Collège militaire royal de Saint-Jean

CALENDAR
1991-1992

CANADIAN MILITARY COLLEGE
Saint-Jean-sur-Richelieu
Québec, Canada

1991

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COLLÈGE MILITAIRE ROYAL DE SAINT-JEAN

ACADEMIC YEAR 1991-1992

First term

August 10	Saturday	Recruits arrive
August 22	Thursday	Students return
August 23 - 25	Friday - Sunday	Administrative Days
August 26	Monday	Classes start
September 2	Monday	Labour Day Holiday
October 5	Saturday	Fall Prize Giving Ceremonies
October 14	Monday	Thanksgiving Holiday
November 11	Monday	Remembrance Day Holiday
December 3	Tuesday	Classes end
December 4	Wednesday	Exams start
December 14	Saturday	Exams end
Dec. 19 - Jan. 7	Thursday - Tuesday	Christmas Leave

Second Term

January 3, 4	Friday, Saturday	Supplemental Examinations
January 5	Sunday	Students return
January 6	Monday	Classes start
Feb. 29 - Mar. 8	Saturday - Sunday	Reading Week
April 17	Friday	Holy Friday Holiday
April 24	Friday	Classes end
April 27	Monday	Exams start
May 8	Friday	Exams end
May 12, 13	Tuesday, Wednesday	Supplemental Exams for 4th Year
May 15, 16	Friday, Saturday	End of Year Ceremonies
May 18 - 20	Monday - Wednesday	Supplemental Exams for remaining years

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Chief of the Defence Staff
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Assistant Deputy Minister (Personnel)
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Major W.A.C.R.G. Harrod, C.D., B.Eng., RRMC, RMC, P.C.S.C.

THE CANADIAN MILITARY COLLEGES

There are three Military Colleges in Canada:

the Collège militaire royal de Saint-Jean (CMR) at Saint-Jean-sur-Richelieu, Québec;

the Royal Military College of Canada (RMC) at Kingston, Ontario; and

the Royal Roads Military College (RRMC) at Victoria, British Columbia.

ROLE AND OBJECTIVE

The role and objective of the Canadian Military Colleges is:

a.   to prepare candidates for effective service as commissioned officers in the Canadian Forces by

(1)   providing a university level education in appropriate disciplines designed on a broad base to meet the 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 fitness,

(5)   stimulating an awareness of the ethic of the military profession;

b.   to improve the academic background of commissioned officers in the Canadian Forces by providing undergraduate and postgraduate courses in appropriate fields.

ACADEMIC OPPORTUNITIES

The Canadian Military College (CMC) programme is designed to educate selected candidates to the baccalaureate level in either Computer Science, Engineering, Science, Arts or Administration. It is also designed to provide them with a well-rounded education. Thus, while the Engineering and Science programmes provide specialization within certain fields of Engineering or Science, they also offer a grounding in arts. Similarly, the Arts and Administration programmes offer a wide field for specialization in the humanities as well as a grounding in Mathematics and Sciences.

Course duration

At CMR, the courses of study are of four or five years duration depending upon whether you are accepted into First or Preparatory Year. All courses of study at RMC and RRMC are of four year duration.

Language training

An important objective of the Canadian Military Colleges and CMR de Saint-Jean in particular is to produce officer cadets who are able to communicate and function in both official languages.

Second language training is mandatory for all officer cadets entering the Preparatory Year at CMR Saint-Jean.

Upon entry Preparatory students are given Canadian Forces Linguistic Proficiency Tests (LPTs) to determine their second language proficiency in each of four skills: listening comprehension, oral expression, reading comprehension, and written expression.

These proficiency tests (LPTs) are administered by the Second Language Centre at CMR. Proficiency in each of the above mentioned skills is measured on a six-point scale (0-5) to give each officer cadet a second language profile eg.: 2 1 2 1. Homogeneous classes are formed by the Second Language Centre based on the second language profiles of the students.

