three classes: Science, Mathematics, and Computer Science, and are ordered by year within each class.

MAE101: Introductory Calculus (MAF101: Introduction au calcul différentiel et intégral)

For First Year students taking Engineering and Science.

Introduction to real numbers. Real sequences. Functions: algebraic, exponential and trigonometric functions and their inverses. Limits, continuity and derivatives. Rules for differentiation. Main theorems of the differential calculus. L'Hôpital's rule.

Applications of derivatives. Antidifferentiation: all basic methods. Definition of the integral, Riemann sums and fundamental theorem of calculus. Improper integrals. Applications of integration. Plane polar and 3-dimensional coordinates. Parametric description of curves. First and second order linear differential equations.

Computer laboratory using MAPLE symbolic computation software to illustrate concepts and solve problems in calculus.

Prerequisite: Admission to RMC

3 - 1 - 4 Weight: 14
Credits: 2

MAE102: Introduction to Probability and Statistics

Offered through the Office of Continuing Studies.

MAE103A: Precalculus Mathematics (MAF103A : Calcul pré-universitaire)

For students in First Year Arts who lack credit for a final year High School mathematics course.

Real numbers and algebra. Solution of linear and quadratic equations and inequalities. Analytic geometry. Real functions: combinations, compositions, inverse, graphs (polynomial, rational, root, exponential, logarithmic and sequences). Mathematical induction. Convergence of simple sequences.

Prerequisite: Admission to RMC

3 - 1 - 4 Weight: 6
Credits: 1

MAE106A: Discrete Mathematics with Probability (MAF106A : Mathématiques discrètes avec probabilité)

For First Year students taking Arts.

Elementary logic. Introduction to sets and operations on sets. Combinations and permutations. Discrete probability.

Prerequisite: Admission to RMC

3 - 0 - 6 Weight: 6
Credits: 1

MAE108B: Elements of Differential Calculus (MAF108B : Éléments de calcul différentiel)

For First Year students taking Arts.

Review of basic algebra including powers and logarithms. The real number system, open and closed intervals, solution of inequalities. Functions and their properties. Definition of the limit and continuity of a function at a point. Limits at infinity. The intermediate value theorem. Graphs of continuous and discontinuous functions. Exponential and logarithmic functions, their graphs, properties and applications.

Definition of the derivative as a limit. The mean value theorem. Derivatives of sums, products and quotients of functions. Composite functions and the chain rule. Derivatives of second and higher order. Application of differential calculus to graph sketching, optimization problems, approximation of functions and marginal analysis.

Prerequisite: Admission to RMC

3 – 1 – 4 Weight: 6
Credits: 1

MAE129A: Introduction to Algebra (MAF129A : Introduction à l'algèbre)

For First Year students taking Engineering and Science.

Vectors in 2, 3 and higher dimensions; geometric applications. Equations of lines and planes. Linear systems of equations. Matrices, matrix algebra and inverse. Solution of matrix equations. Determinants of 2x2 and 3x3 matrices; Cramer's rule. Sets and set notation. Algebraic properties of number systems. Complex numbers, arithmetic, powers and roots. Fundamental theorem of algebra and solution of polynomial equations. Techniques of mathematical proof will be introduced and illustrated throughout the course.

Prerequisite: Admission to RMC

3 - 1 - 4 Weight: 7
Credits: 1

MAE201: Intermediate Calculus (MAF201 : Calcul différentiel et intégral intermédiaire)

For Second Year Honours Science students and/or Mathematics Majors.

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.

Prerequisite: MAE101.

3 - 1 - 4 Weight: 14
Credits: 2

MAE203: Engineering Calculus (MAF203 : Calcul différentiel et intégral pour l'ingénieur)

For Second Year students 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.

Prerequisite: MAE101.

3 - 1 - 4 Weight: 14
Credits: 2

MAE204A/B: Modern Algebra (MAF204A/B : Algèbre moderne)

For students taking Science.

Divisibility properties of integers, the Euclidean Algorithm and GCDs. Prime numbers, Mersenne and Fermat Numbers. Groups, finite groups, the integers modulo n, Wilson Theorem. Subgroups, Lagrange Theorem and Fermat First Theorem. Linear congruences and the Chinese Remainder Theorem. Galois fields.

Prerequisite: MAE229A/B

3 - 1 - 4 Weight: 7
Credits: 1

MAE208A: Elements of Integral Calculus and Linear Algebra (MAF208A : Éléments de calcul intégral et d'algèbre linéaire)

For Second Year students taking Arts

Antiderivatives and indefinite integration. Rules of integration (substitution and integration by parts). Riemann sums, definite integrals and the Fundamental Theorem of Calculus. Numerical techniques for approximating definite integrals. Applications of definite integrals to problems in

business and economics, and to the evaluation of probabilities and expected values. Improper integrals and their evaluation.

Linear systems of equations and their solutions. Matrices and matrix operations. Matrix representation of linear systems and Gaussian elimination.

Prerequisite or corequisite: MAE108B or equivalent

3 – 1 – 4 Weight: 6
Credits: 1

MAE209A/B: Probability and Statistics (MAF209A/B : Probabilités et statistiques)

For Second Year students taking Engineering and Science.

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.

Prerequisite: MAE201 or MAE203

3 - 0 - 4 Weight: 6
Credits: 1

MAE229A/B: Linear Algebra MAF229A/B : Algébre linéaire)

For Second Year students taking Engineering and Science.

Introduction to vector spaces. Subspaces, bases and dimension. Linear transformations and matrix representations. Eigenvalues, eigenvectors and diagonalization of matrices.

Prerequisites: MAE129A

3 - 1 - 4 Weight: 7
Credits: 1

MAE232A/B: Topics in Discrete Mathematics (MAF232A/B : Sujets en mathématiques discrètes)

For students in Mathematics and Computer Science and others with the permission of the department.

Introduction to formal proofs in logic. Elements of coding theory. Applications of number theory.

Prerequisites: MAE101 and MAE129A

3 – 0 – 4 Weight: 6
Credits: 1

MAE234A/B: Introduction to Cryptography (INF234A/B : Introduction à la cryptographie)

This course will be an introduction to cryptography including its military, political and
mathematical aspects.The course will survey both historical cryptography (antiquity to 1967) and modern (post 1967) cryptography.

Students succeeding in this course will understand the workings of important modern techniques including public key cryptography, key exchange protocols and elliptic curve cryptography; both modern encryption and cryptoanalysis will be covered..

More specifically, the following topics will be covered:

Historical techniques such as: Alphabetic Ciphers, Frequency Analysis, Vigenere Ciphers, Kaisiski's Method, One Time Pads; The mathematical basis behind modern encryption and decryption: Basic group theory and basic properties of the integers;

Modern encryption techniques such as: Public Key Cryptography, RSA, Diffie-Helman Key Exchange, Rabin Encryption, El Gamal, Discrete Log, Elliptic Curves.
Modern decryption techniques such as: Birthday Attacks, Quadratic Sieve, Known Plaintext attacks, Man-in-the-middle attacks.

3-0-3 Weight: 6
Credit: 1

MAE236A/B: Introduction to Game Theory (MAF236A/B : Introduction à la théorie des jeux)

Students succeeding in this course will understand the mathematical treatment of games that arise in real life situations and economical models. They will understand the contrast between zero-sum games and von Neumann's minimax theorem on one side, and non-cooperative games and Nash equilibrium on the other. They will be familiar with many examples arising from economical models. They will also understand the basic elements of social choice theory, including axioms of social choice, May's theorem on simple majority voting and Arrow's impossibility theorem.

3 – 0 – 3 Weight: 6
Credit: 1

MAE302: Differential Equations and Complex Analysis (MAF302 : Équations différentielles et analyse complexe)

For Third Year students in Honours Science. Others by permission of the department.

This course consists of the MAE305 syllabus augmented by certain selected topics including Sturm-Liouville theory and Legendre functions. The tutorial period is used for directed study of these topics; lecture periods are in common with MAE305.

Prerequisite: MAE201 or MAE203

3 - 1 - 4 Weight: 14
Credits: 2

MAE305(1): Laplace Transforms, Fourier Analysis and Differential Equations (MAF305(1) : Transformée de Laplace, analyse de Fourier et équations différentielles)

For Third Year students in Science.

This course consists of the Fall Term of MAE305.

Prerequisite: MAE201 or MAE203

3 - 1 – 4 Weight: 7
Credits: 1

MAE305: Differential Equations, Boundary Value Problems and Complex Variables (MAF305 : Équations différentielles, problèmes de conditions aux limites et variables complexes)

For Third Year students in Computer Engineering, Electrical Engineering or Science.

Fall Term
Laplace transforms and initial value problems. Fourier series, integrals and transforms. Power series and Frobenius methods for linear differential equations. Bessel equations and functions.

Winter Term
Partial differential equations and solution of boundary value problems using method of separation of variables. Functions of a complex variable: analytic functions, Taylor and Laurent series, complex integration, residue theorem.

Prerequisite: MAE201 or MAE203

3 - 1 - 4 Weight: 14
Credits: 2

MAE315: Applied Mathematics for Chemical and Materials Engineers (MAF315 : Mathématiques appliquées au génie chimique et des matériaux)

For Third Year students 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 Fourier series and orthogonal functions. Solution of ordinary differential equations by analytical and numerical methods, including Laplace transforms. Method of Frobenius for Bessel equations and Legendre equations. Techniques for analysing experimental results and for optimization are developed.

Prerequisite: MAE201 or MAE203

3 - 0 - 3 Weight: 12
Credits: 2

MAE327: Differential Equations, Boundary Value Problems and Complex Variables (MAF327 : Équations différentielles, variables complexes et problèmes de conditions aux limites)

For Third Year students taking Mechanical Engineering.

Laplace transforms and the solution of ordinary differential equations. Fourier series and integrals. Partial differential equations and the method of separation of variables. Boundary value problems. Functions of a complex variable. Conformal mapping.

Prerequisite: MAE201 or MAE203

2 - .5 - 2.5 Weight: 9
Credits: 1.5

MAE331A/B: Mathematics of Signal Processing (MAF331A/B : Mathématiques pour le traitement des signaux)

For students in Science.

Distributions, Dirac's delta function and convolutions. Correlation and autocorrelation. Linear time-invariant systems. Continuous and discrete signals. Impulse and step esponses. Transfer function and frequency response. Applications of the Laplace transform. z-transform and solutions of finite difference equations. Applications of the Fourier Transform. Nyquist rate and Shannon's signal reconstruction formula,
discrete Fourier transform, wavelet analysis.

Prerequisite: MAE201 or MAE203

3 - 0 - 4 Weight: 6
Credits: 1

MAE334A/B: Graph Theory (MAF334A/B : Théorie des graphes)

For students in programs offered by the Department, and others by permission of the Department.

The topics in this course are relevant both to mathematics and to computer science.

Graphs and sub-graphs, trees, connectivity, Euler tours and Hamiltonian cycles, matchings, independent sets and networks. Graph theoretic algorithms for finding spanning trees, shortest paths in weighted graphs and maximal flows in networks. Selected applications will cover timetabling, travelling salesman and tournament scheduling type problems.

Prerequisites: CSE101B and MAE229A/B. MAE232A/B also recommended

3 – 1 - 4 Weight: 7
Credits: 1

MAE340A/B: Foundations of Probability (MAF340A/B : Fondements des probabilités)

An elective for Third or Fourth Year students in Science and others with the permission of the department.

Probability; random variables and distributions; joint distributions; functions of random variables; conditional expectations; sequences of random variables; stochastic processes.

Prerequisites: MAE201 or MAE203 and MAE209A/B

3 - 1 - 4 Weight: 7
Credits: 1

MAE362A/B: Evolution of Mathematical Ideas (MAF362A/B : Évolution de la pensée mathématique)

An elective for Third or Fourth Year students taking 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.

Prerequisite: Permission of the instructor

3 - 0 - 6 Weight: 6
Credits: 1

MAE404(1): Fundamental Concepts of Applied Mathematics (MAF404(1) : Notions de base pour les mathématiques appliquées)

For Fourth Year students in the double major in Mathematics and Business Administration.

This course consists of the Fall Term of MAE404.

Prerequisites: MAE129A and MAE302 or MAE305

3 - 0 - 4 Weight: 6
Credits: 1

MAE404: Fundamental Concepts of Applied Mathematics (MAF404 : Notions de base pour les mathématiques appliquées)

For Fourth Year students in Honours Mathematics and Computers Science. Others by permission of the department.

This course presents topics fundamental to the domain of modern applied mathematics.

First Term: The notion of topology, continuity, separation axiom, convergence of nets, compactness and connectedness. The topology of a metric space, compact and complete metric spaces and Cantor's theorem. Normed and Banach spaces, linear functionals, the dual of a Banach space, weak convergence and linear operators. A short presentation of the Lebesgue integral, and the definition of spaces L1 , L2 and LP . Hilbert spaces, strong and weak convergence, orthogonal and orthonormal sequences, orthogonal complement and Riesz's representation theorem of functionals.

Second Term: Linear operators in Hilbert spaces, bilinear functionals, quadratic forms, adjoint, self-adjoint, invertible, isometric, unitary, positive and compact operators. Fixed point problems, Banach's contraction principle, Brouwer's theorem, Schauder's theorem and applications to numerical analysis and to the solvability of linear systems, nonlinear equations, differential and integral equations. Fredholm and Volterra integral equations. Gâteaux and Fréchet derivatives. Variational calculus. Variational inequalities.

Prerequisites: MAE129A and MAE302 or MAE305

3 - 0 - 4 Weight: 12
Credits: 2

MAE408A/B: Numerical Analysis (MAF408A/B : Analyse numérique)

An elective for Fourth Year students 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.

Prerequisites: MAE201 or MAE203 and CSE301A/B

3 - 0 - 3 Weight: 6
Credits: 1

MAE413A/B: Mathematical Physics (MAF413A/B : Physique mathématique)

An elective for Fourth Year students 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.

Prerequisite: MAE302 or MAE305

3 - 0 - 3 Weight: 6
Credits: 1

MAE451A/B : Topics in Mathematics (MAF451A/B : Sujets choisis de mathématiques)

An elective course for students enrolled in programs offered by the Department.

The objective of this course is to allow members of the department to share their expertise with students in areas of mathematics not covered in other courses. Students will present seminars and written reports, as appropriate.

Prerequisite: Permission of the instructor

0 - 3 - 3 Weight: 6
Credits: 1

MAE456A/B: Mathematical Modelling (MAF456A/B : Modélisation mathématique)

For Fourth Year students in Honours Mathematics and Computers Science. Others by permission of the department.

This course involves a study of the principles of mathematical modelling.

Continuous models based on ordinary differential equations, systems of ordinary differential equations, partial differential equations and integral equations. Models based on optimization and variational calculus. Each model type will be illustrated by concrete examples and numerical methods appropriate to these equations will be investigated. The latter part of the course will be dedicated to a qualitative study of mathematical models. Mathematical models for military problems will be considered.

Prerequisite: MAE302 or MAE305.

3 - 0 - 4 Weight: 6
Credits: 1

CSE101B: Introduction to Algorithms and Computing (INF101B : Introduction aux algorithmes et à la programmation)

For First Year students taking Engineering and Science.

The subject of this course is the design, analysis and implementation of algorithms.

It examines the relationship between problem solving and algorithms, the design of algorithms using pseudocode; sequence, selection and iteration; and abstraction (functions), and the correctness and efficiency of algorithms. Algorithms for tasks such as searching, sorting and pattern matching will be introduced and analyzed.

Algorithms will be implemented in a high-level programming language as programs using appropriate data types, statements and methods. The use of compilers, interpreters and virtual machines in executing programs will be studied. An introduction to object-oriented programming, classes and objects will be given.

Prerequisite: Admission to RMC

3 - 1 - 4 Weight: 7
Credits: 1

CSE250A/B: Data Structure and Algorithms (INF250A/B : Structure de données et algorithmes)

Required for Honours Mathematics and Computer Science. Strongly recommended for students majoring in Computer Science.

Note: Students who have taken CSE250B will not be granted credit for CSE365A.

Introduction to abstract data structures (stacks, queues, lists, trees, graphs) and their implementation. Big-Oh analysis of algorithms and running time of programs. Programming principles. Applications to problems from science and engineering will be used throughout the course.

Prerequisite: CSE101B

3 - 2 - 4 Weight: 8
Credits: 1

CSE260A/B: Introduction to Computer Concepts (INF260A/B : Introduction aux concepts informatiques)

An elective course for students in Arts. This course is part of the core curriculum.

This course gives an introduction to information technology and its applications. Topics include an overview of computer hardware and system software, algorithm design, programming in a high level language, use of spreadsheets and data base systems. Computer networks and the Internet.

Security considerations.

Prerequisite: None

3 - 0 - 6 Weight: 6
Credits: 1

CSE301A/B: Scientific Computing (INF301A/B : Programmation scientifique)

For Second or Third Year students taking Honours Mathematics and Computer Science. An elective for students taking Science or others with the permission of the department.

Sources of error in numerical computation. Stable and unstable algorithms, computational pitfalls. Topics in numerical analysis including the solution of linear and non-linear equations, numerical integration and differentiation, polynomial and spline interpolation, discrete least squares approximation, numerical solution of ordinary differential equations.

Prerequisites: MAE201 or MAE203, MAE129A and CSE101B

3 - 1 - 4 Weight: 7
Credits: 1

CSE321A/B: Algorithm Analysis (INF321A/B : Analyse d'algorithmes)

For Third Year students taking Honours Mathematics and Computer Science and/or those majoring in Computer Science.

Recursive algorithms and recursive function theory; introduction to complexity analysis and complexity classes; computability and undecidability. Problem solving strategies. Relationship between data structures and algorithm design. Data structures and algorithms will be covered in some depth.

Prerequisites: MAE201 or MAE203, and MAE232A/B

3 - 2 - 4 Weight: 8
Credits: 1

CSE323A/B: Formal Languages and Automata (INF323A/B : Langages formels et automates)

For Third Year students taking Honours Mathematics and Computer Science and/or those majoring in Computer Science.

Introduction to the theory of automata and formal languages with application to the theory of computation. Deterministic finite automata, regular languages, pushdown automata, context free grammars, Turing machines (TM), unsolvable problems about TM and grammars, P and NP classes, NP completeness.

Prerequisite: MAE204A/B

3 - 2 - 4 Weight: 8
Credits: 1

CSE341B: Introduction to Database Systems (INF341B : Introduction aux bases de données)

For students taking Honours Computer Science. An elective for students in Computer Engineering or Science.

Database system concepts; Primary file organization and index structures; Data modeling using entity-relationship model and enhanced entity-relationship model; Relational model, Normalization; relational algebra and relational calculus; SQL, Embedded SQL and JDBC; query optimization, transaction processing; security and database integrity.

Prerequisite: CSE250A/B or CSE365A

3 - 2 - 5 Weight: 8
Credits: 1

CSE365A: Computer Program Design (INF365A : Conception de programmes pour l'ordinateur)

For Third Year students in Computer Engineering or Science. Others with the permission of the department. Students who have taken CSE250A/B will not be granted credit for CSE365A.

Essential notions of object-oriented programming: classes, objects, abstraction, encapsulation, inheritance, polymorphism. Abstract data types (stacks, queues, sequences, binary trees, heaps, dictionaries, etc.) and their implementations in an object-oriented programming language, using arrays, linked lists, and other linked structures. Standard searching and sorting algorithms and their efficiency.

Prerequisite: CSE101B

3 - 2 - 5 Weight: 8
Credits: 1

CSE411A: Advanced Database Concepts and Applications (INF411A : Concepts avancés de base de données et applications)

An elective for students taking Science or Engineering

Concurrency and recovery. Decision support . Object databases. Distributed databases and client-server

architecture. Active databases and temporal databases. Deductive databases. Data warehousing and data mining. Study of applications such as GIS, genome database, bioinformatics, digital library and multimedia databases.

Prerequisite: CSE341B

3 - 2 - 5 Weight: 8
Credits: 1

CSE431A/B: Pattern Recognition and Image Analysis (INF431A/B : Reconnaissance des formes et analyse des images)

An elective course for students enrolled in programs offered by the Department, and others by permission of the Department.

Signal and noise, basic principles of statistical decision making and of automated thinking as applied to image analysis. Bayes' decision rule, pattern classification, interclass distance measures, discriminant functions, supervised and unsupervised learning. Labs will include the use and development of image processing software.

Prerequisites: CSE250A/B and CSE301A/B. MAE331A/B also recommended

3 - 2 – 5 Weight: 8
Credits: 1

CSE444A/B: Computer Applications Laboratory (INF444A/B : Laboratoire d'informatique appliquée)

For Fourth Year students taking Honours Mathematics and Computer Science and/or those majoring in Computer Science.

A series of self-directed laboratory exercises using various 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.

Prerequisite: CSE250A/B

0 - 4 - 4 Weight: 6
Credits: 1

CSE451A/B: Topics in Computer Science (INF451A/B : Sujets choisis en science informatique)

An elective course for students enrolled in programs offered by the Department.

The objective of this course is to allow members of the department to share their expertise with students in areas of computer science not covered in other courses. Students may be expected to work on software projects, and will present seminars and written reports as appropriate.

Prerequisite: Permission of the instructor

0 - 3 – 3 Weight: 6
Credits: 1

CSE453B : Modeling and Simulation (CSE453B : Modélisation et Simulation)

For 3rd and 4th year students in computer science, engineering, manufacturing, or business.

After the course, students will be able to solve problems using computer simulations.
More specifically, students will be able to describe the procedures involved in modeling and simulation; they will know how to structure and then verify models for complex systems, how to conduct designs of experiment on models, i.e., simulation, and how to measure and evaluate these experiments (simulation analysis). Advanced applications will be shown and students will be able to solve problems by using various skills of modeling and simulation. Finally, they will be able to apply their knowledge of modeling and simulation to solve defence related applications.

Perequisites: MAE101, MAE102, CSE101, CSE250/365 or CSE321

3 - 2 - 4 Weight: 8
Credits: 1

CSE472A/B: Knowledge-Based Systems (INF472A/B : Systèmes à base de connaissances)

An elective 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.

Prerequisites: CSE250A/B and CSE321A/B

2.5 - 1.5 - 4 Weight: 7
Credits: 1

CSE475A/B: Genetic Algorithms and Neural Networks (INF475A/B : Algorithmes génétiques et réseaux de neurones)

An elective course for students in Science or Engineering.

Genetic information processing. Natural mechanisms of optimization of species. Molecular computers. Algorithm of artificial genetics.

Neural networks. Elements of functioning of natural networks and of learning. Artificial networks: the most important models, including the perceptron, the adaline, the associative memories, error back-propagation, Kohonen's SOM, the radial basis functions networks, and many of their practical applications.

This course includes two periods of laboratory per week. Students will use commercial software and will also write their own programs.

Prerequisite: MAE201 or MAE203

3 - 2 - 3 Weight:8
Credits: 1

GRADUATE STUDIES AND RESEARCH

For graduate courses, see the Calendar of the Graduate Studies and Research Division.

DEPARTMENT OF PHYSICS

Professor Emeritus - D.C. Baird, BSc, PhD
Professor Emeritus - M.H. Edwards, BA, MA, PhD, NDC
Professor Emeritus - R. Favreau, BSc, MSc, PhD
Professor Emeritus - R.F. Harris-Lowe, rmc, BSc, PhD
Professor Emeritus - S.L. McBride, BSc, PhD
Professor Emeritus - D.H. Rogers, BSc, MSc, PhD
Professor Emeritus - D.E. Tilley, BSc, PhD
Professor Emeritus - R.R. Turkington, BSc, MSc, PhD
Professor Emeritus - L.S. Wright, BSc, MAT, PhD
Associate Professor (Adjunct) - J.R. Gosselin, BScA, PhD
Professor and Dean of Science - R.F. Marsden, rmc, BSc, PhD
Professor - E. Batalla, BSc, MSc, PhD
Professor - J.R. Buckley, BSc, PhD
Professor - N. Gauthier, BA, BSc, MSc, PhD
Professor - A.R. Lachaîne, BSc, MSc, PhD
Professor and Head of the Department - B.K. Mukherjee, BSc, PhD
Professor - T.J. Racey, BSc, BEd, MSc, PhD
Professor - S. Ranganathan, ndc, BSc, MSc, MTech, PhD
Professor - P.L. Rochon, BSc, PhD, PEng
Professor - P.J. Schurer, BSc, MSc, PhD
Professor - M.W. Stacey, BSc, PhD
Assistant Professor and Director of the Centre of Space Research - Lieutenant Commander D. Burrell, CD, BSc, MSc, PhD
Assistant Professor - Captain S. Dubois, rmc, BEng, MSc, PhD
Assistant Professor - Captain A. Mac Giolla Chainnigh, CD, rmc, BEng, MSc, PhD
Assistant Professor - J.-M.A. Noël, BSc, MSc, PhD
Assistant Professor - G. Wade, BSc, MSc, PhD
Lecturer - Captain S. Hurlbut, BSc, MSc
Lecturer, Major M. Labrecque, BSc, MSc
Research Associate - B. Bennett, BA, BSc, MA, PhD
Research Associate - B. Phelps, BSc, MSc, PhD
Research Associate - W. Ren, BSc, MSc, PhD
Research Associate - G. Yang, BSc, MSc, PhD
Research Assistant - A. Rogers, BSc
Research Assistant - A. Russell, BSc, MSc
Research Assistant - J. Woodside

DEPARTMENT PROGRAMMES

First Year (common for science): PH103, CC100, MA129A, MA101, EN100/FR151, CS101B, PS123B

HONOURS PHYSICS

Second Year: MA203, MA229A, PH205A, PH207A, CC217A, HI207A, MA209B, PH225B, PH227B, PO205B, HI203B

Third Year: MA305, PH302A, PH304A, PH305A, PH331, PS301A, PH303B, PH415B*, HI271B

Fourth Year: MA413A, PH403A, PH412A, PH407A, SC420, PO316A, PH413B*, PH451B, PS401B plus one semester physics course at the 300 or 400 level

PHYSICS MAJORS

Second Year: MA 203, PH205A, PH207A, PH225B, PH227B, HI207A, PO205B, HI203B plus 3 semester science courses at the 200 level

Third Year: MA 305, PH302A, PH303B, PH304A, PH305A, PS301A, HI271B plus 3 science courses at the 300 or 400 level

Fourth Year: 1 physics course at the 300 or 400 level plus 5 science electives at the 300 or 400 level plus PO316A and PS401B

HONOURS SPACE SCIENCE

Second Year: MA203, MA229A, PH205A, PH207A, CC217A, HI207A, MA209B,
PH225B, PH227B, PO205B, HI203B

Third Year: MA3051, MA330B, PH300A, PH302A, PH350A, PH331, PS301A, PH352B*, PH354B, PH364B, HI271B

Fourth Year: PH407A, PH450A, CC452A, PH422, PO316A, PO450B, PH452B, PH442B*, PS401B

SPACE SCIENCE MAJORS

Second Year: MA 203, PH205A, PH207A, PH225B, PH227B, HI207A, PO205B, HI203B plus 3 semester science courses at the 200 level

Third Year: PH302A, PS301A, HI271B; plus two one semester space science electives from: PH331, PH350A, PH352B, PH354B, PH364B, PH442B or CC452: plus 6 science courses at the 300 or 400 level

Fourth Year: PH407A, PH422, PH452B, PS401B, PO316A plus 2 science electives at the 300 or 400 level

COMBINED HONOURS IN PHYSICS AND SPACE SCIENCE

Second Year: MA203, MA229A, PH207A, PH205A, CC217A, HI207A, MA209B, PH225B, PH227B, PO205B, HI203B

Third Year: MA305 or MA3051/MA331B, PH302A, PH303B, PH304A, PH350A, PH331, PS301A, PH354B, PH352B, HI271B

Fourth Year: PH407A, PH305A, PH450A, SC420 or PH422, PO316A, PH452B, PH442B, PS401B, Physics Elective or MA413A

COMBINED MAJORS IN PHYSICS AND SPACE SCIENCE

Same as Honours Physics and Space Science above, less three semester equivalent courses from: PH350A, PH331, PH354B, PH352B, PH450A, PH442B. Note: PH422 must be taken.

Combined honours and majors programmes are also available in physics/mathematics, physics/computer science, physics/chemistry, space science/mathematics, space science/computer science and space science/chemistry. The physics and joint department should be consulted for details.

PHYSICS MINOR

To receive a minor in physics, the students must complete the first year in science and complete PHE205A and PHE207A plus 6 semester science courses at the 200, 300 or 400 level.

Notes:

1. * indicates course is offered in alternate years.
2. The department will consider equivalent Physics substitutions at the third and fourth year level for the combined Physics and Space Science programmes on a case by case basis.

Table of Pre-Requisites

Course	Co-Requisite	Pre-Requisite
PH103 (General Phys)	MA101	
PH202B (Elementary Phys)		
PH205A (Waves & Vibes)	MA203	MA101, PH103
PH207A (Electr & Magn)		MA101, PH103
PH225B (Modern Phys)	MA203	PH205A
PH227B (Electromag)	MA203	PH207A
PH300A (Modern Phys)	MA305/330B	PH205A, 225B, 227B
PH302 (Electromag Waves)	MA305/330B	MA203, PH227B
PH303B (Statistical Phys)	MA305/330B	MA203, PH304A
PH304A (Quantum Mech)	MA305/330B	MA203, PH225B
PH305A (Classical Mech)	MA305/330B	MA203, PH205A
PH314B (Adv Quant Mech)	MA305/330B	PH304A
PH331 (Instrumentation)		
PH352B (Astronomy)	MA203, PH105	FYB
PH354B (Space Systems)		
PH360 (Arts Astronomy)		
PH364B (Space Lab)		
PH403A (Solid State)	MA305/330B	PH304A or PH300A
PH404B (Fluid Mech)	MA305/330B	PH302A
PH407A (Optics)	MA305/330B	PH302A
PH412A (Adv Electrom Theory)	MA305/330B	PH302A
PH413B (Nuclear)	MA305/330B	PH304A
PH420 (Senior Project)		Honours
PH422 (Spacecraft Design)		FYB
PH442B (Astrophysics)		PH300A or equivalent
PH450A (Space Comm & Nav)		FYB
PH452B (Remote Sensing)	MA305/330B	PH407A
PH451B (Phys Lab)		

Note: FYB - First year basic: MA101, PH103

COURSE DESCRIPTIONS

PHE 103: General Physics (PHF 103: Physique générale)

For all students in the First Year General Course.

An introduction to the principles of physics through the study of mechanics and optics. The course covers the following material in the first semester: 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, conservations 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, Law of universal gravitation. The second semester covers: nature and speed of light, reflection and refraction, spherical mirrors, lenses and optical instruments, the wave nature of light, interference and diffraction and spectroscopy, including: black body radiation and Planck's hypothesis, atomic spectra empirical models, Bohr's, prediction of hydrogen spectral lines using Bohr's model and the correspondence principal.

Serway, Physics for Scientists and Engineers, fourth ed.

3 - 3 - 6 Credits: 3

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 103.

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

PHE108: Introduction to Oceanography

Offered through the Office of Continuing Studies.

PHE110: Elements of Electro-optics

Offered through the Office of Continuing Studies.

PHE131: Mechanics

Offered through the Office of Continuing Studies.

PHE133: Optics

Offered through the Office of Continuing Studies.

PHE202B: Elementary Physics (PHF202B: Physique élémentaire)

For students taking Arts.

Topics in this introductory physics course will include Newtonian mechanics including projectile motion, work and energy; acoustic, speed of sound, sound intensity; optics, lasers, mirrors, lenses, interference and diffraction.

3 - 0 - 6 Credit: 1

PHE203: Introduction to Astronomy

Offered through the Office of Continuing Studies.

PHE205A: Mechanics (PHF205A: Mécanique)

For students taking second year science, civil or mechanical engineering.

Oscillatory motion is studied including: undamped and damped harmonic motion. Forced harmonic motion and resonance. Damped forced oscillations. Standing and progressive waves. Conditions for static equilibrium in two and three dimensions. Introduction to fluid statics and fluid dynamics.

3 - 1 - 4 Credit: 1

PHE207A: Electricity and Magnetism (PHF207A: Électricité et magnétisme)

For students taking second year science, electrical, computer or chemical engineering.

This is an introductory course electricity and magnetism. The following topics are discussed: electric fields. Coulomb's law. Motion of charged particles. Gauss' law. Electric flux. Conductors in electrostatic equilibrium. Electric potential. Method of images. Magnetic fields. Motion of charged particles. Magnetic forces and torque. Biot-Savart law. Ampere's law. The magnetic field of a solenoid. Faraday's law. Motional emf. Maxwell's equations in integral form. Electromagnetic waves. Production of electromagnetic waves by an antenna.

3 - 1 - 4 Credit: 1

PHE217: Introduction to Electromagnetism

Offered through the Office of Continuing Studies.

PHE225B: Modern Physics (PHF225B: Physique moderne)

For students in science; required for student in physics or space science honours or majors.

Concepts in physics developed from 1900 are discussed including: relativistic kinematics and dynamics; space and time; Doppler effect; momentum and energy. Particle aspects of electromagnetic radiation. Wave aspects of particles. Rutherford and Bohr models of the atom. Development of the Schrodinger equation. Application of the Schrodinger equation to a particle in a box and finite potential wells. Tunnelling. Models of the Single- and many electron atoms; molecules. Nuclear structure and energetics of reactions. Radioactivity: alpha and beta decay, gamma emission.

3 - 1 - 4 Credit: 1

PHE227B: Electromagnetism (PHF227B: Électromagnétisme)

For students in science; required for students in physics or space science honours or majors.

Concepts in electromagnetic theory, introduced in PHE207A are studied in greater detail including: dielectrics. Electric polarization. Bound charges. Gauss' law. Magnetic materials. Magnetization. Equivalent surface and volume currents. Magnetic field intensity H. Ampere's law. Magnetization curve. Current and resistance. Ohm's law. Capacitance. Combination of capacitors. Direct current circuits. Kirchoff's rules. RC circuits. Inductance. Self-inductance. RL circuits. Oscillations in LC circuits. RLC circuits. Complex impedance. Transmission line.

3 - 1 - 4 Credit: 1

Experimental Physics A (Physique expérimentale A)

For students of the Second Year taking 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 the students choose from a wide variety of experiments that have been selected to train them in the principles of experimental measurement. Much of the design and analysis of the experiments is done by the students independently.

0 - 3 - 3

Experimental Physics B (Physique expérimentale B)

For students of the Second Year taking Science.

Standing in this course will be included in the standing obtained in PHE225B and PHE227B.

The students choose from a wide variety of experiments that have been selected to train them in the principles of experimental measurement and to illustrate some fundamental physical concepts.

0 - 3 - 3

PHE233: Elements of Physics (PHF233: Éléments de physique)

Offered through the Office of Continuing Studies.

PHE300A: Modern Physics (PHF300A: Physique Moderne)

For Third Year students taking Space Science. This course may not be taken by students registered in Physics.

Atomic Physics: The hydrogen atom. The exclusion principle. The electronic structure of atoms and the periodic table. Atomic Spectra. The Zeeman Effect.

Molecular Physics: Ionic and covalent binding. Rotational and vibrational energies. Molecular spectra.

Nuclear Physics: Nuclear stability and binding energy. Radioactivity. Nuclear reactions, fission and fusion.

Statistical Physics: The classical and quantum distribution functions. Maxwell velocity distribution in classical gases. The equipartition theorem. Blackbody radiation. The electron gas. Degenerate fermion and boson gases. Specific heat of solids and gases.

3 - 0 - 3 Credit: 1

PHE302A: Electromagnetic Waves (PHF302A: Ondes électromagnétiques)

For Third Year students taking Physics or Space Science. An elective for students taking Science.

This course develops Maxwell's equations in differential form, and proceeds directly to the Helmholtz equation, describing the wave propagation of electromagnetic fields. Electromagnetic waves are studied in free space, lossy media, conductors, and dielectrics, with particular attention to power transfer (Poynting vector), and the reflection and transmission of waves at interfaces (Fresnel equations). Propagation along waveguides and transmission lines are studied in detail. The modes of propagation in rectangular waveguides (transverse electric and transverse magnetic) are analyzed in terms of field amplitudes, phases, and attenuation. The guiding of waves along a transmission line is analyzed in terms of the propagation constant, characteristic impedance, input impedance, standing wave

ratio, and power. Various applications of transmission lines are examined.

3 - 0 - 3 Credit: 1

PHE303B: Statistical and Thermal Physics (PHF303B: 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 Credit: 1

PHE304A: Quantum Mechanics (PHF304A: Mécanique quantique)

For Third Year students taking Science.

Postulates of quantum mechanics, the Schrödinger equation, operators, eigenfunctions and eigenvalues, superposition and stationary states, the one-dimensional square well. Time independent perturbation theory. The hydrogen atom, energy levels, angular momentum, magnetic moment, Stark effect, Zeeman effect, He, electron spin, Hartree-Fock approximation. Slater determinants, many electron atoms, LS coupling, jj coupling, spectroscopic notation, electronic structure and Hund's rule, periodic table.

3 - 0 - 3 Credit: 1

PHE 305A: Classical Mechanics (PHF 305A: Mécanique classique)

For Third Year students taking Physics. An elective for students taking Science.

Newton's laws, applications. Calculus of variations, Lagrangian and Hamiltonian formulation. Central force motion, Kepler's laws, collisions, Rutherford scattering. Rotating coordinate systems, Coriolis force. Rigid body motion, Inertia tensor, Euler's equations.

3 - 0 - 3 Credit: 1

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. Fundamentals of imaging using acoustic waves.

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.

2 - 2 - 3 Credits: 2

PHE350A: Orbital Mechanics (PHF350A: Mécanique orbitale)

For students of the Third Year taking Space Science. An elective for other students taking Science.

Newton's laws. Two-body problem in a central force field, orbit calculations. Motion of an artificial satellite, orbit insertion, orbit transfers, perturbations.

3 - 0 - 4 Credit: 1

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 astronomy and the application of astronomical techniques to space operations. Electromagnetic spectrum, measurements and distances. Earth, moon, solar system, stellar structure and evolution, and galactic structure.

3 - 0 - 3 Credit: 1

PHE354B: Space Systems (PHF354B: Systèmes spatiaux)

For students of the Third Year taking Space Science. An elective for other students 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.

3 - 0 - 2 Credit: 1

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 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.

3 - 0 - 6 Credit: 1

PHE362A: Ideas and Concepts of Modern Physics (PHF362A: Concepts de physique moderne)

(Offered in alternate years. May be offered in Winter Term.)

An elective course for students 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 the impact of the new concepts on contemporary thought.

3 - 0 - 6 Credit: 1

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 Credit: 1

PHE370A: Introductory Synoptic Oceanography (PHF370A: Introduction à l'océanographie)

An elective for 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 Credit: 1

PHE372: Naval Operations Oceanography (PHF372: Océanographie navale opérationnelle)

Offered through the Office of Continuing Studies.

PHE380A: Physics of Armaments (PHF380A: Physique des armements)

An elective for 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 programs.

3 - 0 - 6 Credit: 1

PHE390A: The Physics of Music (PHF390A: Physique de la musique)

An elective course for students 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 Credit: 1

PHE403A: Solid State Physics (PHF403A: Physique de l'état solide)

For Fourth Year students registered in Physics. An elective course for other science students.

Crystal structure, Bragg scattering and reciprocal space. Bonding in solids. Lattice vibrations and the specific heat of solids. Energy bands. Electrical and thermal conduction in solids. Semiconductors. Dielectric and optical properties of solids. Magnetic properties of solids.

3 - 0 - 3 Credit: 1

PHE404B: Fluid Mechanics (PHF404B: Mécanique des fluides)

An elective course for students taking Science or Space Science.

The Navier-Stokes, conservation of mass, continuity, and Bernoulli's equations are developed. Flows in pipes, shock waves, cavitation, dispersive and nondispersive waves, laminar and turbulent flows, and boundary layer theory are discussed. The acoustic wave equation is developed and applied to underwater sound propagation.

3 - 0 - 3 Credit: 1

PHE407A: Optics (PHF407A: Optique)

For Fourth Year students taking Space Science and Honours Science (Physics). An elective for other students taking Science.

Study of the main phenomena of physical optics: Polarisation, linear, circular, and elliptical, treated using Jones' matrices, with introduction to Stokes parameters; interference; coherence, spatial and temporal; diffraction. Fourier optics, advanced geometric optics: Propagation of light rays in an optical system using ray matrices, leading to the treatment of thick lenses and a general axial optical system. These concepts are rendered tangible by a relevant choice of laboratory experiments.

3 - 2 - 3 Credit: 1

PH412A: Advanced Electromagnetic Theory (PHF412A: Théorie électromagnétique avancée)

For Fourth Year students taking Physics. An elective for other students taking Science or Space Science.

Pre-requisite: PHE302A

Various topics in electromagnetic theory are investigated in detail. Electrostatic fields are studied with attention to continuous charge distributions, the electric dipole, electric potential, polarization and boundary conditions. Magnetic fields, magnetic dipoles, and the magnetization of materials are described in terms of the magnetic vector potential. Further topics in magnetism include magnetic torque,

magnetic moment, and magnetic boundary conditions. Time varying fields are shown to lead a "displacement current" in Ampère's Law, yielding the final form of Maxwell's equations. Antenna theory is developed for simple geometries, including those of the Hertzian dipole, the half-wave dipole, the quarter-wave monopole, and the small antenna loop. Other topics in antenna theory include: antenna characteristics, arrays, effective area, and radar.

3 - 0 - 3 Credit: 1

PHE 413B: Nuclear Physics (PHF 413B: Physique nucléaire)

For Fourth Year students taking Physics. An elective for students taking Science or Space Science.

Nuclear constituents and Rutherford scattering. Evidence of the nuclear force. The deuteron. Binding energy and the semi-empirical mass formula. Nuclear stability. The single-particle shell model. Beta and alpha decay; gamma ray emission. Fission and fusion. Qualititive aspects of particle physics and quark and lepton nomenclature.

3 - 0 - 3 Credit: 1

PHE415B: Advanced Quantum Mechanics (PHF415B: Mécanique quantique avancé)

For Third Year students taking Honours Science (Physics) and an elective for Science students.

The three dimensional square well. The harmonic oscillator, zero point energy, Hermite polynomials. Creation and annihilation operators. The time dependent Schrödinger equation; time evolution of states and operators, Ehrenfests's principle. Time dependent perturbation theory; transitions, selection rules, Fermi's golden rule. Scattering.

Pre-requisite: PH304A

3 - 0 - 3 Credit: 1

PHE420: Senior Project (PHF420: Projet)

For students of the Fourth Year taking Honours 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 Credits: 2

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 - 7 - 5 Credits: 2

PHE440: Selected Topics in Physics (PHF440: Sujets choisis en physique)

An elective course for students of the Fourth Year taking Honours 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 Credit: 1

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 astrophysical phenomena. The topics to be covered would be selected from: Observational Astronomy, Stars and Stellar Evolution, Galaxy Formation and Evolution, Observational Cosmology, Theory and Chronology of Big Bang, and Model of the Universe.

3 - 0 - 4 Credit: 1

PHE 450A: Space Communications and Navigation (PHF 450A: Communications et navigation spatiale)

For Fourth Year students taking Space Science. An elective for students taking Science.

This course is an introduction to communication between spacecraft and ground stations. Students are introduced to antenna theory: dipole antenna, antenna gain, antenna patterns, directivity and signal strength. The theory is then applied to modulation, transmission, propagation, reception and demodulation of signals between the ground and a satellite. Fundamentals of ionospheric effects, frequency bands, communication link equations and telemetry are covered.

Space based navigation systems are examined. Topics include positioning using RF Doppler and GPS positioning. Precision navigation and surveying, personal communication systems as well as search and rescue systems are also examined. Satellite tracking is discussed.

3 - 0 - 3 Credit: 1

PHE451B: Senior Physics Laboratory (PHF451B: 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 Credit: 1

PHE452B: Remote Sensing (PHF452B: Télédétection)

For students of the Fourth Year taking Space Science. An elective for students taking Science.

Pre-requisites: PHE302A, PHE407A

This course provides a foundation for the theory and applications of remote sensing of the earth's surface from space. Optical, infra-red and passive and active microwave sensing systems are examined from basic electromagnetic principles, through expected surface responses and atmospheric effects, to modern satellite systems utilizing these systems. Techniques of digital image processing are developed in the context of satellite imagery. Applications of remote sensing technology to terrestrial and marine environments are discussed, highlighting topics of interest to the Canadian Forces.

Lecture material is supplemented with weekly computer laboratory exercises in image processing and in the examination of different types of satellite imagery.

3 - 2 - 4 Credit: 1

GRADUATE STUDIES AND RESEARCH

For graduate courses see the Calendar of the Graduate Studies and Research Division.

DEPARTMENT OF CHEMISTRY AND CHEMICAL ENGINEERING

Professor Emeritus - R.F. Mann, rmc, BSc, MSc, PhD, FCIC, PEng..
Professor, Head of the Department - K.A.M. Creber, BSc, MSc, PhD
Professor - P.J. Bates, BSc, MEng, PhD, PEng.
Professor - L.G.I. Bennett, CD, rmc, BEng, MASc, PhD, PEng.
Professor - H.W. Bonin, BA, BSc, BScA, MIng, PhD, ing, PEng, FCIC, FCNS.
Professor - V.T. Bui, BScA, MScA, PhD.
Professor - J.C. Amphlett, BSc, PhD.
Professor - J.P. Laplante, BSc, MSc, PhD
Professor and Professor-in-Charge of the Chemical 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 - R.D. Weir, CD, BSc, DIC, PhD, FCIC, FEIC, FIUPAC, FRSC, CChem, PEng.
Professor (Adjunct) – W.R. Cullen, MSc, PhD.
Professor (Adjunct) - M.J.B. Evans, BSc, PhD, CChem, FRSC.
Professor (Adjunct) – B. Harrison, BSc, PhD.
Professor (Adjunct) - J.C. Kennedy, BA, MD, PhD.
Associate Professor - W.S. Andrews, CD, rmc, BEng, MEng, PhD, PEng.
Associate Professor - B.A. Peppley, BASc, BEd, MSc, PhD.
Associate Professor - B.A. Zeeb, BSc, PhD.
Associate Professor (Adjunct) - U.I. Bickis, BSc, MEng, PhD.
Associate Professor (Adjunct) - S. Liang, BSc, MSc, PhD.
Associate Professor (Adjunct) - W.W. Mohns, BA, PhD.
Associate Professor (Adjunct) - D.F. Quinn, BSc, PhD.
Assistant Professor - Captain K.M. Jaansalu, CD, rmc, BEng, MEng, PhD .
Assistant Professor - G.L.P. Lord, BA, BSc, MSc, PhD.
Assistant Professor – Lieutenant-Colonel J.E.J. Lord, CD, plsc, pcsc, ltsp, BSc, MSc.
Assistant Professor - J.Y.S.D. Pagé, CD, rmc, BEng, MEng, PEng, PhD.
Assistant Professor - Captain B. Tucker, CD, rmc, BEng, MEng.
Assistant Professor (Adjunct) – E. Cooper, BSc, PhD.
Assistant Professor (Adjunct) - E.F.G. Dickson, BSc, PhD.
Assistant Professor (Adjunct) - D.G Kelly, BSc, PhD.
Assistant Professor (Adjunct) – I. Koch, BSc, PhD.
Assistant Professor (Adjunct) - J.S. Poland, BSc, DPhil.
Assistant Professor (Adjunct) – R. Rao, BSc, MSc, PhD.
Assistant Professor (Adjunct) – D. Wilkinson, BSc, PhD.
Lecturer – Captain D.J. Sims, CD, BASc, MSc, MEng, PEng.