As it is mentioned above, second language training is mandatory for all officer cadets in Preparatory Year. In First, Second, Third and Fourth Years, it is mandatory for all officer cadets who have not attained the "integral" bilingualism level. The integral level is defined as scores of at least 4 in listening and speaking, with a minimum total of 14 (eg.: 4 4 3 3). After Preparatory Year, students who attain the "integral" level are no longer required to take second language training. First Year students who do not achieve the "integral" level by the end of the academic year will take an intensive summer course (ten weeks - 200 hours).

The Second Language Centre must administer the LPTs at the end of each academic year and after the summer intensive course, so as to have an annual update of each officer cadet's second language profile.

Second language proficiency is a degree requirement for officer cadets who entered in 1986 and thereafter. The minimum language profile requirement (which is under review) has been established at 2 2 2 2 (or any combination of the four profile scores totalling not less than 8). The 2 2 2 2 profile is considered a minimum requirement and students will be required each year to achieve a satisfactory rate of progress in their second language up to the "integral" level.

In order to satisfy collegiate requirements, students are given final examinations each semester. In Preparatory and First Years, students earn units (2 units) for each course taken. However, in Second, Third and Fourth Years, second language courses are non-credit courses.

The benchmarks for officer cadets' bilingual proficiency have been established as:

Integral - 4 4 3 3 - Scores of at least 4 in listening and speaking with a minimum total of 14.

Functional - 3 3 2 2 - Scores of at least 3 in listening and speaking with a minimum total of 10.

Minimal - 2 2 2 2 - Any combination of the four profile scores totalling not less than 8.

Second language courses, which benefit from the bilingual environment at CMR, are extremely successful. Officer cadets are expected to demonstrate excellent progress in acquiring bilingual skills.

Students are grouped in small, homogeneous classes, usually composed of less than ten students, and are offered tutorials designed to maximize the impact of second language instruction.

Four periods of second language instruction are given every week during normal class hours in Preparatory and First Year. In Second, Third and Fourth Years, students receive three periods per week of second language instruction.

To increase exposure to the second language and to underline the bilingual character of CMR, activities are conducted in both official languages except for courses. The academic year is divided into English and French weeks to reflect the bilingual nature of the college and to provide students the opportunity to work in their second language.

Military Leadership studies

Courses in Military Leadership and Management are integrated into the academic studies. Principles of leadership from a historical perspective are integrated with concepts and practices drawn from the disciplines of psychology and sociology. Emphasis is also placed upon principles of personnel management as applied in the Canadian Forces.

MILITARY TRAINING

The primary role of the Canadian Military Colleges is to educate and train career officers for the Canadian Forces and therefore, students will undergo intensive military training during each academic year as well as during summer periods.

The military training is designed to develop those qualities essential in a good leader. It is based on the principle that "no one is fit to command who has not learned to obey" and progresses to the point where, under supervision, officer cadets of the senior year are responsible for the discipline, organization and general administration of the cadet organization. Thus, when they reach senior year, they will be able to practice and become experienced in the techniques of leadership and men management which they have been taught during their early training. This officer cadet organization gives excellent training in leadership, acceptance of responsibility, and proper exercise of authority; moreover, it engenders a healthy competitive spirit. Parade and ceremonial drill also form part of this training.

The rank of officer cadet

Students will be enroled in the Canadian Forces as officer cadets. Consequently, they will be subject to a code of discipline consistent with regulations. A copy of the instructions which outline the policy and procedures governing the activities of the officer cadets' organization will be issued. As part of a leadership development process, daily life will be regulated through orders and instruction which students will be expected to interpret intelligently and observe by means of self-discipline.

Upon graduation, officer cadets will immediately be promoted to the commissioned rank of Second Lieutenant.