Technical Officer - B.A. Kelly, BSc, BEd, MSc.
ESG Program Manager - D.A.Reimer, BScH.
Director Slowpoke Facility - K. Nielsen, BSc, MSc.

Research Associate – F. Akbari, BSc, MSc, PhD.
Research Associate – S. Bhowmik, BEng, MEng, PhD.
Research Associate – P. Bodurtha, BSc, MSc, PhD.
Research Associate – T.G. Gopakumar, MSc, PhD.
Research Associate – R. Goyan, BSc, PhD.
Research Associate - A.R. Green, BSc, PhD.
Research Associate - R.D. Klassen, BSc, BEng, PhD.
Research Associate - D. Loock, PhD.
Research Associate - E.A. Ough, BSc, PhD.
Research Associate - A. Qi, BSc, MSc, PhD.
Research Associate - C. Qi, BSc, PhD.
Research Associate - C. Thurgood, BSc, MSc, PhD.
Research Associate – Y. Wan, BSc, PhD

ACCREDITATION

The baccalaureate degree programme in Chemical 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 Engineering, and Bachelor of Science Chemistry at the Honours, Major or General levels.

To enter the Third Year Honours programme 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 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. Chemistry and Chemical Engineering 106A (for students with no high school equivalent)
2. Chemistry and Chemical Engineering 200A, 360A, 362A, 364B, 366B (Electives).

For students taking **Engineering**:
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 220A

For students taking **Chemical Engineering**:
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 220A
3. Chemistry and Chemical Engineering 301, 303A, 311, 317B, 321, 337B, 341, 345A, 353A, 385B
4. Chemistry and Chemical Engineering 401, 405, 407A, 409B (Elective), 413B, 415A, 417, 421, 425, 427, 437B, 441A, 485B (Elective)

For students taking **Space Science**:
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 220A
3. Chemistry and Chemical Engineering 452

For students taking **Honours Chemistry**
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 240B
3. Chemistry and Chemical Engineering 302B, 310A, 320B, 337B, 341, 342B, 345A, 353A, 385B.
4. Chemistry and Chemical Engineering 437B, 440 (elective), 441A, 451A, 460A, 462B
5. Science 420
6. Plus 5 electives (3 Science, and 2 Chemical) at the third or fourth year level

For students taking a **Major** in **Chemistry**:
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 240B
3. Chemistry and Chemical Engineering 310A, 320B, 341, 342B
4. Chemistry and Chemical Engineering 441A, 451A, 460A, 462B
5. Plus 12 electives of Science courses

For students taking **General Science**, or a **Minor in Chemistry**:
1. Chemistry and Chemical Engineering 101
2. Chemistry and Chemical Engineering 217A, 240B
3. Plus 6 electives from the courses listed under Honours Chemistry

The prescribed course of study for students taking Chemical Engineering is set out in the tables in the Course Outlines as follows:

First Year	Table 2
Second Year	Table 6
Third Year	Table 11
Fourth Year	Table 19

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 7
Third Year	Table 10
Fourth Year	Table 18

Chemistry Major Program

First Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA101	Calculus	3		1	4	1
MA129A	Intro Algebra	3		1	4	1
PH103	Physics	3	3		6	1
CC101	Chemistry	3	2		5	1
E/F 100	Eng/French	3			3	1
TOTALS		15	5	2	22	5

First Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA101	Calculus	3		1	4	1
CS101B	Intro Comp	3		1	4	1
PH103	Physics	3	3		6	1
CC101	Chemistry	3	2		5	1
PS123B	Psychology	3			3	1
E/F100	Eng/French	3			3	1
TOTALS		18	5	2	25	6

Second Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA203	Calculus	2.5		1.5	4	1
CC217A	Phys Chem	3			3	1
CC341	Organic Chem	3	2		5	1
HI207A	Canada	3			3	1
Science	Elective	3			3	1
TOTALS		14.5	2	1.5	18	5

Second Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA203	Calculus	2.5		1.5	4	1
CC240B	Intro to Biol	3			3	1
CC341	Organic Chem	2	2		4	1
PO205B	Civics & Soc	3			3	1
HI203B	History	3			3	1
Science	Elective	3			3	1
TOTAL		16.5	2	1.5	20	6

Third Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
CC310A	Thermo	3			3	1
PS301A	Ethics	3			3	1
Science	Elective	3	?		3	1
Science	Elective	3	?		3	1
Science	Elective	3	?		3	1
TOTALS		15			15	5

Third Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
CC320B	Chem Lab		3		3	1
CC342B	Inorganic	3			3	1
HI271B	History	3			3	1
Science	Elective	3	?		3	1
Science	Elective	3	?		3	1
TOTALS		12	3		15	5

Fourth Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
CC441A	Mat Eng Lab		4		4	1
CC451A	Topic P Chem	3			3	1
CC460A	Metabolism	3			3	1
PO316A	Politics	3			3	1
Science	Elective	3	?		3	1
TOTALS		12	4		16	5

Fourth Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
CC462B	Photochem	3			3	1
PS401B	Psychology	3			3	1
Science	Elective	3	?		3	1
Science	Elective	3	?		3	1
Science	Elective	3	?		3	1
TOTALS		15			15	5

Chemistry Major: 42 credits as outlined in the chart.

Honours Chemistry Program

First Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA101	Calculus	3		1	4	1
MA129A	Intro Algebra	3		1	4	1
PH103	Physics	3	3		6	1
CC101	Chemistry	3	2		5	1
E/F 100	Eng/French	3			3	1
TOTALS		15	5	2	22	5

First Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA101	Calculus	3		1	4	1
CS101B	Intro Comp	3		1	4	1
PH103	Physics	3	3		6	1
CC101	Chemistry	3	2		5	1
PS123B	Psychology	3			3	1
E/F100	Eng/French	3			3	1
TOTALS		18	5	2	25	6

Second Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA203	Calculus	2.5		1.5	4	1
PH207A	Elec & Mag	3		1	4	1
CC217A	Phys Chem	3			3	1
CC341	Organic Chem	3	2		5	1
HI207A	Canada	3			3	1
TOTALS		14.5	2	2.5	19	5

Second Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
MA203	Calculus	2.5		1.5	4	1
PH225B	Modern Phys	2		2	4	1
CC240B	Intro to Biol	3			3	1
CC341	Organic Chem	2	2		4	1
PO205B	Civics & Soc	3			3	1
HI203B	History	3			3	1
TOTAL		15.5	2	3.5	21	6

Third Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
PH304A	Quantum Phy	3			3	1
CC353A	Metallurgy	3			3	1
CC345A	Met Lab		3		3	1
CC310A	Thermo	3			3	1
PS301A	Ethics	3			3	1
Science	Elective	3	?		3	1
TOTALS		15	3		18	6

Third Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
CC302B	Mol Str& Spec	3			3	1
CC342B	Inorganic	3			3	1
CC320B	Chem Lab		3		3	1
CC385B	Bio & Micro	3			3	1
HI271B	History	3			3	1
Science	Elective	3	?		3	1
TOTALS		15	3		18	6

Fourth Year: First Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
SC420	Thesis		4		4	1
CC460A	Metabolism	3			3	1
CC451A	Topic P Chem	3			3	1
CC441A	Mat Eng Lab		4		4	1
PO316A	Politics	3			3	1
Chem	Elective	3	?		3	1
TOTALS		12	8		20	6

Fourth Year: Second Term						
Course	**Title**	**Lectures**	**Labs**	**Tutorials**	**Total Hours**	**Credits**
SC420	Thesis		4		4	1
CC462B	Photochem	3			3	1
PS401B	Psychology	3			3	1
Science	Elective	3	?		3	1
Chem	Elective	3	?		3	1
TOTALS		12	4		16	5

Honours Chemistry: 45 credits as outlined in the chart.

Double Major: 44 credits to include: 8 first-year, 10 core-curriculum, 11 chemistry (CC217A, CC341, CC219B, CC307A, CC364B, CC320B, CC460A, CC451A, CC441A, CC462B), SC420, MA 203 and 11 credits in the second major subject (to be determined by second department).

Chemistry Major: 42 credits to include: 8 first-year, 10 core-curriculum, 12 chemistry (CC217A, CC341, PH225B, CC219B, CC310A, CC342B, CC320B, CC460A, CC451A, CC441A, CC462B) and 12 elective credits.

Note: a "credit" is the equivalent of a one-term course (A or B designation). A full-year course is the equivalent of 2 credits.

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, FEMLAB, LABVIEW and CODAS are used to automate and simulate chemical processes.

COURSE DESCRIPTIONS

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 Credit: 2

CCE101: Engineering Chemistry I
(CCF101: 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 Credit: 2

CCE106A: Basic Chemistry
(CCF106A: Chimie de base)

An introductory chemistry course for students with little or no previous background in chemistry, to prepare them for university level chemistry.

Classification and physical properties of matter. Measurement, errors, dimensional analysis. Chemical nomenclature, chemical formulas, valence. Chemical reactions, chemical equations and stoichiometry. Properties of gases. Liquids and solutions. Reactions and stoichiometry in solution. Atomic theory of matter, introduction to electronic structure. Periodic table of the elements. Introduction to chemical bonding. Laboratory: properties of matter, measurement, chemical preparations and stoichiometric analysis.

3 – 2 - 5 Credit: 1

CCE200A: Contemporary Chemistry (CCF200A: Chimie contemporaine)

An elective course for students of the Second Year taking Arts, and other students with the permission of the Department. This is a core curriculum course for Arts students.

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
Hill & Kolb, Chemistry for Changing Times (9th Ed)

3 - 0 - 6 Credit: 1

CCE217A: Physical Chemistry (CCF217A: Chimie Physique)

For students of the Second Year taking Science.
Prerequisite: CCE/F101.

The course is a continuation of CCE 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

3 - 0 - 3 Credit: 1

CCE220A: Introduction to Materials Science and Engineering Materials CCF220A: Introduction à la science des matériaux et aux matériaux d'ingénierie)

For students of the Second Year taking Engineering.
Prerequisite: CCE/F101.

This introductory course in the chemical science and engineering of materials is focussed on liquids and solids. It begins with a review of thermodynamics and with phase equilibrium in one and two component systems to include thermodynamic table and charts. The Clausius and Clausius-Clapeyron equations are introduced. Raoult's and Henry's Laws are applied to liquid-vapour equilibrium. Phase diagrams for two and more component systems with liquid and solids are studied to include those for steel and other engineering alloys. The fundamentals of crystal structure and crystallography are introduced that include unit cells, and symmetry elements for metals, ionic and covalently bonded materials, which serve as the basis for the study of imperfections in solids that lead to dislocations, point and surface defects that ultimately can lead to materials failure. Diffusion mechanisms are examined based on Fick's First and Second Laws. Ceramics are studied and phase diagrams used for applications to silicates and glasses. The properties and structures of polymers are introduced for thermoplastics, thermosets and elastomers with their engineering applications. Composite materials are examined.

Askeland, The Science and Engineering of Materials

3 - 0 - 3 Credit: 1

CCE240B: Introduction to Biological Sciences (CCF240B: Introduction aux sciences biologiques)

For students of the Second Year taking Chemical Engineering, Honours Chemistry or a Major in Chemistry.
Prerequisite: CCE/F101.

This is an introductory course in general biology that will prepare the students for the upper year courses, CCE/F385, 460 and 485. The basic themes and concepts of modern biology spanning organisational levels from molecules to cells to communities and populations will be covered systematically and in an evolutionary context. Effort will be made to present unifying biological and chemical concepts with examples to encourage student understanding rather than memorisation.

Campbell, Biology Package, 6th Ed.
Starr &Taggart, Unity and Diversity of Life, 10th Ed.

3 – 0 – 3 Credit: 1

CCE301: Fluid Mechanics and Heat Transfer (CCF301: Mécanique des fluides et transfert de chaleur)

For students of the Third Year taking Chemical Engineering. Prerequisite: PHE/F105, MAE/F203 or equivalent.

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 transfer 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 - 0 - 2 (Fall Term)
2 - 0 - 2 (Winter Term) Credit: 2

CCE302B: Molecular Structure and Spectroscopy (CCF302B: Spectroscopie et structure moléculaire)

For students of the Third Year taking Honours Chemistry or a Major in Chemistry. An elective course for students taking other Science programs.

Bonding in molecules, ionic and covalent bonds, valence theory, hybridization, molecular orbitals, simple homo- and hetero nuclear diatomic molecules, polarization, correlation diagrams, delocalization, resonance, the benzene ring. Absorption and emission of radiation in molecules, radiative and non-radiative processes, selection rules, rotational, vibrational and electronic spectroscopy of small molecules, Raman spectroscopy, spectroscopy of large molecules.

3 - 0 - 4 Credit: 1

CCE303A: Energy and Fuels Engineering (CCF303A: Génie de l'énergie et des combustibles)

For students of the Third Year taking Chemical Engineering. Co-Registration : CCE/F311. Prerequisite: CCE/F217A

This course introduces the fundamentals of chemical engineering in the context of the Canadian Forces. Mass and energy balances on single and multiple unit processes involving material separation and reactions are performed. A study is also made of conventional and substitute fuels, their combustion and use by the Canadian Forces. The use of computer-aided process simulation is also introduced.

Felder & Rousseau. Elementary Principles of Chemical Processes (2nd Ed).

3 - 0 - 3 Credit: 1

CCE310A: Chemical Thermodynamics (CCF310A: Thermodynamique chimique)

For students taking Honours Chemistry or a Major in Chemistry.
Prerequisite CCE/F217A.

Review of definitions and terminology; First Law and thermochemistry; Second Law and spontaneity; introduction to statistical thermodynamics; Third Law entropies; Chemical potential and open systems; free energy and chemical equilibria. Applications to ideal gas reactions, nonideal solutions, electrolytes and electrochemical cells.

3 – 0 – 4 Credit: 1

CCE311: Applied Thermodynamics (CCF311: Thermodynamique appliquée)

For students of the Third Year taking Chemical Engineering.

Prerequisite: CCE/F220A.

This course is a continuation and extension of the thermodynamics taught earlier. 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 Pitzer 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 energy 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, reaction coordinate, equilibrium constant; power cycles; refrigeration 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) Credit: 2

CCE317B: Kinetics and Surface Science (CCF317B: Cinétique et sciences des surfaces)

For students of the Third Year taking Chemical Engineering, Honours Chemistry or a Major in Chemistry. An elective course for students taking other Science programs.
Prerequisite: CCE/F101.

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 surfaces 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 Credit: 1

CCE320B: Chemistry Laboratory (CCF320B: Laboratoire de chimie)

For students of the Third year taking Honours Chemistry or a Major in Chemistry . An elective course for students taking other Science programs.
Prerequisite: CCE/F101.

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 Credit: 1

CCE321: Engineering Laboratory (CCF321: Laboratoire de génie)

For students of the Third Year taking Chemical Engineering.
Co-Registration: CCE/F301, CCE/F303A.
Prerequisites: CCE/F101, CSE/F201A, MAE/F209B.

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 illustrate 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
Dietel, Java : How to program (3ème éd)

0 - 3 - 3 (Fall Term)
0 - 4 - 4 (Winter Term) Credit: 2

CCE337B: Seminar
(CCF337B: Séminaire)

For students of the Third Year taking Chemical Engineering or Honours Chemistry.

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 – .5 - 0 (one seminar every second week) Credit: 0

CCE341: Organic Chemistry
(CCF341: Chimie organique)

For students of the Third Year taking Chemical Engineering, Honours Chemistry or a Major in Chemistry. An elective course for students taking other Science programs.
Prerequisite: CCE/F101.

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 characterization 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
Weast, Handbook of Chemistry and Physics

3 - 2 - 5 (Fall Term)
2 - 2 - 4 (Winter Term) Credit: 2

CCE342B: Inorganic Chemistry
(CCF342B: Chimie inorganique)

For chemistry students in Honours and Major Programs. Other students may take the course with permission of the department.
Prerequisite: CCE/F101.

An introduction to inorganic chemistry, including atomic structure; simple bonding theory; symmetry and group theory and molecular orbitals. Acid-base and donor-acceptor chemistry. The crystalline solid state. Chemistry of the main group elements. Coordination chemistry I : structures and isomers; II :bonding; III : electronic spectra; IV : reactions and mechanisms. Organometallic chemistry; organometallic reactions and catalysis; parallels between main group and organometallic chemistry. Bioinorganic and environmental chemistry.

Miessler and Tarr, Inorganic Chemistry, 2nd Ed.

3 – 0 - 3 Credit: 1

CCE345A: Materials Science: Metallurgical Laboratory
(CCF345A: Sciences des matériaux: laboratoire de métallurgie)

For students of the Third Year taking Chemical Engineering or Honours Chemistry.
Prerequisite: CCE/F220A.

A laboratory course designed to illustrate and augment subject matter covered in CCE353A including heat treatment, mechanical testing, casting, metallography, X-ray diffraction, phase diagrams and chemical analysis.

Skoog et West, Fundamentals of Analytical Chemistry
Skoog et West, Principles of Instrumental Analysis

0 - 3 - 3 Credit: 1

CCE353A: Materials Science: Metallurgy
(CCF353A: Sciences des matériaux: Métallurgie)

For students of the Third Year taking Chemical Engineering or Honours Chemistry.
Prerequisite: CCE/F220A.

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 intended 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) Credit: 1

CCE360A: Environmental Sciences: Hazardous Materials (CCF360A: Sciences de l'environnement: matériaux dangereux)

(Not offered every year)

An elective course for students of the Third or Fourth Year taking Arts. A core curriculum course.
Prerequisite: CCE/F106A, or CCE/F200A.

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 Credit: 1

CCE362A: Environmental Sciences: Energy (CCF362A: Sciences de l'environnement: énergie)

(Not offered every year)

An elective course for students of the Third or Fourth Year taking Arts. A core curriculum course.
Prerequisite: CCE/F106A, or CCE/F200A.

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, strategic and economic context. Methods to determine the 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 Credit: 1

CCE364B: Military Chemistry: Munitions and Chemical Defence (CCF364B: Chimie militaire: munitions et protection chimique)

(Not offered every year)

An elective course for students of the Second, Third or Fourth Year taking Arts. A core curriculum course.
Prerequisite: CCE/F106A, or CCE/F200A.

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 Credit: 1

CCE366B: Environmental Sciences: Impact of Technology on the Environment (CCF366B: Sciences de l'environnement: technologie et son impact sur l'environnement)

(Not offered every year)

An elective course for students of the Third or Fourth Year taking Arts. A core curriculum course.
Prerequisite: CCE/F106A, or CCE/F200A.

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 Credit: 1

CCE385B: Biochemistry and Microbiology for Environmental Science and Engineering (CCF385B: Biochimie et microbiologie de l'environnement)

For students of the Third Year taking Chemical Engineering or Honours Chemistry. An elective course for students taking other Science programs.
Prerequisite: CCE/F101, CCE/F240B.

This course involves the basic principles of chemistry, biochemistry and microbiology applied to environmental systems and problems. The fundamentals and principles of biochemistry, including important 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 formulation, 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
Lehninger, Nelson & Cox, Principles of Biochemistsry.

3 - 0 - 3 Credit: 1

CCE401: Nuclear Science and Engineering (CCF401: Sciences et génie nucléaires)

For students of the Fourth Year taking Chemical Engineering. An elective course for students of the Fourth Year taking Honours Science or General Science.
Prerequisites: MAE/F315, CCE/F220A, CCE/F301, CCE/F303A.

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, criticality and steady-state operation, and reactor kinetics and control. The selection and behaviour of materials for nuclear applications are covered. A survey of the nuclear fuel cycle from a chemical engineering perspective, 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) Credit: 1

CCE405: Mass Transfer Operations (CCF405: Opérations de transfert de matière)

For students of the Fourth Year taking Chemical Engineering.
Prerequisites: CCE/F301, CCE/F303A, CCE/F311, CCE/F341.

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 extended from an engineering point of view. Equipment design, performance, and efficiency are examined in both stagewise and continuous contacting. Generalized design equations are derived and applied. Individual separation techniques are studied, with gas absorption and fractional distillation emphasized because of their prime importance in fluid system separations. Other separation techniques, including adsorption, liquid-liquid and solvent extraction, and membrane separations are also covered.

Hines & Maddox. Mass Transfer.
Welty, Wicks & Wilson. Fundamentals of Momentum, Heat and Mass Transfer. (3rd Ed).

2 - 0 - 2 (Fall Term)
2 - 0 - 2 (Winter Term) Credit: 1

CCE407A: Reaction Engineering (CCF407A: Génie des réactions)

For students of the Fourth Year taking Chemical Engineering. An elective course for students taking other Science programs.

Prerequisites: CCE/F301, CCE/F303A, CCE/F311, CCE/F317B, CCE/F341.

This course builds on the material of CCE317B 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 reactors, 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.

Fogler, Elements of Chemical Reaction Engineering

3 - 0 - 3 Credit: 1

CCE409B: Combustion and Explosion Engineering (CCF409B: Génie de la combustion et d'explosion)

Elective for students of the Fourth Year taking Chemical Engineering.

Prerequisites: CCE/F303A, CCE/F311, CCE/F317B.

The study of the physical and chemical processes associated with applied combustion science that include concepts from thermodynamics, chemical kinetics, fluid mechanics, mass transfer and heat transfer. Also studied are pre-mixed and diffusion flames, combustion suppression and combustion pollutants.

An introduction is given to energetic materials, explosions and gun propellants.

Turns, Introduction to Combustion
Cooper, Explosives Engineering

3 - 0 - 3 Credit: 1

CCE413B: Systems Analysis: Modelling and Optimization (CCF413B: Analyse des systèmes: simulation et optimisation)

For students of the Fourth Year taking Chemical Engineering.
Prerequisites: CCE/F301, CCE/F303A, CCE/F407A, MAE/F315.
Co-Registration: CCE/F401, CCE/F405.

The formulation of mathematical models from word statements of engineering problems and digital computer simulation are emphasized in this course. The students are introduced to the methods of computer simulation of engineering systems as used within the industry, for the prediction of the (steady-state) behaviour and performance of various processes and systems of contemporary and future significance to the Canadian Forces. Several modern optimization techniques are studied and applied to solve optimization 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
Edgar, Optimization of Chemical Process
Besset, Object-Oriented Implementation of Numerical Methods
Deitel, Java: How to Program

3 - 0 - 3 Credit: 1

CCE415A: Control Systems and Instrumentation (CCF415A: Systèmes asservis et appareils de mesure)

For students of the Fourth Year taking Chemical Engineering.
Prerequisites: CCE/F301, CCE/F303A, MAE/F315.
Co-Registration: CCE/F401, CCE/F405, CCE/F407A.

This course emphasizes the basic concepts of control system analysis. Topics include: review of the Laplace transforms; transfer functions and responses of open-loop systems; measurement techniques; analysis of linear closed-loop systems including control system, closed-loop transfer functions, transient response and stability; frequency-response methods; direct digital control (DDC) covering the functions of digital computers for control of industrial processes, analysis of sampled data, 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 Credit: 1

CCE417: Design Project (CCF417: Projet de fin d'études)

For students of the Fourth Year taking Chemical 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. When possible, students are encouraged to present their work at student conferences.

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.

R.A. Day, How to Write and Publish a Scientific Paper, ISI Press 1979.

0 - 2 - 2 (Fall Term)
0 - 4 - 4 (Winter Term) Credit: 2

CCE421: Engineering Laboratory (CCF421: Laboratoire de génie)

For students of the Fourth Year taking Chemical Engineering.
Prerequisites: CCE/F301, CCE/F303A, CCE/F321.
Co-Registration: CCE/F405, CCE/F407A.

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 et Green, Chemical Engineer's Handbook (6e éd.)
Gaboury, An Introduction to the International System of Units
Mavrow, Writing in Engineering

0 - 3 - 3 (Fall Term)
0 - 3 - 3 (Both Terms) Credit: 2

CCE425: Materials Engineering: Polymers and Materials Selection (CCF425: Génie des matériaux: polymères et choix des matériaux)

For students of the Fourth Year taking Chemical Engineering. An elective course for students taking other Science programs.