Military Career functional groups and occupations

Upon enrolment, most officer cadets are assigned to one of five Career Functional Groups - Sea Operations, Land Operations, Air Operations, Engineering or Support. Thus, before making an application, you should think seriously about the selection of your future occupation as an officer. During your first academic year, you will be assigned a Military Occupation (MOC) within your selected Functional Group based on your preferences and the needs of the Canadian Forces. This aspect of your application is therefore very important as changes in groupings are not normally approved. It is wise to seek advice from the Military Career Counsellor at the Recruiting Centre before you select a Functional Group. (See Figure 3 at the end of the English text).

Canadian Forces counselling

Officers from most of the MOC's are members on the staff of the three colleges and are responsible for the military career counselling of all students. These officers are available at all times to answer queries on military matters and to offer advice on careers in the Canadian Forces.

Initial training

Entry of First Year candidates into RMC and RRMC is contingent upon successful completion of a six week basic officer training course (BOTC). The aim of this course is to develop essential officer-like qualities and provide an introduction to those military subjects, the knowledge of which is essential to all officers in the Forces. First Year candidates will attend BOTC in Chilliwack, B.C. Students entering Preparatory or First Year at CMR will attend BOTC the summer following their first year of studies.

Upon arrival at the Military College, officer cadets will undergo a short orientation course designed to familiarize them with the daily routine at the College.

Training in subsequent summers

Except for those entering CMR in the Preparatory or First Year, officer cadets will spend the summer following the first academic year pursuing a course of intensive language training.

Subsequent summers will be spent in practical military training in the assigned military occupation. During the summer term, normal pay and allowances will be received. This term is of approximately nine week duration but varies according to military occupation. Upon completion of this training, annual leave is normally granted prior to commencement of the next academic year.

PHYSICAL EDUCATION & ATHLETICS

This programme provides opportunities for participation in activities that are physically demanding and mentally satisfying. The athletic activities at the colleges are designed to enable students to attain a high standard of physical fitness, to achieve a satisfactory level of sports skills, and to learn the organization and duties of officials for selected activities. This enables officer cadets to organize and run their own intramural sports programme under the professional guidance of the Athletic Department. The physical education and athletic programme is divided into four areas: physical education, intramural sports, intercollegiate sports, and recreation activities.

Physical Education

Physical education is compulsory and is conducted in a 90 minute period per week for the duration of students academic training. Emphasis is placed on fitness and the acquisition of basic skills in a wide variety of sports, including sports in which officers are likely to participate after graduation.

Intramural sports

The Intramural programme involves a wide variety of sports and is directed to all officer cadets so that they may learn and enjoy a broad spectrum of sports activities. Participation is compulsory and even if students have never played certain sports, they will be taught how to play by qualified instructors. They will be using equipment and facilities which often are not available at civilian universities. Intramural sports are also part of the physical conditioning aspect of student life at a CMC.

Intercollegiate sports

Many popular Canadian sports are played at the intercollegiate level. These include team sports such as football, soccer, hockey, water polo, volleyball and basketball and individual sports such as tae kwon do, biathlon and cross-country running. Approximately 45 per cent of the students participate in this programme.

LIFE AT THE COLLEGES

It's a good life, but there is hard work, especially during the first year. However there are many recreational and cultural activities available which compensate for the hard work. Preparatory and First Year students (officer cadets) can expect to receive limited privileges, but then, in the Second, Third and Fourth Years they will be given additional privileges which correspond to increased responsibilities. A unique spirit of comradeship develops among fellow officer cadets and out of this comradeship comes lifelong friendship.

Weekday routine

Although the programme of academic, military, athletic and recreational activities is more demanding, more comprehensive and far more exacting than at any other university, a scheduled daily routine provides time for both recreation and study.

The typical daily routine on weekdays is as follows:

0630	hours -	Reveille
0650 - 0720	hours -	Morning military activities, e.g. parade, room inspections
0640 - 0800	hours -	Breakfast
0800 - 1200	hours -	Classes
1130 - 1215	hours -	Lunch (First Sitting)
1230 - 1315	hours -	Lunch (Second Sitting)
1300 - 1600	hours -	Classes
1630 - 1800	hours -	Sports (Mon-Tue-Thu-Fri) Cultural - Non-Athletic recreation (Wed)
1745 - 1915	hours -	Dinner
1945 - 2245	hours -	Study Period
2300	hours -	Lights Out for Preparatory Year Officer Cadets

On weekends, drill parades and ceremonial practices are sometimes held on Saturday morning and a Commandant's parade is held on one Sunday morning each month. A church service is held every Sunday morning. (Frequency of these activities varies at each college). The remainder of the weekend is normally free. During examinations, most non-academic activities are suspended, although students are expected to get daily exercise.

Officer Cadet Organization

Students at each college are organized into a Cadet Wing composed of a headquarters and several squadrons which in turn are subdivided into flights and sections. Students of the senior classes (at CMR, students of the last two years) hold appointments from Wing Commander to Section Commander and receive practical training in leadership by being responsible for the discipline, progress and efficiency of their wing, squadron, flight or section. This combination of university and military life provides an unparalleled opportunity to practice the leadership and management techniques that are studied in the classroom.

Activities

Besides participating in the physical education and sports programme, students are also encouraged to participate in other recreational, cultural and extra curricular activities at the College. These activities are, for the most part, organized and run by the students themselves.

Cultural organizations

A large number of clubs provide outlets for students' special interests, namely social dance, debating, flying, photography, war games, Canadian Aeronautical Space Institute, international relations, and the Engineering Society. Other organizations such as the Music Club, the Electronics Club (including short wave stations) and the Entertainment Committee (for dances and other activities), and the production of monthly newspapers and college Year Books will give you experience in management. Student participation is sponsored in national and international gatherings, various university-conducted forums, etc. Religious clubs such as the Newman Club and Iota Sigma are also active. Although some of the listed clubs are active at only one college, most are run in all three colleges, depending upon interest.

Recreation

Athletic clubs are organized for those officer cadets interested in parachuting or scuba diving, mountaineering, orienteering and aeronautics. Opportunities are also provided for students to ski, skate, curl, play golf or tennis, and sail. The reading rooms and libraries also provide recreational facilities.

Social

All colleges enjoy frequent formal and informal social events during the academic year. These functions are also organized and run by the students. Each college also has an officer cadets' lounge which provides facilities for relaxation as well as introducing you to the customs and practices of a military mess.

Religion

The Chaplains - Protestant and Roman Catholic - conduct regular Sunday Services of Divine Worship. Students are encouraged to attend church regularly, and are required to attend on occasions specified by the Commandant. The Chaplains are always available for counselling.

The Ex-Cadet Clubs

All those who have attended a Canadian Military College are eligible to become a member of either the CMR Ex-Cadet Club or the RMC Club of Canada - the alumni of the Canadian Military Colleges. As a member of these Clubs, you'll retain a valuable connection with the colleges. In

addition, no matter where duties and responsibilities take fellow classmen, later on their paths will cross many times thereby enabling them to renew the friendships they have made at the College.

ADMISSION PLANS

There are different plans for admission: the Regular Officer Training Plan (ROTP) and the Reserve Entry Training Plan (RETP), as well as the University Training Plan for Non Commissioned Members (UTPNCM), the University Training Plan for Officers (UTPO) and the Postgraduate Training Programmes (PG).

Regular Officer Training Plan (ROTP)

The defence programme at home and abroad has created a demand for a large number of officers to meet current and future needs, especially in the operational and technical fields. The ROTP was introduced to provide the principal source of such highly qualified officers for the Canadian Forces. The plan gives young Canadians the opportunity to obtain both a university education and a commission as an officer in the Canadian Forces. If accepted for entry at a Canadian Military College, candidates are enroled in the regular component of the Canadian Forces as an officer cadet.