CCE425 I: Polymers

Prerequisites: CCE/F220A, CCE/F341.
Co-Registration: CCE/F407A.

A course in polymer science, technology and engineering, including the chemistry and kinetics of polymerization, polymerization 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.

Charrier, Polymeric Materials and Processing

CCE425 II: Materials Seminar

Prerequisites: CCE/F425 I, GEE/F265A, GEE/F231B.

Groups of students are given part design problems in which they are required to : (I) develop detailed part and material specifications, (ii) select an appropriate material, (iii) chose a processing
technique and (iv) design the process tooling. The design is presented to the class in a seminar format. The intent of the course 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) Credit: 2

CCE427: Corrosion and Electrochemical Power Sources (CCF427: La corrosion et sources d'énergie électrochimique)

For students of the Fourth Year taking Chemical Engineering. An elective course for students taking other Science programs.
Prerequisites: CCE/F220A, CCE/F353A.

The course covers the fundamentals of electrochemistry and considers 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 transfer and mass transport; 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
Roberge, Handbook of Corrosion Engineering
Bagotsky and Skundin, Chemical Power Sources

3 - 0 - 3 (Fall Term)
2 - 0 - 2 (Winter Term) Credit: 2

CCE437B: Seminar (CCF437B: Séminaire)

For students of the Fourth Year taking Chemical Engineering or Honours Chemistry.

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 -.5 - 0 (one seminar every second week) Credit: 0

CCE440: Special Topics (CCF440: Étude de sujets spécialisés)

An elective for students in the Fourth Year taking Honours Chemistry or a Major in Chemistry.

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 Credit: 2

CCE441A: Materials Engineering: Laboratory (CCF441A: Génie des matériaux: laboratoire)

For students of the Fourth Year taking Chemical Engineering or Honours Chemistry . An elective course for students taking other Science programs.
Prerequisite: CCE/F220A.

A laboratory course in which the emphasis is on the use of

instrumental methods for the analysis and characterization of materials.

1 - 3 - 5 Credit: 1

CCE451A : Topics in Physical Chemistry (CCF451A : Sujets choisis en chimie-physique)

For students taking Honours Chemistry or a Major in Chemistry
Prerequisite : CCE/F307A.

Kinetic theory : Maxwell distribution, collison theory, introduction to transport processes; Chemical kinetics : mechanisms, rate laws, temperature dependence, transition state theory; Surface chemistry : physisorption, chemisorption, adsorption isotherms, catalysis, surfactants, colloids, modern experimental methods; Polymers : structures, types, properties, polymerization mechanisms.

3 – 0 – 4 Credit: 1

CCE452: Materials Science: Materials and Physics of the Space Environment (CCF452: 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.
Prerequisite: CCE/F220A.

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) Credit: 1

CCE460A: An Introduction to Metabolism. (CCF460A: Introduction au métabolisme)

For students taking Honours Chemistry or a Major in Chemistry.
Prerequisite:CCE/F101.

This course will study the major metabolic (anabolic and catabolic) pathways in plants and
animals. The course begins by looking at the structure of proteins and the kinetics associated
with their catalytic (enzyme) activity. We will study the chemical reactions within the glycolytic,
citric acid and oxidative phosphorylation pathways and we will investigate how fats, proteins and
polysaccharides enter into (catabolism) and leave (anabolism) these pathways. In addition, we
will study how photosynthetic organisms are able to generate oxygen from water and how they
reduce carbon dioxide to sugar. The course finishes by looking at the relationship between proteins, RNA and DNA.

3 - 0 - 4 Credit: 1

CCE462B: Photochemistry and Photobiology (CCF462B: Photochimie et Photobiologie)

For students taking Honours Chemistry or a Major in Chemistry.
Prerequisite: CCE/F101.

The electromagnetic spectrum, light sources, absorption and emission of radiation, excited states, Jablonski diagram, quantum yield, Beer_s law, energy transfer, photochemical reactions, atmospheric photochemistry, photochromism, photosynthesis, vision, photoimaging, photosensitization, environmental photobiology and photomedicine.

3 – 0 - 3 Credit: 1

CCE485B: Waste Treatment Processes (CCF485B: Traitement des rejets)

An Elective course for students of the Fourth Year taking Chemical Engineering, Honours Science, and General Science.
Prerequisites: CCE/F101.

The objective of this course is to examine the sources, properties, fate and treatment of solid, liquid and gaseous wastes. Water and wastewater treatment, solid waste disposal -including radioactive waste- and air pollution will be investigated. Contaminated site investigation procedures, environmental regulations and guidelines, and site remediation methods will be reviewed as will environmental management systems. A unifying theme will be the fact that environmental engineering problems must be solved using a holistic approach that incorporates the role of ethics in decision making and implements pollution prevention strategies to reduce waste streams. The important of risk communication will be highlighted. Case studies and material from the current technical literature will be used to illustrate key points and applications.

Vesilind et al., 1990 Environmental Pollution & Control
Droste, 1997, Theory and Practice of Water and Wastewater Treatment

3 - 0 - 3 Credit: 1

GRADUATE STUDIES AND RESEARCH

For graduate courses see the Calendar of the Graduate Studies and Research Division.

CHEMICAL ENGINEERING

The Chemical Engineering program has a strong Materials Engineering component. Nuclear and Environmental Engineering are also included to reflect the spectrum of chemical engineering interests of value to the Canadian Forces and the Department of National Defence. In addition to the basic chemical engineering core, the program emphasises the areas of corrosion, fuel cells, batteries, alloys, polymers, ceramics, composite development, explosives. combustion processes, nuclear energy applications and environmental stewardship. All these areas highlight the unique nature of the Chemical Engineering Degree at RMC

The Chemical Engineering degree programme is headed by a Professor-in-Charge, who reports to the Dean of Engineering through the Head of Department. The programme is administered by the Chemical Engineering Committee, of which the Professor-in-Charge is Chair.

CHEMICAL ENGINEERING COMMITTEE

CHAIR - B.J. Lewis, BSc, MEng, PhD, PEng, Professor & Professor-in-Charge, Chemical Engineering.

MEMBERS - J.C.Amphlett, BSc, PhD., Professor and Head of Department of Chemistry and Chemical Engineering.

W.S. Andrews, CD, rmc, BEng, MEng, PhD, PEng, Associate Professor.

P.J. Bates, BSc, MSc, PhD, PEng, Professor.

L.G.I. Bennett, CD, rmc, BEng, MASc, PhD, PEng, Professor.

K.A.M. Creber, BSc, MSc, PhD, Professor.

W.T. Thompson, BASc, MASc, PhD, PEng, Professor.

R.D. Weir, CD, BSc, DIC, PhD, FCIC, CChem, FRSC, PEng, Professor.

The Chemical Engineering Committee is responsible to the Dean of Engineering for the curriculum of the Chemical Engineering programme, for its engineering accreditation, and for representing and protecting the interests of the students enrolled in the programme. It reports, through the Head of Department, to the Dean of Engineering.

ACCREDITATION

The baccalaureate degree programme in Chemical 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 Engineering is set out in the tables under "Course Outlines" as follows:

First Year	**Table 2**
Second Year	**Table 6**
Third Year	**Table 11**
Fourth Year	**Table 19**

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 CCE 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.
Professor Emeritus - D.W. Kirk, CD, ndc, BSc, MSc, PhD, PEng.
Professor and Head of the Department - J.H.P. Quenneville, rmc, BEng, MEng, PhD, PEng.
Professor and Dean of Engineering - J.A. Stewart, CD, rmc, BEng, MASc, PhD, PEng.
Professor - G. Akhras, DipIng, MScA, PhD, PEng, FCSCE, FASCE, FEIC
Professor - R.J. Bathurst, BSc, MSc, PhD, PEng, FEIC.
Professor - A.N.S. Beaty, BSc, PhD, CEng, FICE, FASCE, PEng.
Professor (Adjunct) - R.P. Chapuis, BEng, DEA, DScA, PEng, FEIC.
Professor - M.A. Erki, BASc, MASc, PhD, PEng, FIIFC, FIABSE.
Associate Professor (Adjunct) - M. Green, BSc, PhD, PEng.
Associate Professor (Adjunct) - C.W. Greer, BSc, PhD.
Associate Professor (Adjunct) - R. Tanovic, BSc, MSc, PhD, PEng.
Associate Professor (Adjunct) - S. Tighe, BSc, MASc, PhD, PEng.
Assistant Professor - D. Chenaf, BEng, MScA, PhD.
Assistant Professor - J.A. Héroux, BEng, MIng, PEng.
Assistant Professor - P. Lamarche, BASc, MASc, PhD, PEng.
Assistant Professor - M. Tétreault, BIng, MScA, PhD, PEng.
Assistant Professor - Major R.G. Wight, CD, rmc, BEng, MEng, PhD.
Assistant Professor - Captain U.V. Honorio, CD, BSc, MASc.
Lecturer - Captain J.L. Hopkins, BEng, MEng, PEng.
Lecturer – Captain J.W. Reeves, CD, BSc Eng, MASc.
Technical Officer - D.A. Young, CET.
Research Associate - K. Hatami, BSc, MSc, PhD, PEng.
Research Associate – L. Bizindavyi, BSc, MSc, PhD.
Research Associate - C. Shyu, BSc, MEng, PEng.

ACCREDITATION

The baccalaureate degree programme in Civil Engineering is accre-dited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers.

COURSES OF STUDY

The prescribed course of study for students taking Civil Engineering is set out in the tables under "Course Outlines" as follows:

First Year	**Table 2**
Second Year	**Table 6**
Third Year	**Table 12**
Fourth Year	**Table 20**

Student should review the course descriptions to verify if they have the required prerequisites to enrol in a given course. Students must have the required prerequisites or the approbation of the department.

LABORATORIES AND EQUIPMENT

The laboratory experiments and exercises are designed to provide the students with practical experience in handling field, office and laboratory equipment used in the civil engineering profession.

The teaching laboratories provide equipment to permit groups of three or four students to conduct experiments in structural engineering, soil mechanics, pavement materials, asphalt technology, hydrology, water supply, wastewater treatment, and environmental 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 tester, 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 environment-controlled rooms.

GEOTECHNICAL ENGINEERING

Soil testing drive rods and sampling spoons; Atterberg limit testing devices; sieves, hydrometers, and specific gravity apparatus; standard and modified Proctor compaction apparatus; Harvard miniature compaction apparatus; CBR equipment; consolidometers; unconfined, direct shear and triaxial test apparatus; seismic refraction surveying apparatus; computerized electronic data acquisition systems; temperature & humidity controlled chamber; rigid and flexible wall permeaters; pressure plate and pressure membrane extractors; 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-resistance 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 controlled rooms; atomic absorption spectrophotometer with flame and furnace for trace metals analysis; TOC analyser; two ion chromatographs; three 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 water 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.

GEOMATICS

Real-time and post-analytical differential GPS receiver equipment; total station, electronic and optical surveying 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; plane stress; combined loading.

Laboratory exercises include: tension, torsion, and bending tests.

2-2-4 Credit: 1

Prerequisites: PHE/F103, PHE/F205A.

GEE235B: Introduction to Earth Sciences (IGF235B: Introduction aux sciences de la terre)

For students of the Second Year taking Civil 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.

3-2-5 Credit: 1

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; bar and beam equations; various beam equations and analysis of beam-columns; nomographs; introduction to plasticity; yield criteria.

3-2-5 Credit: 1

Prerequisite: GEE/IGF231B

CEE305B: Structural Theory (GCF305B: Théorie des structures)

For students of the Third Year taking Civil Engineering.

Loads according to the National Building Code of Canada, structural systems and load transfer, superposition principle; work and energy; virtual work, unit load method, method of consistent deformation; influence lines; slope deflection method and matrix approach; and approximate methods for lateral and gravity loads.

3-2-5 Credit: 1

Prerequisites: CEE/GCF303A, CEE/GCF317A

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.

Steel design is introduced by topics such as limit state design; types and properties of steel construction; design of tension members, beams, compression members, 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 Credit: 1

Prerequisite: CEE/GCF303A
Co-Registration: CEE/GCF305B

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 programming and in the application of the computer to Civil Engineering problems. A significant proportion of the course will entail computer use.

2-2-4 Credit: 1

Prerequisites: MAE/F203, MAE/F229A, MAE/F209

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 Credit: 0.5

Prerequisite: CEE/GCF317A

CEE 343A Hydrology (GCF 343A Hydrologie)

For students of the Third Year taking Civil Engineering.

Introduction to the hydrologic cycle. Study of rainfall- runoff relationship. Presentation of the unit hydrograph theory. Application of statistics in hydrology. Study of hydrologic and hydraulic routing techniques. Review of the principles of fluid mechanics. Presentation of ground water flow equations. Presentation of the principles of drinking water and wastewater flow rates estimation. Introduction to storm water management, and to urban flow simulation models.

At the end of the course, the student should be able to calculate and predict the flow rate that can be expected at specific locations of a watershed for given hydrologic conditions.

2-1-3 Credit: 1

Prerequisite: MAE/F203
Co-Registration: MEE/GMF315A

CEE355A: Soil Mechanics (GCF355A: 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.

3-2-5 Credit: 1

Prerequisites: GEE/IGF235B, GEE/IGF231B

CEE 360A: Geomatics I (GCF 360A: Géomatique I)

For students of the Third Year taking Civil Engineering.

In this first geomatics course, topics include: surveying principles, error analysis, instrument checks and calibrations, measurements, trigonometric calculations, projections, coordinate systems, detail surveys, route construction surveys, and project planning. Equipment includes levels, theodolites, total stations, and GPS (Global Positioning System) receivers.

Upon completion of this course, students can plan and carry out surveying work for civil engineering projects.

2-2-4 Credit: 1

CEE 362B: Geomatics II (GCF 362B: Géomatique II)

For students of the Third Year taking Civil Engineering.

In this second geomatics course the emphasis is on the study of the mapping sciences and least squares analysis. Topics include: geographic information systems, remote sensing, photogrammetry, cartography and the adjustment of survey observations.

Upon completion of this course, students can analyse survey network computations and use mapping science tools to support civil engineering projects.

2-2-4 Credit: 1

Prerequisites: CEE/GCF360A, CEE/GCF317A

CEE363B: Survey Field School (GCF363B: Camp d'arpentage)

For students of the Third Year taking Civil Engineering.

During this course, students plan and conduct simple horizontal and vertical control networks for the production of detail and construction surveys. Activities include: laying out circular, spiral and vertical curves; calculating earthwork volumes (cut/fill); producing topographic maps; and collecting data for input to a geographic information system.

Upon completion of this course, students can plan and carry out geomatics projects to meet civil engineering needs. These abilities will be put to immediate use during the third year civil engineering project following this course.

Two weeks duration, following Winter Term examinations

Credit: 1

Prerequisite: CEE/GCF362B

CEE385A: Introduction to Environmental Engineering (GCF385A: Introduction au génie de l'environnement)

For students of the Third Year taking Civil Engineering.

Presentation of water quality parameters. Description of typical water and wastewater treatment plants. Presentation of dissolved oxygen sag curve. Introduction to soil degradation processes. Discussion of solid and hazardous wastes treatment and disposal options. Introduction to site environmental assessment. Study of environmental impact assessment methodologies. Discussion of air quality parameters. Description of typical air treatment units.

At the end of the course, the student should be able to identify water and air quality parameters, and select appropriate treatment or disposal options for air, water, or soil pollutants.

3-1-4 Credit: 1

Prerequisites: CCE/F101, MAE/F203

CEE387B: Highway Design (GCF387B: Routes)

For students of the third Year taking 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.

Geometric design of roads and intersections.

3-2-5 Credit: 1

Prerequisites: CEE/GCF317A, CEE/GCF343A, CEE/GCF355A

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 stress and development of reinforcement.

Laboratory exercises include: mixing, admixtures, curing, aggregate tests, strength tests for concrete; fabrication and testing of a reinforced concrete beam.

2-2-4 Credit: 1

Prerequisite: CEE/GCF303A

CEE405A: Structural Analysis (GCF405A: Analyse des structures)

For students of the Fourth Year taking Civil Engineering.

Stiffness method: plane and space trusses; beams; plane and space frames; grids.

Finite element method: beams and trusses; triangular and quadrilateral elements for plane stress and plane strain.

Application of in-house and commercial structural analysis programs.

3-2-5 Credit: 1

Prerequisites: CEE/GCF305B, CEE/GCF319

CEE415B: Reinforced Concrete Design (GCF415B: Dimensionnement des structures en béton armé)

For students of the Fourth Year taking Civil Engineering.

Topics include: Shear design of reinforced concrete beams. Analysis of loads, wind and earthquake effects, continuity in structures, continuous beams and girders; design of one-way and two-way slabs; columns, footings; deflection and cracking of reinforced concrete members.

A major assignment will be an integrated complete design of a 10-storey office building.

3-2-5 Credit: 1

Prerequisites: CEE/GCF403A, CEE/GCF405A

CEE417A: Steel Design (GCF417A: Construction en acier)

For students of the Fourth Year taking Civil Engineering.

Topics include: connections; plate girders, composite structures, seismic design, multi-storey buildings, steel bridges, and P-Delta effects in steel structures. Term projects include : design of bridges, industrial buildings and task structures.

3-1-4 Credit: 1

Prerequisite: CEE/GCF311B
Co-Registration: CEE/GCF405A

CEE 443A Urban Hydraulics (GCF 443A Hydraulique urbaine)

For students of the Fourth Year taking Civil Engineering.

Review of principles of fluid mechanics, and of flow rates estimation. Study of flow in pressure conduits. Presentation

of urban water supply and distribution systems design techniques. Study of open channel flow. Presentation of sewage and storm water collection systems design techniques.

At the end of the course, the student should be able to calculate the conduit or channel dimension required to carry a given flow rate under specified conditions.
2-1-3 Credit: 1

Prerequisite: CEE/GCF343A

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 interaction.

Earth pressure theories; analysis and design of rigid, flexible and braced retaining structures.

Slope stability; analysis and design of cuttings and embankments, performance of natural slopes.

Construction methods. Site investigation.

4-2-6 Credit: 1.5

Prerequisites: CEE/GCF355A, CEE/GCF319B

CEE485B: Sanitary and Environmental Engineering (GCF485B: Techniques sanitaires et de l'environnement)

For students of the Fourth Year taking Civil Engineering.

Review of relevant chemistry (basic, acid-base, organic) and biochemistry notions. Study of the ways to measure organic matter in water and wastewater. Presentation of relevant microbiology notions. Analysis of common reactor configurations and reaction rate equations. Study (including numerical analysis and design) of physico-chemical treatment processes (screening and sedimentation, aeration, coagulation and flocculation, filtration, disinfection) and of biological treatment processes (aerobic treatment, biological reactor design). Introduction to anaerobic treatment processes.

At the end of the course, the student should be able to design the main components of a water and of a wastewater treatment plant, and identify key design parameters and design issues.

4-2-6 Credit: 1.5

Prerequisite: CEE/GCF385A

CEE489A: Transportation Planning (GCF489A: Transports et planification)

For students of the Fourth Year taking Civil Engineering.

Characteristics of different modes of transport. The land use/urban transportation planning process. Transportation studies, data collection and analysis, demand models, forecasts. Traffic flow and capacity, level of service and freeway operations.

3-2-5 Credit: 1

Prerequisite: CEE/GCF319B

CEE493: Civil Engineering Project (GCF493: Projet de génie civil)

For students of the Fourth Year taking Civil Engineering.

This course consists of practical projects undertaken by Fourth Year Civil Engineering students. Project topics are selected from proposals submitted by the Department of National Defence and are subject to the approval of the Department of Civil Engineering. The course consists of practical civil engineering fieldwork to be conducted after the Third Year, and an engineering design to be completed during the Fourth Year. Students are required to make oral presentations at the end of each term during the Fourth Year. An engineering report will be submitted at the end of the course.

Fieldwork: 0-4-4 Credit: 2
Fall: 1-2-3
Winter: 1-3-4

Co-requisites: Appropriate 4th year courses.

Co-Registration: Appropriate 4th year courses. Topic depend on department approval.

GRADUATE STUDIES AND RESEARCH

For graduate courses see the Calendar of the Graduate Studies and Research Division.

DEPARTMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Professor Emeritus - J.D. Wilson, BSc, PhD, PEng
Professor and Head of the Department - C.N. Rozon, BSc, MSc, PhD, PEng
Professor - D. Al-Khalili, BSc, MSc, PhD, PEng
Professor - P.E. Allard, BSc, BASc, MSc, PhD, FEIC, PEng
Professor - Y.M.M. Antar, BSc, MSc, PhD
Professor (Adjunct) - Y.T. Chan, BSc, MSc, PhD, PEng
Professor - M. Farooq, BScEng, MTech, PhD, PEng.
Professor (Adjunct) - J. Plant, OMM, CD, mde, Phd(MIT), FEIC, FIEEE, PEng
Professor - G.E. Séguin, BScA, MScA, PhD
Professor - C.D. Shepard, BSc, MA, PhD, PEng
Associate Professor - S. Amari. DES, MSEE, PhD
Associate Professor - D.Bouchard, CD, rmc, BEng, MEng, PhD, PEng
Associate Professor - F. Chan, BEng, MScA, PhD
Associate Professor - G. Drolet, BSc, MSc, PhD, Peng
Associate Professor - M.H. Rahman, BSc, MSc, PhD, Peng
Associate Professor (Adjunct) – C.W. Trueman, BEng, MEng, PhD
Assistant Professor – J. Bray, BASc, MASc, PhD
Assistant Professor – N. Chabini, BSc, MSc, PhD
Assistant Professor (Adjunct) – T. Dean, BSc, MSc, PhD
Assistant Professor – Captain D. De Planché, BSc, Meng
Assistant Professor - Captain S. Drouin, CD,rmc, BSc, MASc
Assistant Professor - M. Hefnawi, BSc, MSc, PhD
Assistant Professor (Adjunct) – R. Inkol, BSc, MASc
Assistant Professor (Adjunct) – S. Knap
Assistant Professor - G.S. Knight, CD, rmc, BEng, MEng, PhD, PEng
Assistant Professor - LCdr J.M.P. Langlois, CD, rmc, BEng, MEng, PhD, PEng
Assistant Professor - D. McGaughey, BSc, MSc, PEng, PhD
Assistant Professor (Adjunct) – G.A. Morin
Assistant Professor - A.M. Noureldin, BSc, MSc, PhD
Assistant Professor – W.G. Phillips, CD, rmc, BEng, MEng, PEng
Assistant Professor - Captain G.M.M. Quintin, CD, BEng, MEng
Assistant Professor - Major R. Smith, CD, rmc, BEng, MSc
Assistant Professor - M. Tarbouchi, BSc, MSc, PhD
Assistant Professor - Major (Retired) C.M. Wortley, CD, BEng, MEng, PEng
Lecturer - Captain J. Dunfield, CD, rmc, BEng
Lecturer – Captain M.W.P. LeSauvage, BEng, MASc
Lecturer – Major J.W. Paul, BSc
Technical Officer - P. Adam
Research Associate - M. A. Hanna, BSc, MSc, PhD
Research Assistant - B. Ghosh, B.E., M.Tech, PhD
Research Assistant - H.F. Hammad, BSc, MSc, PhD
Research Assistant - H. Lee, BEng
Research Assistant – Q. Rahman, BSc, MSc, PhD
Research Assistant – J. Serdula
Research Assistant – A. Sommer
Research Assistant - H. Sun, BSc, MSc, PhD
Research Assistant – O.Tal
Research Assistant - J. Xue, BE, ME

ACCREDITATION

The baccalaureate degree programmes in Electrical Engineering and Computer Engineering are accredited by the Canadian Engineering Accreditation Board of the Canadian Council of Professional Engineers.