The cost of tuition, uniforms, books, instruments, and other essential fees for the duration of the course of studies will be borne by the Department of National Defence. In addition, officer cadets are paid a monthly allowance, with annual increases. This allowance comes as a salary with monthly deductions for income tax, supplementary death benefits, pension plan, rations, and quarters. Free medical and dental care is provided through the entire training period. Annual leave with pay is granted according to regulations.

Officer cadets are obliged to maintain a satisfactory academic and military standard throughout their course. Should they fail a year at College (or a term, if at CMR) they may, on the recommendation of the College, be permitted to repeat a year or term at their own expense and, if successful, be reinstated to full pay and allowances.

Upon successful completion of the course, students will be awarded a degree from a Canadian Military College and a commission as an officer, beginning a career in the Canadian Forces.

Obligatory Service

An officier cadet who commenced subsidized academic training under the ROTP in a Preparatory or First Year baccalaureate programme at a CMC may apply for release before the commencement of the next academic year without service or financial obligation on his part. Such release requests will normally only be considered at the following times during the academic year:

    (1)   on the 1st of November;

    (2)   between the end of the first term final exams and the beginning of the second term; and

    (3)   between the end of the second term final exams and the beginning of the second academic year.

An officer cadet may be granted a voluntary release after the beginning of his second academic year, provided the Crown is repaid the cost of subsidization under the ROTP. This reimbursement can be done by serving as a regular member of the Canadian Forces or by

financially reimbursing the cost of subsidization. Upon graduation, the newly commissioned officers will have incurred an obligation to serve for a period of five years. Release within this period will be considered only under special and unforseen circumstances. Release in such circumstances may be subject to reimbursement of all or part of the cost of subsidization.

Admission to Civilian University

Some candidates who are not accepted at a Canadian Military College because of space limitations or because they do not possess the full academic requirements may be selected for ROTP sponsorship at a recognized post-secondary institution under the terms of the ROTP. This applies also to candidates who intend to pursue a program not available at a CMC (medical studies, for instance).

Reserve Entry Training Plan (RETP)

Students who wish to have military training along with their education, but are not yet prepared to commit themselves to a career in the Regular Forces at the time of entry, should consider the RETP programme.

The Canadian Military Colleges provide vacancies for Reserve entry officer cadets. Admission requirements are the same as those for ROTP applicants. Students receive the same education and training as the ROTP officer cadets but are required to pay fees to defray the cost of tuition, clothing, books, instruments, laundry, dry cleaning, meals and accommodation according to the scale of fees mentioned below. They are also required to take summer classification training for which they receive pay and allowances at the same rate as a Second Lieutenant on Class B service.

Students may transfer to the ROTP at any time during their college course, in which event they pay no further fees and they receive the same financial benefits as the ROTP officer cadet. If you elect to remain a Reserve entry officer cadet, you will be required to serve in a component of the Canadian Reserve Forces upon graduation.

Fees (Reserve Entry Officer Cadets only)

The following approximate fees apply to all officer cadets with reserve status:

a. $1080 each term for tuition, clothing, books, instruments, drawing materials and incidental expenses;

b.   approximately $1800 per term to defray the cost of meals and accommodation;

c.   an annual Recreation Club Fee of $80, including $20 for the Recreation Association.

NOTE -   All fees quoted will be revised periodically, and current costs should be obtained from the nearest Recruiting Centre.

University Training Plan for Non Commissioned Members (UTPNCM)

Training under the UTPNCM is limited to male and female members of the Regular Force who are not officers. Except for certain differences in pay and terms of service, the policy and procedures for the UTPNCM are similar to those for the Regular Officer Training Plan (ROTP). The purpose of the UTPNCM is similar to the ROTP, which is to develop selected candidates for service as career officers in the Regular Force. Like their counterparts in the ROTP, officer cadets

under the UTPNCM will be selected to attend a Canadian Military College (CMC) or a civilian university in Canada.

University Training Plan for Officers (UTPO)

The purpose of the UTPO is to increase the number of officers in the Regular Force with university degrees by enabling deserving officers to obtain degrees while serving.

Under the UTPO, officers of the Regular Force will be sent to a Canadian Military College (CMC) or a Canadian university at public expense. Training is restricted to obtaining an initial baccalaureate. The plan will not be used to train officers for a second baccalaureate or higher degree.

Postgraduate Training Programmes (PG)

The PG Training programmes are designed to qualify Officers of the Regular Force for duties which require academic qualifications higher than a baccalaureate degree. This training can be provided by a Canadian Military College (CMC) or a civilian university.

Information

Complete information on the above mentioned training plans can be obtained from the Director of Recruiting and Selection, National Defence Headquarters, Ottawa, Ontario, KIA OK2 or from any Canadian Forces Recruiting units listed in the yellow pages under "Recruiting". The Registrar at one of the Canadian Military Colleges can provide more detailed information on Academic Programmes if desired.

Collège militaire royal de Saint-Jean
Saint-Jean-sur-Richelieu, Quebec J0J 1R0
Tel. 514-358-6519

The Royal Military College of Canada
Kingston, Ontario K7K 5LO
Tel. 613-541-6302

Royal Roads Military College
Victoria, British Columbia V0S IB0
Tel. 604-380-4514

GENERAL ADMISSION REQUIREMENTS

General qualifications

Admission requirements for ROTP and RETP entry are the same. As a candidate for admission, you must:

a. be a Canadian citizen;

b. have preferably reached your 16th birthday on or before January 1st of the year of your enrolment;

c. for entry to RMC, RRMC or First Year at CMR, you must be preferably under 21 years of age on January 1st of the year of your enrolment;

d.   for entry to the Preparatory Year at CMR, you must be preferably under 20 years of age on January 1st of the year of your enrolment;

e.   meet the medical standards for enrolment as prescribed;

f.   obtain a passing standing in a series of pre-enrolment tests as prescribed;

g.   be single; and

h.   possess the necessary academic qualifications.

Physical requirements

Candidates are required to meet the common enrolment standards of the Canadian Forces. The fundamental medical requirement is a sound, healthy body with normal mental and muscular co-ordination. 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 hearing acuity. Any condition which, in its present state, or in a more advanced state, could limit your career as a member of the Canadian Forces will be cause for rejection. You should be prepared to participate fully in a vigorous, progressive physical training program.

Further information on physical requirements may be obtained from a military career counsellor at your nearest Canadian Forces Recruiting Centre.

General Academic Requirements

To meet the minimum requirements for admission to any of the three CMC's, candidates must present satisfactory marks as well as having matriculated at the level designated below:

	Preparatory Year** CMR - only	First Year** RMC, RRMC and CMR
Nfld	Grade 11	Grade 12
P.E.I.	Grade 11	Grade 12
Nova Scotia	Grade 11	Grade 12
N.B.	Grade 11	Grade 12*
Québec	High School Leaving (11) Secondaire V	CEGEP I or equivalent***
Ontario	Grade 12	Grade 13 or equivalent***
Manitoba	Grade 11	Grade 12
Sask.	Grade 11	Grade 12
Alberta	Grade 11	Grade 12
B.C.	Grade 11	Grade 12

*   Specific subjects offered for CMR admission must be at the 121 or 122 level with 121 level courses preferred.

**   See "Academic requirements for admission in Preparatory Year" and "Academic requirements for admission in First Year" (p. 50-51).

***   I4 Courses (See: "Programme Outlines - Preparatory Year") (p. 69-70).

In the light of the course requirements at the Military Colleges, mathematics/science average in high school will be an important criterion in the selection process.

University certificates of academic standing and high school graduation diplomas from other recognized examining bodies will be assessed and accepted in so far as they meet the prescribed entrance requirements.