ELECTRICAL ENGINEERING – COURSE OF STUDY

The prescribed course of study for students taking Electrical Engineering is set out in the tables under Course Outlines as follows:

First Year	**Table 2**
Second Year	**Table 6**
Third Year	**Table 14**
Fourth Year	**Table 22**

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 course of study for students taking Computer Engineering is set out in the tables under "Course Outlines" as follows:

First Year	**Table 2**
Second Year	**Table 6**
Third Year	**Table 13**
Fourth Year	**Table 21**

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 l5).

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, microcomputers, computer networks and operating systems, 3-D graphics, VLSI system 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 all students of the Second Year Engineering except those in Civil Engineering.

This course introduces the students to the basic techniques of circuit analysis. Circuit elements and their volt-ampere relationship as phasors at steady-state. Circuit analysis techniques using nodes and meshes. Steady-state single phase and three-phase circuits. Single phase transformers. Introduction to DC and AC machines.

3 - 2 - 6 Credit: 1

EEE301B: Applied Electromagnetics (GEF301B: Electromagnétisme appliqué)

For students of the Third Year taking Electrical Engineering.

Students completing this course will be capable to apply the laws of electromagnetism to simple practical problems. It provides the basis for the program's microwave and antenna courses. 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 Credit: 1

EEE307B: Computer Interfacing Techniques (GEF307B: Techniques d'interface)

For students of the Third Year taking Computer or Electrical Engineering.

After completing this course, students will be capable to design simple interfaces to modern microcomputers. 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 Credit: 1

EEE311B: Signals and Systems (GEF311B: Signaux et Systèmes)

For students of the Third Year taking Electrical Engineering.

At the end of this course, the student will be able to apply the basics of communications theory and the mathematical tools to simple analog and digital communications problems. Fourier analysis of signals, linear systems and filters, sampling theory, probability theory, random variables and random processes.

3 - 2 - 5 Credit: 1

EEE321B: Object-Oriented Techniques (GEF321B: Techniques de logiciel orienté objets)

For students of the Third Year taking Computer Engineering.

At the end of this course, the student will be able to apply the techniques of Object-Oriented Analysis (OOA) and Design (OOD). The course material covers managing complexity, using data and procedural abstraction, encapsulation, hierarchies, and decomposition of problems into classes and

objects. The concepts of overloading, multiple inheritance and polymorphism are introduced. The analysis, design and implementation phases of software development are considered in the context of an iterative, use case driven object-oriented development methodology. Design patterns are introduced as context for higher-level reuse. Lecture material and course assignments will provide an introduction to the Unified Modelling Language (UML). Java will be used as an implementation language to illustrate object-oriented concepts.

3 - 2 - 5 Credit: 1

EEE331A: Energy Conversion (GEF331A: Électrotechnique I)

For students of the Third Year taking Electrical Engineering.

The objective of this course is to provide the student with a basic understanding of the operation of electromechanical devices and a realistic expectation of their performance. 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 Credit: 1

EEE341B: Electronic Devices and Circuits (GEF341B: Dispositifs et circuits électroniques)

For students of the Third Year taking Electrical or Computer Engineering.

At the end of this course the student will be able to analyze and design simple electronic circuits. Description and operation of electronic components: diodes, bipolar and field effect transistors. Diode circuits and applications. Single stage amplifier: biasing, small signal models, configurations, analysis and design of amplifier circuits. Low frequency response of single stage amplifiers. Binary logic circuits.

3 - 2 - 5 Credit: 1

EEE343A: Basic Network Analysis (GEF343A: Analyse des circuits: Concepts fondamentaux)

For students of the Third Year taking Electrical Engineering or Computer Engineering.

At the end of this course, the student will be able to apply the laws of circuit analysis to practical electronics or power systems problems. 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 Credit: 1

EEE345A: Logic Design (GEF345A: Conception de circuits logiques)

For students of the Third Year taking Electrical or Computer Engineering.

Students completing this course will be able to analyze and design simple digital circuits. Review of number systems and introduction to digital codes. Basic combinational logic topics: Boolean Algebra, SSI logic gates, minimization techniques, and mixed logic theory. Detailed discussion of MSI logic functions: decoders, multiplexers, comparators and arithmetic logic units. Sequential logic and digital memory: latches, flip-flops and registers. Classical and Algorithmic State Machine design procedures for, and problems with synchronous, sequential machines. Introduction to hardware construction and computer aided simulation tools.

3 - 2 - 5 Credit: 1

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 objective of this course is for the student to learn a modern assembly language and be able to program in that language. The microprocessor as a system building block;

introduction to architecture. Microcomputer buses, address decoding, memory devices, simple input/output. Introduction to programming: instruction sets, addressing modes, assembly and machine-language programming, interrupts and vectors. Interfacing with peripherals: parallel and serial interface adapters, interrupt requests and handshakes.

3 - 2 - 5 Credit: 1

EEE361B: Digital Design and HDL Modelling (GEF361B: Conception de circuits numériques et modélisation HDL)

For Third Year students taking Computer Engineering.

Students, after taking this course, will understand the process of designing digital systems and be able to use modern digital design tools to plan, develop and implement complex digital systems. Review of the analysis and design of synchronous sequential circuits : Moore networks, Mealy networks. Controller design using the Algorithmic State Machine approach (ASM): ASM chart notation; Standard methods for ASM implementation: multiplexer method, one-hot method, ROM method. Introduction to a hardware description language: VHDL. Presentation of the various VHDL constructs and their usage. Simulation of VHDL circuit descriptions. Register Transfer Logic (RTL): introduction of a simple language to describe register transfers; hardware implementation of RTL statements; Application to the design of a simple computer.

Microsequencers and microcontrollers. Implementation of control algorithms using microsequencers: modification to ASM charts, microprogramming. Review of modern microcontrollers. Introduction to programmable logic: description of PLAs, PALs, CPLDs, FPGAs. Introduction to software tools for design with programmable logic.

3 - 2 - 5 Credit: 1

EEE403A: Electronic Circuits (GEF403A: Circuits électroniques)

For students of the Fourth Year taking Electrical or Computer Engineering.

Students are provided with an understanding of the principle of operations of analog circuits of medium complexity that are used as building blocks in larger circuits. 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 Credit: 1

EEE407A: Control Systems I (GEF407A: Asservissements I)

For students of the Fourth Year taking Electrical Engineering.

Students will know and understand the theoretical foundations of control systems. 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 sampled-data systems.

3 - 2 - 5 Credit: 1

EEE409B: Electronic Circuits for Communication (GEF409B: Circuits électroniques de communication)

An elective course for students of the Fourth Year taking Electrical Engineering.

At the end of this course, the students will be able to solve technical problems linked with complex high-speed analog circuits. 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 Credit: 1

EEE411A: Communication Theory (GEF411A: Théorie de communication)

For students of the Fourth Year taking Electrical Engineering.

The aim of this course is to provide the student with knowledge and understanding of the basics of communication theory. 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 Credit: 1

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 Credit: 1

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 Credit: 1

EEE429A: Electric Machines and Power (GEF429A: 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 Credit: 1

EEE431B: DSP Hardware (GEF431B: Traitement numérique des signaux)

For Fourth Year Computer Hardware Stream and elective for Electrical Engineering.

Introduction to digital signal processing; sampling: Nyquist rate, sample and hold, D/A and A/D, delta modulation; digital signal processors; DSP hardware: multipliers and barrel shifters; hardware architectures; digital filters design and implementation: FIR and IIR; FFT algorithm and software implementations; multiprocessor systems.
This course consists of lectures, demonstrations, exercises and laboratories.

Prerequisite: EEE351A Computer Organization and Assembly Language, EEE461A Digital Communications or EEE411A Communication Theory.

3 - 2 - 5 Credit: 1

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 Credit: 1

EEE435A: Principles of Operating Systems (GEF435A: Principes des systèmes d'exploitation)

For students of the Fourth Year taking Computer Engineering.
Introduction to the C language, concurrent processes, interprocess communication, deadlock, scheduling, input/output, file systems, file servers, memory management, virtual storage management.

3 - 2 - 5 Credit: 1

EEE441B: Microwave Circuits, Devices and Systems (GEF441B: Circuits, dispositifs et systèmes à micro-ondes)

An elective for students of the Fourth Year taking Electrical Engineering.

Prerequisite: EEE417A Electromagnetic Propagation and Radiation 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.

3 - 2 - 5 Credit: 1

EEE445B: Power Distribution Systems (GEF445B: Distribution de l'énergie)

An elective for students of the Fourth Year taking Electrical Engineering.

Prerequisite: EEE429A: Electric Machines and Power Analysis of steady-state and transient stability of interconnected machines and transmission 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 and transmission. Economic operation of power systems.

3 - 2 - 5 Credit: 1

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, quantization; actuators. Implementation of representative microprocessor-based closed-loop systems selected from the areas of motor drives and robotics. Software implementation of robot control systems. Types of robot arms. Path control and obstacle avoidance methods. Single processor and multi-processor distributed systems.

3 - 2 - 5 Credit: 1

EEE449B: Power Electronics (GEF449B: Électronique de puissance)

An elective for students of the Fourth Year taking Electrical Engineering.
Prerequisite: EEE331A: Energy Conversion

Characteristics of power semiconductor devices. Switching circuits; rectifiers, voltage controllers, converters, inverters and cycloconverters. Polyphase circuits, harmonics and modulation. Applications to control of DC machine, synchronous and induction motors. Energy conversion.

3 - 2 - 5 Credit: 1

EEE453A: Digital VLSI Design (GEF453A: Conception de circuits numériques intégrés à très grande echelle)

An elective for students of the Fourth Year taking Computer or Electrical Engineering.

IC technologies overview; MOS transistor: structure, operation, modelling; NMOS inverters: d.c. analysis and comparative analysis; CMOS inverter: d.c. and transient analysis, power dissipation; IC lithography and fabrication steps; layout and layout verification; Digital CMOS circuits: analysis and layout of combinational and sequential circuits; dynamic CMOS; I/O structures.

3 - 2 - 5 Credit: 1

EEE455: Electrical Engineering Design Project (GEF455: Projet de génie électrique)

For students of the Fourth Year taking Electrical Engineering.

The design project allows the student to demonstrate that he is capable of applying the skills and techniques he has learned in program courses to deliver a working product. Under the supervision of a faculty member, groups of 2-4 students design and construct a prototype system to satisfy selected criteria against which its actual performance is evaluated. Oral progress reports are required along with a written final report and formal examination by a board of staff members.

0 - 1 - 1 (Fall Term)
0 - 4 - 4 (Winter Term) Credit: 2

EEE457: Computer Engineering Design Project (GEF457: Projet de génie informatique)

For students of the Fourth Year taking Computer Engineering.

See EEE455. Emphasis will be placed on software specification, documentation and management techniques.

0 - 1 - 1 (Fall Term)
0 - 4 - 4 (Winter Term) Credit: 2

EEE461A: Digital Communications for Computer Engineers (GEF461A: Communications numériques pour ingénieurs en informatique)

For students of the Fourth Year taking Computer Engineering.

The aim of this course is to provide the student with knowledge and understanding of the basics of digital communication theory. 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; transmission media characteristics; basic probability theory and coding theory.

3 - 2 - 5 Credit: 1

EEE465A: Software Architecture and Distributed Applications (GEF465A: Architecture de Logiciel et applications distribuées)

An elective course for students of the Fourth Year taking Computer Engineering.

At the end of this course,a student should have enough understanding of software architectures to be able to select an architecture for a specific application. Software architectural style. Generation and choice of architectural alternatives for a problem. Specialization of architectures for families of applications. Distribution architectures; high and low level abstractions for distribution. Implementation of distributed systems. Tool support. Analysis, selection and design of distribution strategies.

3 - 2 - 5 Credit: 1

EEE469A: Computer Organization (GEF469A: L'architecture des ordinateurs)

For students of the Fourth Year taking Computer Engineering.

A course to familiarize the student with some aspects of computer hardware. Topic include: computer design methodology, processor and control design, memory and system organization. Input/ Output.

3 - 2 - 5 Credit: 1

EEE473B: Computer Communications (GEF473B: Télématique)

For students of the Fourth Year taking Computer Engineering. An elective course for students of the Fourth Year taking Electrical Engineering.

Review of computer-communication techniques and networks; circuit 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 Credit: 1

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 Credit: 1

EEE491B: Software Work Products and Maintenance (GEF491B: Produits de développement et maintenance du logiciel)

An elective for students of the Fourth Year taking Computer Engineering.

The software engineering problem: programming in the large vs. programming 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, program specifications, implementation, test plan, testing. Object-oriented analysis, design and implementation. Language support for modules. Modules as finite state machines. Debugging vs. inspection.

3 - 2 - 5 Credit: 1

EEE493A: Software Process and Quality (GEF493A: Processus et qualité du logiciel)

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. Trustworthy vs. reliable software. Tools that support software development.

3 - 2 - 5 Credit: 1

EEE495B: Digital Systems Architecture (GEF495B: Architecture des systèmes numériques)

For students of the Fourth Year taking Computer Engineering with hardware specialization.

Hardware components and technologies; digital systems design methodology; ASIC design methodology; synchronous systems: static timing analysis, performance analysis, synchronization and synchronization failures; clocked static and dynamic circuits; asynchronous circuits; arithmetic algorithms: architectural trade-offs and silicon realization; regular array architectures: PLA architectures and PLA generation for ICs, MOS memory architectures: RAM, DRAM, ROM and CAM.

Students will learn to design digital systems or components of digital systems including physical realization using CAE tools.

Prerequisite: EEE345A Logic Design, EEE453 VLSI Design

3 - 2 - 5 Credit: 1

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 programming languages. Fault tolerance, critical races, deadlock and livelock. Host target development. Distributed systems.

3 - 2 - 5 Credit: 1

DEPARTMENT OF MECHANICAL ENGINEERING

Professor Emeritus - P. Bussières, CD, rmc, BEng, MEng, PhD, PEng
Professor Emeritus - W.C. Moffatt, rmc, ndc, BSc, BSc, MSc, ScD, PEng
Professor Emeritus - J.G. Pike, rmc, BSc, MSc, PhD
Professor and Dean of the Division of Continuing Studies - M.F. Bardon, rmc, BEng, MEng, PhD, PEng
Head of Department and Program Director of the Division of Continuing Studies - Colonel (Retired) J.G. Lindsay, OMM, CD, rmc, plsc, qtc, pcsc, ltsc, BEng
Professor - S.H. Benabdallah, BEng, MScA, PhD, PEng
Professor (Adjunct) - R.J. Boness, DipAM, BSc, MEng, PhD, CEng, MIMechE
Professor - D.L. DuQuesnay, BASc, MASc, PhD, PEng
Professor (Adjunct) - W.E. Eder, Ing, MSc, PEng
Professor (Adjunct) - E.J. Fjarlie, BASc, MASc, PhD, PEng
Associate Professor - A. Benaïssa, BSc, MSc, PhD, PEng
Associate Professor - I.E. Boros, Dipl Ing, MASc, PhD, PEng
Associate Professor (Adjunct) - G. Ciccarelli, PEng, MEng, PhD
Associate Professor (Adjunct) - E.M. Croitoro, MASc, MSc, PhD
Associate Professor - D.R. Hamilton, CD, rmc, BEng, BS, MSME, PhD, PEng
Assistant Professor - Major W.D.E. Allan, CD, rmc, BEng, MASc, DPhil, oxon, QFTE
Assistant Professor (Adjunct) - M.S. Guellouz, BASc, MASc, PhD
Assistant Professor - Major P.J. Heffernan, CD, rmc, plsc, BEng, MASc, PhD, PEng
Assistant Professor - M. LaViolette, BScA, PhD
Associate Professor - D.C.M. Poirel, CD, rmc, BEng, MEng, PhD, PEng
Assistant Professor - Captain G.E. Werner, CD, rmc, BEng, MSc, Peng
Assistant Professor - Captain R.W. Tucker, CD, rmc, BEng, MEng
Lecturer - Captain R.R.J. Cyr, CD, rmc, BEng, MASc, PEng.
Lecturer - Lieutenant (N) R.K. Jonkers, CD, rmc, BEng, MASc, PEng
Research Associate - N. Cai, BEng, MEng, PhD
Research Associate - P.R. Underhill, BSc, PhD
Research Associate - J. Wei, BSc, MSc, PhD
Research Engineer - D. Li, BEng
Research Engineer - G. Pucher, BASc, PEng
Research Engineer - G. Wang, BE, ME
Senior Researcher - R. Vaivads, MET
Research Assistant - D. Fisher, BA

ACCREDITATION

The baccalaureate degree programme in Mechanical Engineering is accredited by the Canadian Engineering Accreditation 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 6
Third Year	Table 15
Fourth Year	Table 23

LABORATORIES AND EQUIPMENT

The department has a number of modern, well-equipped laboratories that permit students to supplement their theoretical knowledge with practical experience. These include major installations for the study of Heat Engines, Fluid Dynamics, Materials Science, Computer-Aided Drawing, Computer-Aided Design and Manufacture, Dynamics, Electro Optics, Control Systems 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 combustion processes, turbo machinery, aerodynamics, fluid mechanics, aeroelasticity, structural dynamics, reciprocating engine performance, alternative fuels, composite materials, fatigue and fracture mechanics, tribology, structures, robotics, laser anemometry and electro-optics.

COURSE DESCRIPTIONS

GEE265A: Engineering Graphics I (IGF265A: Sciences graphiques I)

For students of the Second Year taking Engineering.

Prerequisite: None

The course introduces the students to the use of engineering graphics in the engineering design process. Graphical communication and visualization are emphasized by both paper sketching and computer-aided methods. The student is introduced to computer-aided drafting and design techniques using SolidWorks 3D CAD software. Topics studied are sketching, applied geometry, solid modelling, multi-view and pictorial projection, sectional views, auxiliary views and dimensioning.

Giesecke et al., Technical Drawing

1 - 2 – 3 Credit: 1

GEE267B: Engineering Graphics II (IGF267B: Sciences graphiques II)

For students of the Second Year taking Mechanical and Civil Engineering.

Prerequisite: GEE/IGF 265

This course continues the study of engineering graphics and its use in engineering design and production. Conventional drawing standards are covered. Topics studied are: sections and assembly drawings, threads and fasteners, fits and tolerance including geometric dimensioning and tolerance (GDT) methods, mapping and geographic information systems (GIS), structural drawing and welding, and working drawing packages. The use of SolidWorks is continued with emphasis on producing conventional engineering drawings to CSA standards from solid models of simple assemblies.

Giesecke et al., Technical Drawing

1 - 2 - 3 Credit: 1

MEE301B: Machine Design (GMF301B: Éléments des machines)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: GEE/IGF 231, MEE/GMF 331, 333

Previous work in mechanics, stress analysis, and metallurgy, as well as new knowledge regarding 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, welds, cables, bolts, bearings, gears, belt drives, brakes, etc.

Juvinall and Marshek, Fundamentals of Machine Component Design

Faires, Design of Machine Elements

3 - 1.5 - 4.5 Credit: 1

MEE303B: Engineering Design (GMF303B: Principes du design en ingénierie)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: GEE/IGF 265, 267, MEE/GMF 335

Approaches and procedures for handling closed and open-ended engineering 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 problems involving all stages from conception to drawings will be assigned.

3 - 1.5 - 4.5 Credit: 1

MEE311B: Fluid Mechanics I (GMF311B: Mécanique des fluides I)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: PHE/F 103, MAE/F 201 or MAE/F 203

This course emphasizes the basic concepts of fluid dynamics. The course includes a study of the following: fluid properties; fluid statics, fundamental equations of fluid motion, control volume concept applied to the continuity, momentum, and energy equations, the Euler and Bernoulli equations; flow measuring devices; similitude and dimensional analysis; incompressible flow in closed conduits; introduction to the concepts of boundary layer, turbulence, velocity distribution in laminar and turbulent flow; open channel flow and hydraulic turbo machines.

The lectures are supplemented by problem assignments and by experiments conducted in the laboratory, including forces on submerged surfaces, velocity distribution in internal flows, weirs and pumps.
Mott, R.L., Applied Fluid Mechanics, 5th ed.

3 - 1.5 - 4.5 Credit: 1

MEE315B: Fluid Mechanics (GMF315B: Mécanique des fluides)

For students of the Third Year taking Civil Engineering.

Prerequisites: PHE/F 103, MAE/F 201 or MAE/F 203

This course emphasizes the basic concepts of fluid dynamics. The course includes a study of the following: fluid properties; fluid statics, fundamental equations of fluid motion, control volume concept applied to the continuity, momentum, and energy equations, the Euler and Bernoulli equations; flow measuring devices; similitude and dimensional analysis; incompressible flow in closed conduits; introduction to the concepts of boundary layer, turbulence, velocity distribution in laminar and turbulent flow; open channel flow and hydraulic turbo machines.

The lectures are supplemented by problem assignments and by experiments conducted in the laboratory, including forces on submerged surfaces, velocity distribution in internal flows, weirs and pumps.

Mott, R.L., Applied Fluid Mechanics, 5th ed.

3 - 2 - 5 Credit:1

MEE321B: Heat Engines Laboratory (GMF321B: Laboratoire de machines thermiques)

For students of the Third Year taking Chemical and Materials Engineering.

Prerequisites: CCE/F 217, 311

A laboratory course illustrating the general principles, operating characteristics, and thermodynamic analysis of internal 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.

Prerequisite: GEE/IGF 231

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 bars, shear flow in thin-webbed beams, etc.

Hibbeler, Mechanics of Materials

3 - 1.5 - 4.5 Credit: 1

MEE333A: Metallurgy and Engineering Materials (GMF333A: Metallurgie et matériaux)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: CCE/F 101, MAE/F 101, 129, PHE/F 103, GEE/IGF 231

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. Emphasis is placed on properties and processing of metallic materials.

The lectures are supplemented by tutorials, assignments on theory and applications, and laboratory experiments with cold working, heat treating and metallography.

Callister, Material Science and Engineering - An Introduction

3 - 1.5 - 4.5 Credit: 1

MEE335A: Introduction to Manufacturing Processes (GMF335A: Introduction au travail d'atelier)

For students of the Third Year taking Mechanical Engineering.

Prerequisite: None

The object of this course is to familiarise the student with some tools of the mechanical engineer. A combination of lectures, demonstrations, and hands-on experience are used to teach the basis of fabrication techniques. Shop work includes measuring techniques, tolerances, machine tool theory and operation, welding and manufacturing processes.

1 - 2 - 3 Credit: 0.5

MEE345A: Applied Mechanics (GMF345A: Mécanique appliquée)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: PHE/F 103, MAE/F 203

This course builds upon the foundations established in PHE103. 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. The course provides the necessary foundation for work in machine design, systems dynamics and robotics.

J.L. Meriam & L.G. Kraige, Engineering Mechanics: Dynamics, 4th ed.

3 - 1.5 - 4.5 Credit: 1

MEE351A: Thermodynamics I (GMF351A: Thermodynamique I)

For students of the Third Year taking Mechanical Engineering.

Prerequisites: MAE/F 203, CCE/CCF 217

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.

Keenan, Chao and Kaye, Gas Tables International Version
Keenan, Chao and Kaye, Gas Tables English Version
Moran, Fundamentals of Engineering Thermodynamics, 2nd ed.
Keenan, Keyes, Hill and Moore, Steam Tables Thermodynamic Properties of Water (SI Units)
Keenan, Keyes, Hill and Moore, Steam Tables Thermodynamic Properties of Water (English Units)
Wildi, Metric Units and Conversion Charts

3 - 1.5 - 4.5 Credit: 1

MEE353B: Thermodynamics II (GMF353B: Thermodynamique II)

For students of the Third Year taking Mechanical Engineering.

Prerequisite: MEE/GMF 351

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
Marks' Standard Handbook for Mechanical Engineers

3 - 1.5 - 4.5 Credit: 1

MEE383B: Measurement Devices and Systems (GMF383B: Instrumentation et systèmes de mesures)

For students of the Third Year taking Mechanical Engineering.

Prerequisite: MAE/F 327

This course is designed to acquaint the student with modern sensors, instrumentation, 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.