Admission Procedure

Application forms may be completed at either a Canadian Forces Recruiting Centre (CFRC) or a mobile recruiting office. Your birth certificate and a report of educational achievement should be submitted.

Application date

Application should be made as early as possible in your final year of high school or GEGEP I (or equivalent) preferably before March 1st, of the year in which you seek admission. Your academic record should be completed with information that is up to date at the time of application, after which school marks should be sent to the Recruiting Centre as soon as possible after they are received in order to ensure rapid processing of your application.

If you are applying for the Canadian Military Colleges, you are urged to submit an application to other universities or colleges in addition so that you will not be denied the opportunity of continuing to university or college in the event that you are not selected for the Canadian Military Colleges. However, evidence of admission to a Canadian university or college is not required for consideration for a place at a CMC.

Selection procedure

Eligible applicants for the ROTP or RETP will be required to appear, by appointment, at a Canadian Forces Recruiting Centre (CRFC) for a medical examination, testing and an interview at a convenient time after the date of their application. Within Canada, applicants not residents of the city within which the CFRC is located will normally be provided with return transportation normal travelling expenses from their place of residence to the CFRC, and with living expenses while at the CFRC.

You will be advised shortly after your interview as to the status of your application. You will be considered for admission to the Military College of your first choice, provided there is a vacancy at that college and that you meet the appropriate minimum admission requirements. Otherwise, you may be considered for entry at another Military College or a recognized civilian post-secondary institution.

Final selection is based on academic standing and on the recommendations of the Interview and Medical Boards and is made by the National Board of Selection. Selection is competitive on the bases of merit, and possession of the minimum admission requirements does not give assurance of acceptance. Chosen candidates are those assessed as being the best for the existing vacancies.

Joining instructions

As soon as the decision of the Final Board of Selection is made known, successful applicants will be informed of the date of posting to the Basic Officer Training Course (RMC and RRMC seniors only), when they must report to their CMC, of the procedures to be followed, and

of the clothing and equipment they should bring with them. They also will be given instructions about transportation and travelling allowances.

UNIVERSITY TRAINING PLAN -- OFFICERS (UTPO)

Officers of the Regular Force who are candidates for the University Training Plan -- Officers (UTPO) may be selected to attend Le Collège militaire royal de Saint-Jean, the Royal Military College of Canada, or the Royal Roads Military College, in accordance with the rules and procedures set forth in CFAO 9-40, University Training Plan - Officers.

According to this order, candidates must be able to obtain a bachelor's degree within a period of two years or less (four terms). Programs of studies which are offered are described in the College Calendars. Any request for information of a strictly academic nature concerning admission to CMR, RMC or RRMC under the UTPO, should be addressed to the College Registrars.

UNIVERSITY TRAINING PLAN -- NON COMMISSIONED MEMBERS (UTPNCM)

Men and women of the Regular Force who apply for enrolment under the University Training Plan -- Non Commissioned Members (UTPNCM) may be selected to attend CMR, RMC, or RRMC, in accordance with the policy and administrative procedures set forth in CFAO 9-l3, University Training Plan - Non Commissioned Members.

Candidates must meet the educational requirements set by the College authorities. Duration of their studies may vary according to the level and quality of their academic background. The available programmes are detailed in the calendar of the colleges.

Any request for information concerning admission to the colleges under this program must be addressed to the Registrars.

POSTGRADUATE STUDIES

Officers of the Regular Force and of the Primary Reserve who are candidates for the Postgraduate (PG) Training programmes may be selected to attend CMR, RMC or RRMC, in accordance with the rules and procedures set forth in CFAO 9-33, Postgraduate Training programmes - Regular Force and Primary Reserve.

CMR actually offers a postgraduate study programme leading to an M.Sc., in Operational Research. This programme and the postgraduate studies rules and regulations are published in a separate brochure which can be obtained from the CMR Registrar's office.