Beckwith et al, Mechanical Measurements, 5th ed.

3 - 1.5 - 4.5 Credit: 1

MEE403A/B: Design of Engineering Systems

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisite: MEE/GMF 303

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.

Marks' Standard Handbook for Mechanical Engineers
Hubka and Eder, Engineering Design

3 - 1 - 4 Credit: 1

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.

Prerequisites: GEE/IGF 267, MEE/GMF 303, 331, 335

The aim of the course is to teach the principles of computer-aided design and manufacturing. Topics covered include hardware configurations, three-dimensional modelling, an introduction to the finite element method, and computer-aided manufacturing. Students will gain hands-on experience with SolidWorks 3D CAD, CosmosWorks FEM and CamWorks softwares through classroom examples and assignments. A project will require the manufacturing of a machined part on a numerically controlled milling machine or turning centre.

Amirouche, Computer-Aided Design and Manufacturing

2 - 2 - 4 Credit: 1

MEE411A: Fluid Mechanics II (GMF411A: Mécanique des fluides II)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 311, MAE/F 327

This course extends the study of Fluid Dynamics initiated in MEE311B - Fluid Dynamics I. Material covered includes the following: advanced concepts in dimensional analysis and similitude, dynamics of inviscid flows, potential flow theory and circulation, vorticity, an introduction to the effects of viscosity and three-dimensional flows.

Alexandrou, Principles of Fluid Mechanics
Gerhart, Gross and Hochstein, Fundamentals of Fluid Mechanics, 2nd ed.

3 - 2 - 5 Credit: 1

MEE413B: Fluid Mechanics III
(MEE413B: Mécanique des fluides III)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 411, 421

In this course, the differential forms of the momentum and energy equations are developed and applied to incompressible viscous flows in canonical flow configurations. Topics include laminar and turbulent momentum and thermal boundary layers, and flow over immersed bodies. A lot of emphasis is put on laboratory experimental work.

Alexandrou, Principles of Fluid Mechanics
Incropera and Dewitt, Introduction to Heat Transfer, 4th ed.
Gerhart, Gross and Hochstein, Fundamentals of Fluid Mechanics, 2nd ed.

3 - 2 - 5 Credit: 1

MEE421A: Heat Transfer
(GMF421A: Transmission de la chaleur)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 311 or 315, 351 and MAE/F 327

This course presents fundamental concepts and mechanisms of heat transfer processes, including the roles of conduction, convection and radiations in the context of the conservation of energy, steady-state conduction in one and two dimensions is undertaken and unsteady conduction in one dimension using analytical numerical, analytic methods. Conduction in simple two and three dimensional geometries is also explored. Heat transfer by free and forced convection is studied using dimensional analysis and experimental correlation. Basic analysis of heat transfer by radiation is carried out.

The lectures are supplemented by problems and experimental laboratory periods, including the determination of the thermo physical properties of substances and experimental heat transfer studies.

Incropera and Dewitt, Introduction to Heat Transfer, 4th ed.

3 - 2 - 5 Credit: 1

MEE431A/B: Stress Analysis
(GMF431A/B: Analyse des contraintes)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisite: MEE/GMF 331

This is an advanced course in stress analysis, covering various topics such as the theory of elasticity, rotating disks, thick-walled pressure vessels, non-circular bars in torsion, failure theories, energy methods, and composite materials.

Cook and Young, Advanced Mechanics of Materials
Budynas, Advanced Strength and Applied Stress Analysis

3 - 2 - 5 Credit: 1

MEE433A/B: Mechanical Behaviour of Advanced Materials
(GMF433A/B: Comportement mécanique des matériaux avancés)

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 331, 333

This course continues the study of engineering materials to cover in depth plastics, ceramics, composites, and speciality alloys. The focus is on mechanical properties, uses, manufacturing and processing of these advanced materials. The applications of these materials in engineering are also outlined. The effects of temperature, environment, failure mechanisms and prevention are covered. Mechanical behaviour under cyclic loading, fatigue, and fracture mechanics are presented.

The lectures are supplemented by laboratory experiments and demonstrations.

Callister, Material Sciences and Engineering – An Introduction
Dowling, Mechanical Behavior of Materials

3 - 1 - 4 Credit: 1

MEE443B: Feedback Control of Electro-mechanical Systems (GMF443B: Asservissements des systèmes électro-mécaniques)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MAE/F 129, 203, MEE/GMF 345, 445

A first course in linear feedback control systems which logically follows MEE445A: Modelling and Simulation of Dynamic Systems. The material is covered under the following main topics: performance specification and preliminary design, stability criteria and techniques of feedback control. The examples and the problems used to illustrate the theory will concentrate on hydraulic and pneumatic systems as used on current military hardware. MATLAB/SIMULINK is used extensively for the design of control systems and to carry out the simulations.

R.C. Dorf, R. Bishop, Modern Control Systems, 8th ed.
Stefani, Shahian, Savant, and Hostetter, Design of Feedback Control Systems, 4th ed.

3 - 2 - 5 Credit: 1

MEE445A: Modelling and Simulation of Dynamic Systems (GMF445A: Modélisation et simulation des systèmes dynamiques)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MAE/F 229 and 327, MEE/GMF 345

This course is a continuation of MEE345. Topics covered include: derivation 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 response of cascaded and coupled electro-mechanical systems. MATLAB/SIMULINK is used to simulate the dynamic response of these systems.

Close and Frederick, Modelling and Analysis of Dynamic Systems, 2nd ed.
Canon Jr, Dynamics of Physical Systems
Ogata, System Dynamics, 2nd ed.

3 - 2 - 5 Credit: 1

MEE451A: Combustion Engines (GMF451A: Moteurs à combustion)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisite: MEE/GMF 353

After a review of basic thermodynamic and combustion principles necessary for studying the topics of interest, 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 performance of fuels; sources and control of air pollution; alcohol, hydrogen, and other non-conventional fuels.

The lectures are supplemented by assignments and laboratory experiments.

Heywood, International Combustion Engine Fundamentals

3 - 1 - 4 Credit: 1

MEE457A/B: Compressible Flow (GMF457A/B: Écoulements compressibles)

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 353, 411

This course continues the study of compressible flow that was introduced in MEE353B - Thermodynamics II. The topics include flow in subsonic and supersonic nozzles and diffusers, supersonic wind tunnels, normal and oblique shock waves, oblique shock wave reflections, Prandtl Meyer Flow, flow in constant area ducts with friction, heating and cooling. 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.

Anderson, Modern Compressible Flow
John, Gas Dynamics
Keenan, Chao, and Kaye, Gas Tables SI Units

3 - 1 - 4 Credit: 1

MEE461A/B: Aeronautical and Space Propulsion (GMF461A/B: Propulsion aéronautique et spatiale)

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisites: MEE/GMF 353, 411

Illustrations of the application of the fundamental principles of fluid mechanics and thermodynamics to the analysis of present-day and proposed propulsion systems. Topics covered include turbojets and ramjets; their associated components including compressors, combustors and turbines. Current developments in chemical, electrical and nuclear rockets are discussed and related to space vehicle missions and requirements.

The lectures are supplemented by assigned exercises and laboratory problems in related areas.

Hill and Peterson, Mechanics and Thermodynamics of Propulsion, 2nd ed.

3 - 1 - 4 Credit: 1

MEE465A/B: Tribology

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisite: Successful completion of 3rd year

Among the topics considered are: surface topography, Hertzian contact stresses and deformation, friction and wear theories, lubricant properties and testing, hydrodynamic lubrication, solution of Reynolds equation, elasto-hydrodynamic lubrication, boundary lubrication, lubricity of aviation fuels, rolling contact 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 Credit: 1

MEE467A/B: Aircraft Performance (GMF467A/B: Performance des avions)

An elective course for students of the Fourth Year taking Mechanical Engineering.

Prerequisite: MAE/F 201 or 203

This course will introduce the students to the analysis and methods used in the evaluation of aircraft 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.

Asselin, An Introduction to Aircraft Performance

3 - 1 - 4 Credit: 1

MEE469A/B: Marine Systems Engineering (GMF469A/B: Génie des systèmes maritimes)

Prerequisites: MEE/GMF 311, 351

This course considers the main engineering issues involved in the design and operation of ships. The topics studied include: hull design for surface ships and submarines, including drag and stability; selection and performance of propulsion engines, including diesels, gas turbines and electric propulsion; propellors and water jet drives; generation and control of on-board electricity; weapon systems; and life support systems. The course is focused on the fundamental principles that drive the design of the systems studied, but also discusses recent technology and future developments.

3 - 1 - 4 Credit: 1

MEE471: Engineering Project (GMF471: Projet de génie)

For students of the Fourth Year taking Mechanical Engineering.

Prerequisite: 8 Third Year Mechanical Courses

This course provides the student with the opportunity to undertake a project of sufficient magnitude to include all

essential elements of an independent engineering study, under the supervision of a faculty member. Students are expected to perform a thorough literature survey on their selected topic, propose a plan of action, prepare a schedule for the major phases of the project, design and build the apparatus and the instrumentation as required, integrate theory taught in previous engineering courses and acquire the new knowledge required for the analytical portion of the project. Students submit three written reports to their project supervisor and make two oral presentations to classmates and faculty members during the course of the year.

0 - 3 - 3 (Fall Term)
0 - 4 - 4 (Winter Term) Credit: 1.5

MEE483A/B: Reliability (GMF483A/B: Fiabilité)

An elective course for students of the Fourth Year taking Mechanical Engineering. This course is offered in French only.

Prerequisite: MAE/F 209

The course will introduce the students to basic reliability principles at the systems and sub-systems level as well as analysis methods and decision-making processes based on reliability data. Topics include: review of probability and statistics, the important functions in reliability, the identification of an item's failure distribution, the reliability of series, parallel and redundant systems.

The lectures are supplemented by assigned exercises and a project in a related area.

3 - 1 - 4 Credit: 1

GRADUATE STUDIES AND RESEARCH

For graduate courses, see the Calendar of the Graduate Studies and Research Division.

LANGUAGE CENTRE

Director, Language Centre - LCol Jean Lord, CD, BSc, MSc
Senior Teacher - E. Bédrossian, BA, MA.
Senior Teacher (acting) - G. Toussaint, BASpéc(Soc), BA(Esp), Cert Ant.
Language Teacher - S. E. Abbott, BComm, BA, DipEd, DEF, DSEF, DDMA, MA, MTS, Th.D, MA.
Language Teacher - R.L.G. Charette, BA, BEd, MEd.
Language Teacher - D. Cléroux, BA
Language Teacher - E. Labonté, BA.
Language Teacher - R. Paquet, BA MA
Language Teacher - J. Roux, BASpécL, LèsL.
Language Teacher - D. Ruta, BA, LèsL.
Language Teacher - M. Séguin, BA
Language Teacher - N. Shirinian, BA, BEd, MA.
Language Teacher - L. Trahan, BASpecL.
Language Teacher - E. Ward, LèsL, MA.
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 50 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 second year take an intensive summer course of 250 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 their actual level.

DEPARTMENT OF ATHLETICS (ATHLETIC COMPONENT)

Acting Athletic Director Head of the Department of Athletics - D. Cates, BKin, MA
Varsity Manager - Mr G. Dubé, BComm (SPAD)
Physical Education Manager - Ms. N. Tremblay, BSc
Recreation and Intramural Manager - Mr M. Robillard, CD

RMC ATHLETIC BOARD

The RMC Athletic Board is responsible for the planning, control, supervision, and financial support of all officially organized sports and recreational activities of the staff and cadets, except for those activities specifically excluded from its jurisdiction by the Commandant. All cadets are members. Coordinating authority is vested in the Athletic Director.

MISSION

As an integrated part of the Royal Military College, the Athletic Department supports the mission of RMC by providing operationally oriented physical education, competitive intramural sports, varsity and recreational club programs for officer-cadets. These programs provide extensive leadership development opportunities in an atmosphere that helps instil the values of the Canadian Forces, the College and the Department. This is achieved through mandatory Cadet involvement in physically and mentally challenging activities.

VISION

The Athletic Pillar of the Royal Military College will provide programs of excellence that contribute to the development of outstanding leaders for the CF who value physically active and healthy lifestyles. These programs will enhance the national reputation and profile of the College and help attract outstanding athletes.

VALUES

The RMC athletic department values are:

Loyalty – to your team and/or squadron including obedience of superiors, e.g., coaches and team captains. Loyalty should always be upward first.

Integrity - hinges on consistently giving precedence to ethical values in our decisions and actions.

Courage - Physical courage is a self-evident requirement for contact sports. Moral courage, related to integrity, is also necessary.

Diligence – Persistence, hard work, meticulous attention to detail and perfection of athletic skills all describe diligence in the athletic context.

Fairness - implies treating people, groups and situations justly, equitably, and without bias.

Responsibility - is the ethical obligation that exercises and maintains integrity. Responsibility implies an obligation to be accountable, competent, and caring.

Excellence - the desire to pursue excellence is fundamental to being an outstanding leader and officer.

Physically Active and Healthy Lifestyle – to maintain a good personal level of physical fitness and a healthy body.

Perseverance - striving to finish and/or to win against seemingly insurmountable obstacles, difficulties, pain and/or setbacks.

GOALS AND STRATEGIES

The Athletic Department's goal is to help attract high quality officer candidates and to develop them into outstanding junior leaders.

Goals in the Department can be described as department or program oriented. The Athletic Department staff, while conducting Strengths, Weaknesses, Opportunities and Threat (SWOT) analysis identified keys issues that were subsequently formulated into the following goals:

- to maintain diverse athletic programs, i.e., Physical Education, Competitive Intramural Sports, Varsity and Recreation;

- to provide athletic programs that encourage and provide opportunities for development of leadership, physical fitness and a healthy lifestyle;

- to take advantage of the flexible and willing support of the RMC Club and Foundation;

- to take advantage of the Red and White Club for recruiting varsity athletes;

- to take advantage of the reduced Varsity Program to

focus and increase College support for the remaining Varsity sports;

• to increase the presence of the RMC Athletic Department on the Internet and in local, provincial and national media;

• to improve upon the historic performance of RMC Varsity teams;

• to gain greater control or influence over the recruiting and selection process for candidates to facilitate the recruiting of Varsity athletes;

• to provide recruiting centres, through the Red and White Club, with accurate and correct Athletic Department information for new recruits;

• to acquire expanded facilities to facilitate RMC hosting of athletic events and competitions;

• to establish a stable departmental budget; and

• to contribute to the rationalization and coordination of demands on officer-cadets' time.

PHYSICAL EDUCATION PROGRAM

The aim of the Physical Education Program is to:

• develop a basic knowledge of physical education theory and philosophy;

• develop physical fitness through a program of strenuous physical activities;

• develop sports skills and to introduce the fundamentals of team play in instructed in, the sports most commonly played by members of the CF;

• develop skills in lifetime sports which have both a social and a fitness value;

• develop leadership and organizational abilities through opportunities in various team and individual activities; and

• award military and/or civilian recognized qualifications.

Officer-cadets participate for two periods per week in the compulsory physical education program, which are twofold:

a. the development and maintenance of a high level of physical fitness which will enable all officer-cadets to attain the required standard on the CMC physical fitness test; and

b. the development of officer-cadets who are knowledgeable and experienced in fitness training methods, who are capable of performing a variety of sports skills and activities, and who have 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.

PO 107

The first year program is aimed at giving officer-cadets the tools to take charge of their personal fitness. Courses in that program include theory on exercise physiology, nutrition, training principles and injury prevention. The practical contents expose officer-cadets to the different training methods commonly used in the Canadian Forces. They are also required to complete the Basic Military Swim Standard test.

PO 207

The second year program has elective courses where officer-cadets select three (3) sports, one in each session. This year's program concentrates it's options on sports activities played within the Canadian Forces plus some other popular ones. Among those sports, we have soccer, broomball, volleyball, basketball, squash, badminton, handball, water polo and softball. Students also acquire basic knowledge related to organizing sports tournaments.

PO 307 ACADEMIC YEAR III

The third year program is developed to expose all officer-cadets to certain military skills generally requiring physical fitness. These courses introduce activities such as various forms of unarmed combat, different obstacle courses, waterborne training as well as military rappelling. Students also acquire basic knowledge related to organizing sports events in a military environment.

PEE 401 ACADEMIC YEAR IV

The fourth year has elective courses and follows the same principals as the second year program. It concentrates it's options on individual sports and activities such as canoeing, rock climbing, weight training, swimming, advanced unarmed combat, pressure points control tactics and aerobics.

ROYAL MILITARY COLLEGE PHYSICAL PERFORMANCE TEST (RMCPPT)

All officer-cadets must do the RMCPPT three times per academic year (beginning, middle and end of the year). These tests are part of the Physical Education Program for each of the four years. The test is composed of 5 items, the 20-meter shuttle run (20MSR), push-ups, sit-ups, an agility run and a standing long jump. Each item is scored on 100 points for a total of 500.

All officer-cadets are required to attain a minimum of 250 points with a minimum of 50 points on the 20MSR and 35 points on the 4 others items for each of the test during the academic year.

Officer-cadets that do not reach the minimal standards for a RMCPPT are given a second chance with a retest. If they fail a second time, they are taken in charge by the supplementary physical training fitness program lead by a qualified physical educator.

COMPETITIVE INTRAMURAL SPORTS PROGRAM

The aim of the Competitive Intramural Sports Program is to:

- provide leadership opportunities;
- improve officer-cadets' physical fitness;
- foster a competitive environment;
- develop team and squadron spirit; and
- promote active and healthy living.

The Competitive Intramural Sports Program 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 Program. Second, it provides each cadet with the opportunity to compete in a variety of sports activities on a biweekly basis.

The Competitive Intramural Sports Program is composed of sports leagues within the College, where each squadron forms teams to compete. The program is compulsory for cadets who are not varsity athletes.

The fall term Competitive Intramural Sports Program offers activities such as soccer, hockey, ultimate, volleyball, water polo and floor hockey. Included in the winter term Competitive Intramural Sports Program are basketball, water polo, floor hockey, hockey and volleyball.

The program is organized on a seasonal basis. The fall program runs from October to the end of November, and the winter program runs from January to the end of February. Responsibility for the day-to-day operation of the program is given to the cadets themselves under the supervision of the Recreation and Intramural Manager, 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.

Officer-cadets are assessed on every phase of the program and the cumulative assessment becomes part of their personal service file.

All officer-cadets must participate in the Cadet Wing championship events. The Wing tournaments normally offer activities such as volleyball, basketball, floor hockey, water polo, hockey for men and women, broomball, tabloid and the Harrier cross-country race.

VARSITY PROGRAM

The aim of the Varsity Program is to:

achieve competitive excellence. This will mean different things to different sports; however, the aim in general is that:

- RMC become a highly respected opponent in terms of competitive challenge and sportsmanship; and
- RMC is the smallest university member of the Canadian Interuniversity Sport (CIS) with a student population of 900 officer-cadets in the undergraduate program. It has to overcome a talent deficit through recruiting, outstanding preparation and performance; and
- provide an opportunity for officer-cadets to participate in highly skilled, competitive and organized athletics;
- instil, through the demands of training and competition, self-discipline, the desire to excel and willingness to compete in a team effort;
- create a College "esprit de corps;"
- provide an opportunity for interaction with other contemporary university athletes thereby bringing RMC into the focus of the civilian community;

- improve physical fitness; and
- provide leadership opportunities.

An extensive varsity team sports program is offered at the Royal Military College for cadets capable of participating at a higher skill level.

RMC is a member of the Ontario University Athletics (OUA) for men's and women's events including basketball (men and women), fencing (men and women), hockey (men), soccer (men and women) and volleyball (men and women).

The taekwondo, rifle and pistol teams compete at local, provincial and national levels.

The Varsity Program is an extension of the Physical Education Program and thus contributes to the achievement of the overall aim by instilling a high degree of self-discipline, the desire to excel, and the willingness to sacrifice personal interest for coordinated team effort. The Varsity Program also provides an opportunity for involvement with contemporary university and college students, thereby bringing the Royal Military College into the focus of the civilian community.

RECREATION

The aim of the RMC Recreation Program is to:

- provide leadership opportunities;
- leisure activities of choice;
- develop social skills and self-fulfilment; and
- promote active and healthy living.

The RMC Recreation program consists of clubs that are organized around different recreational activities that include group and individual sports and hobbies. All students and staff at RMC are permitted and encouraged to participate in the Recreation Program. The list of clubs is subject to change depending on the interest: Aikido, Arts, Astronomy, Broomball, Climbing, Cycling, Debating, Drama, Drill, Equestrian, Fish and Game, Jiu-Jitsu, Judo, Karate, Outdoor, Photo, Power Flying, Rowing, Social Dance, Stage Band, Video Editing, War Games, Windsurfing, and Yachting.

FACILITIES AND EQUIPMENT

RMC's athletic facilities are shared with those of CFB Kingston and include a large triple-gymnasium with various combinations of basketball, volleyball and badminton; one field house which includes one 200-meter indoor track and four large sports courts; one 25-meter, 8 lanes pool; one small warm-up pool; one weight training and cardio area; one indoor artificial ice arena; eight soccer fields; five outdoor tennis courts; six squash courts, two martial arts rooms, and one indoor rifle and pistol range.

With its location on Lake Ontario, the College has excellent facilities for recreational sailing and boating.

In addition to the athletic facilities, use is made of nearby military recreation facilities, which include an eighteen-hole golf course and a curling rink.

Equipment is provided for participation in the Physical Education Program, Varsity Program, Competitive Intramural Sports Program and Recreational Program.

PROFESSIONAL MILITARY TRAINING (PMT)

Director of Cadets
Colonel W. Peters, CD
Deputy Director of Cadets
Lieutenant Colonel R. McDonald, CD
Chief Instructor
Major J.S.D. Pelletier, CD
Staff Officer Standards

Staff Officer Training
Captain E.B. Mills, CD
Drill Sargent-Major
Master Warrant Officer B. Boudreau, CD
Training Cell
Warrant Officer J.R.N.M. Beausoleil, CD

The Military Pillar of the ROTP, RETP, and UTPNCM programmes at RMC provides Professional Military Training during the academic year. This Pillar is compulsory for all OCdts in all years.

PROGRAMME OBJECTIVES

The main purpose of the Military Pillar is to identify, develop, and consolidate the moral qualities and ethical values which are essential for a military officer. These qualities and values include: honesty, loyalty, integrity, honour, and courage. These are also very effectively captured in the College's motto of "TRUTH, DUTY, VALOUR".

Additional objectives include the completion of the Basic Officer Training Period (BOTP), which was started at the Canadian Forces Leadership and Recruit School prior to joining RMC, and Environmental Familiarization (EF) visits to Army, Navy, and Air Force operational bases. The Military Pillar also develops and prepares OCdts to function effectively within the College and Cadet Wing organization.

PROGRAMME DESIGN

The personal, team, and leadership skills and values required of an officer must be exercised on a continuous basis, at all times, in all places, in all situations. The Military Pillar provides the necessary forum for the development and assessment of these qualities by exposing OCdts to a wide variety of training scenarios.

FOCUS BY YEAR

The programme is designed to achieve three important transformations in the officer candidates over the four years at RMC. These are: adolescent to adult, imposed discipline to self discipline, and followership to leadership. The emphasis by year is as follows:

1st year: completion of BOTP, EF, Personal Development, Followership, Teamwork

2nd year: Personal Development, Teamwork, prepare for Leadership positions

3rd year: Personal development, Leadership

4th year: Personal development, Leadership, prepare for Commissioning

COURSES OF STUDY

There are six main areas of competence, which are identified as Performance Objectives (PO's). These can be considered as courses of study, using a combination of formal classroom instruction and a wide variety of practical exercises. The six PO's are:

a. General Military Knowledge
b. Personal Attributes
c. Teamwork
d. Leadership
e. Communications, and
f. Drill

PROGRAMME DELIVERY

Two periods per week are allocated for drill classes or other formal classroom instruction. Additional training is provided on weekends as required. Practical leadership and teamwork activities such as dress and room inspections and Squadron level parades, are scheduled on weekday mornings. Wing and College level activities take place during Duty Weekends as listed in the Table at the end of this Section. In third and fourth year, OCdts are appointed to various command and staff positions to provide semester-long development and assessment opportunities.

EQUIVALENCIES AND CREDITS

The military record of service for OCdts in the UTPNCM programme, or for OCdts in the ROTP and RETP programmes who have previous military service, is reviewed upon joining RMC. Previous training may be accepted for credits under the Military Pillar.

COURSE DESCRIPTIONS

GENERAL MILITARY KNOWLEDGE

The PO covers general knowledge regarding Canadian Forces policies and regulations such as drugs and alcohol, harrassment, counselling, duties and responsibilities, etc. This PO also covers RMC-specific knowledge such as College history, organization, Cadet Wing structure, etc. A basic familiarization of the Army, Navy, and Air Force is obtained through familiarization visits (EF) to operational bases.

PERSONAL ATTRIBUTES

Officers in the Canadian Forces must exhibit exemplary conduct and deportment at all times. Such conduct stems from well developed personal character traits such as honesty, integrity, loyalty, self respect, respect of others, responsibility, and courage. It includes the concept of "service before self", and the development of a work and play ethic to bring out the best in individuals and subordinates.

These traits are developed and assessed throughout the 4yr programme.

TEAMWORK

Teamwork and cooperation are essential elements of a successful military unit. This PO provides practical opportunities for team building and fostering esprit-de-corps. It also develops the necessary confidence and trust in peers. The PO stresses the need to become a good follower and team player in order to become a good leader.

LEADERSHIP

The core element of officership is leadership. This PO provides practical opportunities to develop and practice leadership in a wide variety of scenarios. All opportunities for leadership, including Cadet Wing bar appointments, sports team captains, class leaders, class seniors, project and event organizers, etc. are exploited to expose OCdts to leadership challenges, and to assess their development and performance. The minimum requirement for successful completion of the programme is to perform satisfactorily as a Cadet Section Commander for one semester in either third or fourth year.

COMMUNICATIONS

This PO is a follow-on to the material commenced during BOTP, and concentrates on the development of essential written and oral communication skills. These skills form a cornerstone of leadership and will be needed for all aspects of RMC life.

DRILL

Drill is a powerful method to develop individual pride, mental alertness, precision, and esprit de corps which will assist OCdts to carry out orders instinctively and immediately at all times. The attainment of good discipline calls for a high development of personal qualities, particularly self-control and cooperation. Drill and formal parades are designed to develop these qualities so that their practice becomes habitual and will persist under the strain of activities in peace and war. This PO will teach OCdts foot, rifle, and sword drill, and will place OCdts in increasing levels of authority and responsibility on the parade
square in order to further develop their self confidence and bearing.

PMT TRAINING PERIODS

In addition to the two periods per week scheduled during the day (0800-1630), the following periods are used to deliver the Military Pillar:

ACTIVITY	YEAR				COMMENTS
	1st	2nd	3rd	4th	
FALL SEMESTER					
Cadet Wing start-of-year Weekend	A	A	A	A	
Reunion Weekend	A	A	A	A	
Battle of Britain	D	D	D	D	
Remembrance Day	A	A	A	A	
Wing Sports Day (Fall)	A	A	A	A	
Ethics Symposium		A	A	A	
Environmental Familiarization Weekend	A			D	3 total in Fall or Winter
Christmas Ball	A	E	E	A	
WINTER SEMESTER					
Leadership Symposium		A	A	A	
Mess Dinner				A	per Environment
Environmental Familiarization Weekend	A			D	
Wing Sports Day	A	A	A	A	
West Point Weekend	A	A	A	A	
MOC Weekend	A	A	A	A	
Military Skills Competition	A	A	A	A	
Colour Party Competition			D		
Sandhurst Competition	D	D	D	D	
Sports Awards Ceremony	A	A	A	A	
Copper Sunday/ Battle of Atlantic Wknd	A	A	A	A	
Graduation Weekend	A	A	A	A	

Legend:

A	All	E	Elective/Optional
D	Designated	S	If/When Scheduled

CANADIAN FORCES MILITARY COLLEGE

A CONSTITUENT COLLEGE OF THE ROYAL MILITARY COLLEGE OF CANADA KINGSTON, ONTARIO

Dean of the Canadian Forces Military College

M. Bardon, RMC, BEng, MEng (RMC), PhD (Calgary)

HISTORY

In 1972, the Chief of the Defence Staff directed that, where appropriate, selected candidates for the University Training Plan Officers (UTPO) [now the Initial Baccalaureate Degree Programme (IBDP)] and the University Training Programme –Men (UTPM) [now University Training Commissioned Members (UTPNCM)] would be sent to a Canadian Military College as undergraduates. To accommodate these students, whose overall obligations would be different from those of other RMC Officer Cadets, 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 l973-74 academic year.

In 1970-71, the Royal Military College initiated a small pilot programme in extension studies, which continued under the auspices of the CFMC until 1996. In 1996-97, the Continuing Studies Project significantly increased access to University level courses for service personnel, their dependents, and other members of the Department of National Defence (DND). The Project resulted in a substantial increase in RMC's extension activity. New undergraduate and post-graduate degree programmes were introduced, designed specifically for non-resident students, and extension courses were initially offered on eight Canadian Forces bases.

In July 1996, the importance of this expanded activity was recognized with the creation of the Division of Continuing Studies (DCS) and the appointment of the first Dean of Continuing Studies.

ROLE OF THE CANADIAN FORCES MILITARY COLLEGE (CFMC)

The CFMC offers non-resident and resident undergraduate and post-graduate studies administered by the DCS and resident programmes under the University Training Plan - Non-Commissioned Members (UTPNCM) and the Initial Baccalaureate Degree Programme (IBDP). CFMC programmes are presently available to members of the Regular and Reserve Forces, spouses of Regular Force members, full-time civilian employees of DND, and other students on a space-available basis.

DEGREE PROGRAMMES OFFERED GENERAL

The required courses and the course pattern for each area of specialization outlined below will be set by the Department and/or Division concerned and approved by the Dean of the CFMC.

One course credit is defined as the equivalent of a course taken at a rate of three lecture hours per week over one term, that is, a three-credit-hour (3.0) course in the terminology used by most Universities. Partial credits are accorded to courses of lesser duration or weight.

NON-RESIDENT DEGREE PROGRAMMES

The CFMC offers three non-resident three-year pass degree programmes not offered to ROTP/RETP Officer Cadets. These programmes include the Bachelor of Military Arts and Sciences (BMASc), Bachelor of Arts (BA), and Bachelor of Science (BSc).

BACHELOR OF MILITARY ARTS AND SCIENCES (BMASC)

The BMASc is a unique degree programme for the CF, thoroughly grounded in the elements of the military profession, integrating in-service training and special and standard University courses. It is designed for the serving military member, to recognize University-level achievement appropriate to the profession of arms.

Though equivalent to a conventional three-year degree in terms of quality and quantity of instruction, the BMASc degree is designed to be earned over an extended period, integrating professional training with academic study.

Military Arts might be roughly defined as the set of skills and subjects which must be mastered for the practice of the profession of arms while Military Sciences might roughly be considered as the design and application of military forces. It is clear that, in this context, "Arts" and "Science" do not retain their classical academic meaning. However, one might as easily choose to interpret the title as the application of the traditional Arts and Sciences to the profession of arms and

this, too, is entirely appropriate. The ambivalence well reflects the union of two ancient and distinct cultures.

The BMASc degree programme is designed around a compulsory core, which includes credits in English and French Literature, Military History, Military Psychology and Leadership, Science, and a Directed Research Project.

At least 50% of the 30 required course credits must have military content, as determined by the Continuing Studies Committee and at least one-third of the course credits must be taken through RMC. An appropriate number (normally one-third) must be at the senior (Third or Fourth Year) level.

BACHELOR OF ARTS (BA) AND BACHELOR OF SCIENCE (BSC)

For the degree of BA or BSc, at least thirty credits are required, no fewer than ten of which must be earned in RMC courses. Of these, at least sixteen must be in Arts or in Science, ten in a chosen discipline and four at the senior level. In addition, one-third of the degree must be obtained through RMC.

Note that course offerings are limited at this time and that completion of a BA or BSc degree may require attendance at RMC or the completion of some courses at other Universities. For a copy of the Continuing Studies calendar or for further information, please contact the DCS toll free at 1-800-352-8979. Further information is also available on the World Wide Web at: http://www.rmc.ca/academic/continuing/ and on the DWAN at: http://kingston.dwan.dnd.ca/rmc/academic/continuing/. E-mail inquiries may be sent to bmasc@rmc.ca.

RESIDENT PROGRAMMES

The three-year non-resident degree programmes are also available as resident programmes for IBDP students and approved UTPNCM students. Additionally, Continuing Studies students may apply to the Dean of the appropriate academic division for admission to any other RMC resident degree programme.

With the authorization of the Dean of the CFMC and on a space-available basis, Continuing Studies students in the Kingston area may attend day-time classes at RMC.

Students in full-time attendance at RMC are normally required to register in ten courses each year for a Pass degree and twelve each year for an Honours degree. For engineering students, candidates must be registered in courses totalling no less than twenty-five classroom contact hours per week in each year of full-time study and they must complete not less than one academic year in full-time study at RMC.

FOUR-YEAR AND HONOURS DEGREES

For the degree of BA (Honours) or BSc (Honours), at least forty credits are required, as specified in the RMC Continuing Studies Calendar. For requirements related to earning and maintaining Honours Standing in Arts and Science, see Academic Regulations 16 through 20. Honours programmes in Arts are currently available in Humanities (English, French Studies or History), Social Science (Politics and Economics), Military and Strategic Studies and in Science (Chemistry, Mathematics and Computer Science, Physics or Space Science).

STANDING

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 their degree scrolls. Requirements for Pass Standing are given in Academic Regulation 28.

BMASc candidates who attain an overall weighted average of 80% in their final year of study will have “with distinction” inscribed on their degree scroll.

TRANSFER FROM ROTP AND RETP

RMC Officer Cadets in good standing who are released from the CF for reasons other than misconduct may continue at RMC for up to one academic year following release as CFMC students. Those who complete the requirements for a degree will be awarded the appropriate degree certificate.

Former ROTP and UTPNCM students who are separated from the College but who have not completed the necessary requirements for an RMC degree, may apply for admission to the CFMC. However, the College will not normally award a degree to such students until they have been qualified in a Military Occupation Classification (MOC) and one full academic year has passed since separation from the College.

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 CF who meet the academic

requirements for admission to RMC or another 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) and the Reserve Entry Training Plan (RETP). 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, and as modified by subsequent orders.

INITIAL BACCALAUREATE DEGREE PROGRAMME (IBDP)

The IBDP is a DND-sponsored subsidization plan open to commissioned Officers serving in the CF who are within two years of meeting course requirements for a baccalaureate degree at a Canadian Military College or another Canadian University. Thus, all students admitted under this plan must enter as candidates with Advanced Standing. The conditions governing eligibility, application and selection procedures, and so on are set forth in CFAO 9-40, and as modified by subsequent orders.

ACADEMIC QUALIFICATIONS

1. Academic Requirements

a. UTPNCM: Admission to First Year. The normal academic requirements for admission are set forth under "Academic Qualifications" in the RMC Calendar.

b. UTPNCM: Admission with Advanced Standing. As for IBDP (see below), except that the CFMC decision regarding admission will be forwarded directly to National Defence Headquarters rather than by a Certificate of Acceptability to the candidate.

c. IBDP: 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 through the CFMC or at one or more recognized Universities, such students being admissible with Advanced Standing;

(2) those who are over 22 years of age and who have been away from school or University for at least two years, such students being admissible as "mature students" who satisfy the College of their capacity to succeed in academic courses at the level demanded in the CFMC degree programmes.

2. Details of Degree Requirements

A. FOR UTPNCM ADMITTED TO FIRST YEAR

UTPNCM students admitted to First Year are eligible for the same degree patterns in Arts, Science, and Engineering as ROTP and RETP students at RMC. The degree requirements are set out in the Course Outlines in the RMC Calendar. Acceptance must be approved by the College Admissions Committee and by the Dean of the CFMC.

B. FOR UTPNCM ADMITTED WITH ADVANCED STANDING

Students may be admitted to a Course of Study for which they are deemed qualified by virtue of course credits transferred on admission. Depending on these qualifications, students are eligible for the same degree patterns in Arts, Science and Engineering as ROTP and RETP students at RMC as well as for the BMASc and special three-year Pass Arts and Pass Science degrees and special four-year Honours Arts and Honours Science degrees. Acceptance must be approved by the College Admissions Committee and by the Dean of the CFMC.

C. FOR IBDP

The same degree arrangements apply to IBDP as to UTPNCM admitted with Advanced Standing (see above), but with the added condition that all IBDP entrants must be within two years of attaining the degree sought. Hence, IBDP students are admitted to CFMC for one or two years with Advanced Standing. Acceptance must be approved by the CFMC Admissions Committee and by the issuance of a Certificate of Acceptability.

CURRICULUM

Students seeking detailed information concerning the curriculum should consult the appropriate sections of this Calendar.

IBDP CLASS SENIOR

A IBDP Class Senior will be appointed annually by the Head of the department of Applied Military Science (AMS) in consultation with the Dean of the CFMC. The IBDP Class Senior shall be responsible to the Head of AMS, who serves as the Commanding Officer for the IBDP students, for the general control and deportment of all IBDP students. The IBDP Class Senior shall also provide liaison between the IBDP students, the Dean of the CFMC and the Head of AMS.

DRILL, PHYSICAL EDUCATION, AND INTRAMURAL SPORTS

UTPNCM

Officer Cadets of the UTPNCM have their own squadron –Otter Squadron - and their own Squadron Commander, under the direct supervision of the Director of Cadets. 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.

IBDP

As commissioned Officers, IBDP students are responsible for maintaining the standards of drill and physical fitness prescribed by the terms of their commitment to the CF. Therefore, unlike the UTPNCM students, they are not required to take drill and physical education classes. However, they are encouraged to take part in the Otter Squadron games programme and are free to participate in intramural and/or inter-collegiate sports and other organized activities at RMC.

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.

SUMMER TRAINING

UTPNCM

Officer Cadets of the UTPNCM will follow the same summer-training programme as the ROTP and RETP Officer Cadets.

IBDP

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 RMC Faculty. The Dean of the 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, and IBDP students should consult their Commanding Officer.

RESIDENCE

No UTPNCM or IBDP students shall live in residence, as is the case for the ROTP/RETP Officer Cadets.

MESSING AND RECREATION

UTPNCM

Since Officer Cadets of the UTPNCM live out, they do not normally mess at RMC, although arrangements may be made for meals in the Officer Cadet dining room or the RMC Canteen at reasonable cost. For recreational activities, UTPNCM Officer Cadets must be members of the Recreational Centre at RMC. In addition, these students are regular members of the RMC Senior Staff Mess (SSM) and are subject to the rights and obligations associated with such membership.

IBDP

As commissioned Officers, IBDP students are regular members of the RMC Senior Staff Mess (SSM) and are subject to the rights and obligations associated with such membership.

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 are open only to CFMC students who have entered with Advanced Standing. See the section on Medals, Scholarships and Prizes of this Calendar for more details.

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. The duration for IBDP 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 particular to CFMC and are 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.

(1) Since the UTPNCM year-structure coincides with that of RMC, Academic Regulations 6-15 apply.

(2) Since the IBDP year-structure does not coincide with that of RMC, Regulations 6-15 do not apply. For IBDP 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 of the 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 IBDP: "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 IBDP students: Where an additional course is needed by a IBDP 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 RMC. To receive credit for this course, a student must obtain a grade satisfactory to the CFMC.

f. All IBDP must take the required 3rd and 4th year courses in military psychology and leadership.

g. Nos. 42-43. These regulations apply to UTPNCM students but not to IBDP students, who may be excluded by the two-year limitation imposed on attendance by CFAO 9-40.

h. Nos. 44-45. These regulations apply to both UTPNCM and IBDP students. Voluntary withdrawal is covered in the CFAOs governing these plans.

i. No. 46. This regulation does not apply to IBDP students.

Note: Certain RMC Academic Regulations distinguish between Officer Cadets and students; IBDP students are excluded from those referring specifically to Officer Cadets.

ACADEMIC REGULATIONS

DEFINITIONS

Academic Year: For full-time students, the period from September to May. The academic year is divided into two terms, Fall Term and Winter term. For the purposes of determining academic standing the Summer term is not normally considered to make up the academic year.

Audit: Courses that are taken without the purpose of earning academic credit. A student must formally register to audit a course at the beginning of the term, subject to the permission of the instructor and the Department Head and will not normally be allowed to change to regular course status after registration deadlines have passed. The level of participation of auditing students will be determined by the instructor and will not normally include submission of assignments or writing exams. Audited courses will be annotated by the code "AU" on the transcript.

Board Pass: Upon recommendation of the department responsible for the Programme of Study, a Board Pass will normally be awarded to an engineering student in their final year of study for a final year course in which the course mark is less than 50% provided that:

(i) **the student's overall final year 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,

(iii) not more than one course has been failed in the final year; and

(iv) the failed course is not required to complete the core curriculum.

The mark will be recorded with the annotation "Board Pass" (BP).

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. Course credits earned through successful passing of a Challenge Examination will be annotated as "CG" (Credit Granted) on the transcript.

Concentration: A field of study within a Programme of Study. A concentration will be either Major or Minor depending on the number of courses completed in the field of study.

Core Curriculum of RMC: Courses RMC students are required to take in order to prepare them to take on positions of leadership within the Canadian Forces.

Course: A unit of study designated by a code and number in the Calendar.

Course Grade: The grade assigned on completion of the course, based on assignments, practical work, examinations and/or other course requirements as determined by the course instructor.

Credit: The equivalent, for all academic programmes, of a course consisting of about 39 hours of lectures, normally delivered in one term.

Credit Granted: Credit granted based on challenge exams, non-university courses or other types of experience which is assessed as duplicating RMC academic requirements. Credits granted on this basis are annotated on the transcript with the code "CG".

Elective: A course belonging to another concentration a student may take to complete the minimum requirements of a Programme of Study.

Exemption: Granted when a student is not required to complete a Mandatory course within a Programme of Study because of prior exposure to related material. An exemption does not earn academic credit, but will enable the student to replace the exempted course with another elective course in order to earn sufficient credits to satisfy degree requirements. The transcript is marked with the code "EXE".

Extra course: A course which exceeds the requirements of the Programme of Study and which is taken only with the special permission of the Dean responsible for the programme in which the student is registered. The grades obtained in Extra Courses are counted in the student's term and cumulative averages, and when the Extra Course is within the field of study or concentration, the grade obtained in that course is taken into account with respect to the award of distinctions.

Failure of a Course: A student is deemed to have failed a course if the student fails the normal requirements for a course and either does not successfully pass the supplemental examination for that course, is not permitted or chooses not to write the supplemental examination.

Full Time Undergraduate Students: Those students registered in at least 80% of the credits of the full year programme for their Programme of Study once the deadline for course withdrawals has expired. Except for First Year, a full time student may, with the permission of the responsible department head, enrol in a maximum of one credit per term over the normal course load for the Programme of Study. Students wishing to enrol in more than one extra credit per term beyond the normal programme must first obtain permission of the responsible Dean. Minimum and maximum credits for full time status are presented in Table D-1.

Interest Only Students: Students who enrol in courses without being admitted into a Programme of Study at RMC or another university. Normally "Interest Only" students may enrol in a maximum of two credits in a given term, and may not complete more than a total of four credits before being required to seek admission into a Programme of Study.

Mandatory Course: A specific course which a student must pass, or otherwise receive credit, in order to complete a Programme of Study.

Optional Courses: Courses within a concentration that are not Mandatory Courses.

Part-Time Undergraduate Students: Students who are registered in less than 80% of the credits of the full year programme for their Programme of Study. A Part-Time Student may take a maximum course load of 3 credits in any one term and must complete at least one course every two years to remain registered in a Programme of Study.

Pass: A student is deemed to have passed a course if the student completes all requirements for that course to the satisfaction of the instructor.

Programme of Study: The minimum set of courses required for the completion of a particular degree or certificate.

Supplemental Examination: An examination or other form of academic evaluation taken by students who have not passed a course, in order to receive credit for the course.

Term Average: The student's weighted average calculated at the end of any academic term based on all courses completed in that term plus the marks of all full-year courses which are in progress at that point.

Transfer Credits: Credits for work done at an accredited institution; transfer credits may be granted for university courses that are assessed as duplicating RMC academic requirements, provided that marks of C- or higher have been earned and an overall satisfactory academic record has been maintained. The minimum mark of C- is to be waived in cases where RMC has entered into a Memorandum of Understanding with another university or a consortium of universities requiring the parties to reciprocally recognize the passing grade in each other's courses, under conditions stipulated in the Memorandum. Course requirements that have been satisfied through Transfer Credit are annotated on the transcript with the code "TC".

Visiting Students: Students enrolled in a degree programme at another university who are authorized by their home university to take courses at RMC. Except where a formal exchange agreement exists, a Visiting Student must provide a letter of permission from the home university in order to be approved for registration in an RMC course.

TABLE D-1
MINIMUM AND MAXIMUM COURSE LOADS FOR FULL-TIME STATUS

PROGRAMME	MINIMUM NUMBER OF CREDITS	NORMAL COURSE LOAD	MAXIMUM NUMBER OF CREDITS
Arts: 1st Year	4 per term/ 10 per academic year	6 credits per term/ 12 per academic year	7 per term
Arts (except Business Administration): 2nd, 3rd or 4th Year	3 per term/ 8 per academic year	5 credits per term/ 10 per academic year	6 per term
Business Administration: 2nd, 3rd or 4th Year	3 per term/ 8 per academic year	Variable across Years	1 per term above the normal programme
Science/Engineering: 1st Year	4 per term/ 10 per academic year	6 credits per term/ 12.5 per academic year	7 per term
Science: 2nd, 3rd or 4th Year	3 per term/ 8 per academic year	5 credits per term/ 10 per academic year	6 per term
Engineering: 2nd 3rd or 4th Year	5 per term/ 10 per academic year	Variable across programmes and Years-	1 per term above the normal programme
BMASc: all Years	3 per term/ 8 per academic year	5 credits per term/ 10 per academic year	6 per term

1. DEGREES

1.1 A degree of Bachelor of Arts (Honours), Bachelor of Arts (Concentration) or a Bachelor of Arts, Bachelor of Science (Honours), Bachelor of Science (Concentration) or a Bachelor of Science, a Bachelor of Engineering, a Bachelor of Military Arts and Science (Honours) or a Bachelor of Military Arts and Science, as appropriate, shall be granted by the Royal Military College of Canada to a student who has successfully completed the requirements of the College. The requirements for each of these degrees are specified in the appropriate sections and tables of the Undergraduate Calendar of RMC.

1.2 A degree of Master of Arts (MA), Master of Science (MSc), Master of Applied Science (MASc), Master of Engineering (MEng), Master of Applied Military Science (MAMSc), Master of Business Administration (MBA), Master of Defence Studies (MDS) or Doctor of Philosophy (PhD) shall be granted by the Royal Military College of Canada to those who successfully complete the requirements of the College. The requirements for each of these degrees are specified in the appropriate sections of the Postgraduate Calendar of RMC.

1.3 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 may be granted by the Royal Military College of Canada to those who are worthy of the honour.

1.4 The Senate may, for cause stated, deny a degree for any student.

2. CERTIFICATES AND DIPLOMAS

2.1 Certificates and diplomas are granted to students who have successfully completed the Programme of Studies leading to Certificates or Diplomas as specified in the appropriate Calendars and Brochures published by RMC.

3. HONOURS PROGRAMMES OF STUDY

3.1 To earn an Honours Bachelor of Arts degree within a discipline, a student must successfully complete the required courses set out in the applicable Honours Programme of Study, with at least 20 credits within the discipline, must maintain a minimum B average in the Honours courses in all 300 and 400 level courses in their Honours Programme of Study, and must attain at least a B- average in the 400 level courses.

3.2 To earn an Honours Bachelor of Science degree within a discipline, a student must successfully complete the required courses set out in the applicable Honours Programme of Study and must maintain a minimum B- average in all 300 and 400 level courses prescribed by the Division of Science.

3.3 To earn a Bachelor of Engineering degree within an approved engineering programme, a student must successfully complete all required courses set out within the applicable Programme of Study as prescribed by the Division of Engineering.

3.4 To earn an Honours Bachelor of Military Arts and Science degree, a student must successfully complete the required courses set out in the applicable Honours Programme of Study, with at least 20 credits in Military Studies, must maintain a minimum B average in the Honours courses in all 300 and 400 level courses in their Honours Programme of Study, must attain at least a B- average in the 400 level courses and must achieve at least a B in the Directed Research Project (MAS 400).

3.5 The Faculty Council may, for cause stated, remove a student from an Honours Programme of Study in Arts or Science at any time, even though the student may have obtained the standard required by these regulations.

4. SECOND DEGREES

4.1 The holder of an Undergraduate Degree from RMC or from another university may complete a second Undergraduate Degree at RMC, subject to the agreement of the Division and/or departments involved and to the following restrictions:

a. The holder of an Honours degree from RMC or from another university may not apply to obtain from RMC a general degree in the same concentration;

b. the student may not apply to register into a Programme of Study leading to a degree which has the same name as the first undergraduate degree he/she has obtained, except that the student may apply to be admitted to an Honours Programme of Study, if the first degree obtained is a general degree;

c. the student has met the requirements for admission into the chosen Programme of Study, as determined by the Division and/or departments concerned.

4.2 To obtain a Second Degree, the holder of a first undergraduate degree, whether from RMC or from another

university, must complete at least half of the credits required by the chosen Programme of Study through RMC and meet all the requirements of the chosen Programme of Study as specified in the RMC Undergraduate Calendar.

5. UPGRADED DEGREE

5.1 The holder of a General Degree from RMC may apply to complete an Honours Programme at RMC, subject to the agreement of the Divisions and/or departments involved, if she/he has met the requirements for admission into the chosen Programme of Study, as determined by the Divisions and/or departments concerned.

5.2 To obtain an Upgraded Degree, the holder of a General Degree from RMC must meet all the requirements of the chosen Honours Programme of Study as specified in the RMC Undergraduate Calendar.

6. CHANGES IN THE PROGRAMME OF STUDY

6.1 In the case of a transfer of registration in a Programme of Study between Divisions, the approval of the Dean and the Head of the Department or Programme Co-ordinator to which the student requests transfer is required.

6.2 The courses selected by any student may not be altered later than four weeks (28 days) after the beginning of the academic year or, in the case of single term courses, four weeks after the beginning of that term without the permission of the Dean of the Division in which the student is registered.

6.3 Normally a student will not be permitted to withdraw from a course after the 7th week (49th day) of the term. Courses dropped between the 4th and 7th week will be reflected as "Withdrawn/Abandonné" on the transcript, whereas after this period a mark will be assigned. In exceptional circumstances, the Dean may authorize a student to withdraw from a course at any time without academic penalty reflected on the transcript.

7. COURSE COMPLETION

7.1 A university degree certifies that its holder has attained a measurable level of academic achievement as established by a recognized system of evaluation. Thus the performance of each student in each course must be evaluated by the instructor or instructors responsible for the course. Final grades are determined by students' performance on one or more of the following:

a. Assigned work: assignments, term papers, projects, oral presentations etc;

b. Class participation which, in certain disciplines, may justify an attendance requirement;

c. Progress tests;

d. Laboratory tests and/or laboratory work;

e. Mid-term and/or final examinations; and/or

f. Level of written and/or oral expression.

7.2 The weight accorded to the various elements is at the discretion of the instructor or instructors responsible for the course. At the beginning of a course the instructor shall provide students with the evaluation scheme in writing. The grading scheme cannot be altered without appropriate notice and normally should not be altered at all after seven weeks (49 days) into the term.

7.3 For courses offered at a distance (correspondence or internet) through the Division of Continuing Studies, the elements to be used in determining the final grade and the weightings of these elements will be decided by the department from which the course emanates. Normally, a proctored examination will be required.

7.4 For each course a student must complete term work and all assignments to the satisfaction of the department concerned.

7.5 Students must normally complete all required course work prior to the last day of the term in which the course is offered. Students with incomplete work will normally receive a final grade based on work completed. Under exceptional circumstances, the Department Head may allow an incomplete grade to be assigned followed by the code “IN”, provided that the student requests an incomplete grade and the instructor agrees to accept the outstanding work. (Prior to granting such a request, the Department Head may require a written appeal and/or medical certification or other documentation that demonstrates extenuating circumstances.) When the Department Head agrees to allow an incomplete grade to be awarded, the student will be advised in writing of the last acceptable date for receipt of late work.

7.6 If a revised mark has not been submitted before the end of the following term, the “IN” annotation will be automatically deleted from the transcript and the interim

mark will stand as the final mark. (This one-term maximum may be extended when failure to complete course requirements is clearly due to exceptional circumstances (i.e., not simply workload demands). However, when it is unlikely that a student will be able to complete a course due to Canadian Forces operational requirements, the student is encouraged to apply to withdraw without penalty.)

8. TRANSCRIPT NOTATIONS

8.1 In addition to numeric and letter grades, the Royal Military College of Canada uses the entries shown in Table 8-1 on the student's Transcript to reflect course status:

TABLE 8-1 TRANSCRIPT NOTATIONS

Transcript Notation	Meaning
AC	Accepted/Accepté (refers to thesis or project)
AE	Aegrotat credit/aegrotat
AU	Audit/Auditeur livre
BP	Board Pass/Crédit du Conseil
CG	Credit Granted/Crédit accordé
CN	No Credit/Crédit non accordé
EX	Extra Course/Cours supplémentaire (in excess of normal degree requirements)
EXE	Exempt/Exempté (no credit given)
IN	Incomplete/Incomplet
IP	In Progress/En cours
TC	Transfer Credit/Crédit de transfert
WD	Withdrawn/Abandonné

9. CREDITS

Each course has been assigned a credit value, which is included in the Calendar description. Credits are used in determining the average and academic standing of a student. The actual credits assigned to a course are function of the contact time and are shown in Table 9.1

TABLE 9-1 CREDITS AS A FUNCTION OF CONTACT HOURS

Weight	Credit
0-2	0.0
3-5	0.5
6-8	1.0
9-11	1.5
12-14	2.0
15-17	2.5
18-21	3.0

Note: Weight = (2 X Lecture hours/week + Tutorial hours/week+ Laboratory hours/week) X Number of Terms

10. FINAL EXAMINATION

10.1 Final examinations will be held at dates and times specified in the examination timetables. Final examinations may be held outside the specified exam period only with prior approval of Faculty Council.

10.2 The instructor may refuse a student permission to write a final examination in a course if the requirements with regard to course work have not been met.

10.3 Under exceptional circumstances, including illness or deployment, a student may be granted, by the instructor or the Department Head concerned, permission to reschedule a final examination.

10.4 Final Standing is granted by the Senate upon recommendation from the Faculty Board and Faculty Council.

11. ACADEMIC GRADES

11.1 Grades for all courses appear on transcripts as letter grades and per cent grades.

11.2 Gradation of Academic Distinctions used by the Royal Military College of Canada is shown in Table 11-1.

TABLE 11-1 GRADATION OF ACADEMIC DISTINCTIONS

	Letter Grade	Percentage Grade Relationship
First Class	A+	94-100
Distinction	A	87-93
	A-	80-86
Distinction	B+	76-79
	B	73-75
	B-	70-72
Pass	C+	66-69
	C	63-65
	C-	60-62
	D+	56-59
	D	53-55
	D-	50-52
Failure	E	40-49
Serious Failure	F	0-39

12. ACADEMIC DISTINCTIONS

12.1 Students graduating with a Bachelor of Arts (Honours) who have attained at least an A- average in the 300 and 400 level honours courses will have their transcripts annotated "First Class Distinction". Students graduating with a Bachelor of Arts Honours who have attained at least a B- average in the 300 and 400 level honours courses will have their transcripts annotated "with Distinction".

12.2 Students graduating with a Bachelor of Science (Honours) who have attained at least an A- average in the 300 and 400 level honours courses will have their transcripts annotated "First Class Distinction". Students graduating with a Bachelor of Science Honours who have attained at least a B- average in the 300 and 400 level honours courses will have their transcripts annotated "with Distinction".

12.3 Students graduating with a Bachelor of Engineering who have attained at least an A- average in all 400 level courses will have their transcripts annotated "First Class Distinction". Students graduating with a Bachelor of Engineering who have attained at least a B- average for all 400 level courses will have their transcripts annotated "with Distinction".

12.4 Students graduating with a Bachelor of Military Arts and Science (Honours) who have attained at least an A- average in the 300 and 400 level honours courses and achieved at least a B in their Directed Research Project will have their transcripts annotated "First Class Distinction". Students graduating with a Bachelor of Military Arts and Science (Honours) who have attained at least a B- average in the 300 and 400 level honours courses and achieved at least a B in their Directed Research Project will have their transcripts annotated "with Distinction".

12.5 For all other undergraduate degrees, students who have attained at least an A- average for all their 300 and 400 level RMC courses, based on a minimum of five courses, will have their transcripts annotated "First Class Distinction". Students who have attained at least a B- average in the 300 and 400 level RMC courses, based on a minimum of five courses, will have their transcripts annotated "with Distinction".

13. AEGROTAT STANDING

13.1 Aegrotat Standing in a course may be granted by the Faculty Council to a student who has been unable to write the final examination, but who has received satisfactory term marks. Courses passed with an Aegrotat Standing will be so annotated in the transcript and not be included in the calculation of overall average.

14. PASS STANDING

14.1 A student is on Pass Standing unless the student is placed on Warning, Probation or is required to Withdraw.

15. WARNING

15.1 A Full Time student shall be placed on Warning if at the end of any term:

a. The student fails one or more courses resulting in a total of less than 2 failed credits; and

b. The student's term average is greater than 50 percent.

15.2 A Full Time student will be removed from Warning if the student passes all completed courses taken in the subsequent two academic terms.

15.3 A Part Time student shall be placed on Warning if, after taking courses in any given Programme of Study, the student has failed courses totalling more than four credits.

15.4 A Part Time student must pass all subsequent courses taken totalling no less than 8 credits to be removed from Warning.

16. PROBATION

16.1 A Full Time student shall be placed on Probation if:

a. The student fails a course while on Warning; or

b. The term average is less than 50 per cent but greater than or equal to 45 percent; or

c. The student fails courses whose total credit value is greater than or equal to 2 but less than or equal to 4; or

d. The student fails one or more Supplemental Examinations.

16.2 A student will be removed from Probation if all courses taken in the subsequent two terms are passed and if the student's cumulative average is equal to or greater than 50 percent.

16.3 A part time student shall be placed on Probation if:

a. The student was on Warning and fails any mandatory course; or

b. The student's cumulative average is less than 50 per cent but equal to or greater than 45 percent; or

c. The student has failed courses totalling more than eight credits.

16.4 A Part Time student must pass all subsequent courses taken totalling no less than 8 credits to be removed from Probation.

17. WITHDRAWAL

17.1 Except when exceptional or extenuating circumstances are present, a Full Time student will be required to Withdraw from a Programme of Study if:

a. A Mandatory Course is failed for a second time; or

b. The term average is less than 45 per cent; or

c. The student fails Mandatory Courses totalling more than 4 credits in any term; or

d. The student has failed courses totalling more than eight credits.

17.2 Except when exceptional or extenuating circumstances are present, a Part Time student will be required to Withdraw from a Programme of Study if:

a. The student on Probation fails a course that the student has previously failed; or

b. The student on Probation has a cumulative average of less than 45 per cent; or

c. The student has failed courses totalling more than twelve credits.

17.3 A student who is required to Withdraw from a Programme of Study may apply for admittance to a different Programme of Study. Permission of the appropriate Dean is required for admittance to a new Programme of Study.

17.4 The Senate of the Royal Military College of Canada may at any time require a student to withdraw from the University if his or her conduct, attendance, work or progress is deemed unsatisfactory.

18. RE-ADMITTANCE

18.1 A student who has been required to Withdraw from a Programme of Study may apply to be re-admitted to the Programme of study no sooner than 12 months after receipt of the notification requiring withdrawal.

18.2 A student who is re-admitted to and is subsequently required to Withdraw from a Programme of Study for a second time will not normally be permitted to apply for re-admittance.

19. SUPPLEMENTAL EXAMINATIONS

19.1 Supplemental Examinations at the Royal Military College of Canada will be held at dates and times specified in the Supplemental Examination timetables.

19.2 Both the original mark and the mark for any supplemental examinations will be shown on the student's transcript.

19.3 Unless precluded by Faculty Council, a Full Time student will be granted the option of writing Supplemental Examinations, provided that:

a. the student's mark in the course is less than 50% but greater than or equal to 40%; and

b. the student's overall Term Average is not less than 50%.

19.4 A Full Time student will not be permitted to write more than two Supplemental Examinations in any term.

19.5 No full-time student will be allowed to write more than four Supplemental Examinations during the student's entire period of undergraduate study at the Royal Military College of Canada.

19.6 Part-time students are not permitted to write Supplemental Examinations.

20. LANGUAGE USED IN EXAMINATIONS AND COURSE WORK

20.1 A student may write examinations in either English or French, except that the examinations in language courses must be written in the language concerned.

20.2 With the exception of language courses, a student may write assignments or other course work in the student's first official language. However, the student must inform the instructor of the student's intention of handing in assignments and other course work written in the official language different from the one in which the course is given no later than seven days after the beginning of the term. If the instructor is unable to mark course work written in that language, the instructor must immediately inform the department responsible for the course of the student's request. The department shall make arrangements for the course work written in that language to be properly marked.

21. COMPLAINTS, GRIEVANCES, APPEALS AND RE-READS OF EXAMINATIONS

21.1 A student with a complaint or issue that is academic in nature should first communicate the concern to the involved instructor in an informal manner. This should be done as soon as possible after the student first becomes aware of the issue. The student must ensure that the instructor is aware of all of the facts that the student believes have a bearing on the issue, and which could affect the instructor's reconsideration of the issue, but which may not have been considered in the instructor's initial decision. The instructor will examine the issue again, reconsider the decision on the basis of the information that the student has provided, and will provide a response to the student as quickly as is practicable, and normally within 7 calendar days.

21.2 If the student is not satisfied with the instructor's decision, the student should take up the issue with the chair of the department or programme of study concerned in an informal manner. The student must ensure that the chair of the department or programme of study is made aware of all the relevant facts having a bearing on the issue. The chair of the department or of the programme of study concerned must provide a response to the student as quickly as is practicable, and normally within 7 calendar days.

21.3 If the student is not satisfied with the decision, a formal Appeal may be made to the Dean of the division responsible for the programme. This Appeal must be made in writing and submitted, through the appropriate Department Head or Programme Chair, as soon as practicable, but not later than 21 calendar days after the student was informed of the instructor's decision. The student should attach to the Appeal copies of all relevant documents in order to provide the correct information, and when copies are not available, provide clear references to other documents that the student feels are relevant. The responsible Dean will inform the student in writing of the decision with respect to the Appeal, normally within 14 calendar days of the date of receipt of the completed Appeal from the student.

21.4 If the student is not satisfied with the decision reached by the Dean, an Appeal may be made to Faculty Council. The student must submit the Appeal in writing, within 21 calendar days of receiving the decision of the Dean. The student must submit the Appeal to Faculty Council through the Registrar, and should attach to the Appeal copies of all relevant documents in order to provide the correct information. When copies of documents are not available, the student must provide clear references to those documents that the student feels are relevant. Appeals to Faculty Council will normally be considered at the next scheduled meeting of Faculty Council, provided that the Registrar received the Appeal at least four working days before the scheduled meeting of Faculty Council. The Registrar will inform the student in writing of the decision about the Appeal that was made by Faculty Council.

21.5 If the student's complaint or grievance pertains to the marks awarded on a final exam and cannot be resolved in an informal manner, the student may make a formal request to have the exam re-evaluated. This request is to be made in writing to the Registrar. The Registrar will forward the request for re-read to the Head of the appropriate department, who will decide how the re-read will be conducted. The result of the final exam re-read will be used to determine the student's final course grade. To ensure that such matters are addressed with due diligence, a request for re-read must normally be submitted not later than 30 days after the student has been made aware of the result. A request for re-read will address only one exam, and normally will not be entertained for assignments, tests, or any other work that has been removed from the custody of the instructor after being marked and recorded.

21.6 A student wishing to make a complaint on an academic issue which is not related to a specific course has to take it directly to the person responsible, whether the programme chair, the head of department or the dean. The complaint or grievance will then follow the process within the delays as prescribed above which apply to the other types of complaints or grievances.

22. ACADEMIC MISCONDUCT

22.1 The three categories of academic misconduct are as follows:

a. Cheating, some examples of which are the following:

(1) An act of attempt to give, receive, share or utilize unauthorized information or assistance before or during a test or examination;

(2) Deliberate failure to follow rules on assignments, presentations, exercises, tests, or examination;

(3) Tampering with official documents, including electronic records;

(4) Falsifying research data;

(5) The inclusion of sources that were not used in the writing of the paper or report;

(6) The impersonation of a candidate at an examination.

b. Plagiarism, which includes the following:

(1) Deliberately and knowingly using the work of others and attempting to present it as original thought, prose or work. For example, this includes failure to appropriately acknowledge a source, misrepresentation of cited work, and misuse of quotation marks or attribution; and

(2) Failure to acknowledge adequately collaboration or outside assistance.

c. Other violations of academic ethics, including the following:

(1) Deliberately not following ethical norms or guidelines in research;

(2) Failure to acknowledge that work has been submitted for credit elsewhere; and

(3) Misleading or false statements regarding work completed.

22.2 Penalties are imposed upon students found guilty of academic misconduct in consideration of mitigating or aggravating circumstances. 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, in cases of aggravated or repeated academic misconduct.

22.3 In cases of repeated or aggravated academic misconduct, when the student is a member of the Canadian Forces, the student's Commanding Officer shall be notified by the Commandant of the Royal Military College of Canada of the infractions. In any instance of academic misconduct by a Canadian Forces member further administrative action may be taken, as deemed appropriate by the member's Commanding Officer.

22.4 Students who are found guilty of repeated or aggravated academic misconduct and, as a consequence, are expelled from RMC may not apply for a degree from RMC nor to be admitted again in any Programme of Study nor apply to attend any course offered by RMC.

ADDITIONAL REGULATIONS OF THE ROYAL MILITARY COLLEGE OF CANADA

The Academic Regulations for the RMC Undergraduate Programme were amended effective 1 September 2003. The following Academic Regulations were in effect prior to 1 September 2003 and continue to apply to students attending RMC under the ROTP, RETP and UTPNCM programmes until officially amended or rescinded.

29. To be granted pass standing a cadet must:

a. achieve a satisfactory standard in Physical Education and in Military Training;

b. achieve a satisfactory standard in Second Language Training; and

c. obtain a favourable report in Officer-Like Qualities.

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.

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BAND INSTRUCTOR - Warrant Officer S. Gagnon, CD

PIPE-MAJOR - Sergeant J. Donnelly, CD

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VARSITY MANAGER - Mr G. Dubé, BComm (SPAD) (Laurentian)

PHYSICAL EDUCATION MANAGER - Ms. N. Tremblay, BSc (Concordia), PFLC, CSCS, NCCP II Canoeing-Kayacking, NCCP I Cross Country Skiing, Instructor CFC, NLS

RECREATION AND INTRAMURAL MANAGER - Mr M. Robillard, CD

WOMEN'S SOCCER PROGRAM COORDINATOR AND HEAD COACH - Mr C. Beaulieu, BSc H.K. (Ottawa), NCCP III, Ontario Soccer Association Provincial "B" License

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PHYSICAL EDUCATOR INDIVIDUAL SPORTS PROGRAM COORDINATOR - Mr B. Bennett, CD, CFC, NCCP II Volleyball

PHYSICAL EDUCATOR MILITARY SKILLS PROGRAM COORDINATOR - Mr J. Blanchet, CD, CFC, Rappel Master

PHYSICAL EDUCATOR COLLECTIVE SPORTS PROGRAM COORDINATOR - Ms S. Bruff, BPEd (Memorial), BA (Memorial), BEd (Memorial), MA (Queen's), NCCP III Volleyball, NCCP III Soccer, NCCP I Canoeing, White Sail Sailing, NCCP I Powerlifting, CFC

PHYSICAL EDUCATOR EVALUATION PROGRAM COORDINATOR - Mr D. Gaboury, BPhEd (Laval), CFC, NCCP III Volleyball, NCCP I Broomball, NCCP I Handball, NCCP IV Task 3 (Volleyball Canada), Power lifting I

VARSITY COORDINATOR - Mr J. Girard, CD, NCCP Level II Badminton

FENCING PROGRAM COORDINATOR AND HEAD COACH - Mrs P. Howes, ChPC, BA (Carleton), National Coaching Institute diploma in high performance coaching (Winnipeg), NCCP IV Fencing, Prevot d'Armes Diploma

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PHYSICAL EDUCATOR TAEKWONDO COACH - COMBATIVE PROGRAM COORDINATOR - Mr P. Nicol, CD, BA (CMR), CFC, 4th Dan WTF TKD, NCCP III Theory, NCCP I Handball

MEN'S HOCKEY PROGRAM COORDINATOR AND HEAD COACH - Mr K. Nobes, M.A. (McGill), BEd (McGill), NCCP Advanced I Hockey

MEN'S BASKETBALL PROGRAM COORDINATOR AND HEAD COACH - Mr C. Norman, BA (Concordia), Graduate National Coaching Institute (Toronto), NCCP IV Basketball

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WOMEN'S BASKETBALL PROGRAM COORDINATOR AND HEAD COACH - Mr B. Schur, BA (RMC), NCCP III Basketball

ACTING ASSISTANT RECREATION AND INTRAMURAL - Ms T. Marshall, Business Diploma, NCCP I Swimming, NLS (Pool/Waterfront), First Aid/CPR, First Aid/CPR Instructor, Bronze Med/Bronze Cross Instructor/Examiner, Red Cross Swimming Instructor, Aquafit/Step Instructor, CFC CSEP, WHMIS

SHOOTING PROGRAM COORDINATOR AND PISTOL HEAD COACH - Mr A. Wilkinson, BA (Queen's), NCCP II Pistol

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SENATE OF THE ROYAL MILITARY COLLEGE OF CANADA

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GENERAL STRUCTURE OF THE UNIVERSITY

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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 (Human Resources - Military) (ADM (HR - Mil)) 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, the Director of Cadets, 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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A.J. BARRETT, CD, rmc, BSc, MSc (RMC), PhD (London) - Vice-Principal, continuing, Integrated and Satellite Programs, Dean of Canadian Forces Military College, Director of Learning Management at the Canadian Defence Academy, and professor of Mathematics and Computer Science.

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- Head of the Department and Professor of Business Administration.

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H. HASSAN-YARI, BA (Mashhad), MA, PhD (UQAM) - Associate Professor of Politics and Head of the Department of Politics and Economics. Cross-appointed to the War Studies Programme and the Business Administration Department.

M. A. HENNESSY, BA (British Colombia), MA, PhD (New Brunswick) - Associate Professor of History and Director of the Department.

COLONEL J.G. LINDSAY, OMM, CD, rmc, plsc, qtc, pcsc, BEng (RMC) - Director Land Force Technical Staff Programme and Head of the Department of Applied Military Science.

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LIEUTENANT-COLONEL D.M. LAST, CD, BA (RMC), MA (Carleton), MMAS (USGGSC), PhD (London) - Registrar and Secretary of the Faculty Council.

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