SCHOLARSHIPS, PRIZES AND AWARDS

Scholarships and Bursaries

Regular Officer Training Plan

Scholarships awarded in recognition of academic merit may be retained under the ROTP.

Reserve Entry Plan

Applicants under the Reserve Entry Plan may be eligible for a number of scholarships and bursaries that are available to students at Canadian universities.

Canada Scholarships

The Canada Scholarships programme recognizes excellence and outstanding achievement and encourages young scholars, particularly women, to pursue undergraduate degrees in science and in engineering. A number of Canada Scholarships are awarded annually to students entering in First Year at CMR. The scholarships are valued at $2000. in the first year, and are renewable provided the high academic standard upon which the award was premised is maintained.

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 a Canadian Military College.

a.   The value of a Dominion Cadetship shall encompass--

   (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 15 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 paragraph (c), and shall normally be forwarded by the first day of March to a Canadian Forces Recruiting Centre or Canadian Forces Recruiting 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.

Foundation Scholarships - Royal Military College Club of Canada

The RMC Club of Canada sponsors a number of foundation scholarships annually. These scholarships are awarded to qualified Reserve Entry Training Plan (RETP) candidates at any of the three military colleges.

The purpose of the scholarship is to attract outstanding candidates to the military colleges who at the time of entry are not prepared to decide upon a Service career but who, nevertheless, are anxious to profit from the disciplined life and excellent educational facilities available at the military colleges. In the awarding of the scholarships, the principle of scholastic excellence will be observed, in keeping with the purpose of the scholarships. Each scholarship has a value of

$1,000 per year until graduation providing the holder successfully completes each previous college year. It is the intention of the Club that a scholarship coupled with the service pay received during the summer, would enable a cadet to defray the major portion of the basic financial obligations associated with the Reserve Entry Training Plan (RETP).

Application forms and further information may be obtained from:

The Secretary-Treasurer
RMC Club of Canada
Royal Military College of Canada
Kingston, Ontario
K7K 5LO

or from the representative of the Branch of the RMC Club of Canada in your area. Applications must be submitted by May 1st of the year of entry.

Bursary

The Educational Funds of the "AFCEA" Association offers a bursary to the student who particularly distinguished himself or herself in the Second and Third Year of the Computer Science programme.

Terry Fox Humanitarian Award Program

When Terry Fox took his Marathon of Hope halfway across Canada in the summer of 1980, his courageous run, combining both outstanding athletic achievement and high humanitarian ideals, stirred the pride and compassion of Canadians everywhere. Although he was unable to complete his cross-country journey, Terry Fox was successful in raising more than $20 million for the cause of cancer research.

Through the Marathon of Hope and the inspiring example of his courage and determination, Terry Fox made a considerable contribution to the Canadian nation. The Terry Fox Humanitarian Award Program has been initiated by the Government of Canada, on behalf of the Canadian people, to provide permanent and honoured recognition of this single contribution by offering scholarship assistance to those who best exemplify the distinguished qualities and ideals of Terry Fox. The Government of Canada has provided an initial $5 million endowment fund for this purpose.

The Terry Fox Scholarship is a renewable award, subject to satisfactory progress, and is tenable at any Canadian university or college. The value of each award is $3000 annually, for a maximum of four years or until a first degree is obtained. For candidates attending an educational institution in provinces where no tuition fee is applicable, the award value is $2000.

Scholarship candidates must be Canadian citizens or have applied for citizenship at the time of award consideration.

As many Scholarships will be granted each year as the number of creditable candidates who apply, with the total number awarded each year limited by the interest from the investment of the $5 million endowment. Candidates must qualify in the province or territory in which they are ordinarily resident. The field of study is open and at the discretion of the successful candidate.

Applications may be obtained by writing to:

Terry Fox Humanitarian Award Program
711 - 151 Sparks Street
Ottawa, Ontario
K1P 5E3

Deadline for the submission of applications, complete with supporting documents is February 1st.

PRIZES AND AWARDS

All 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. A student who is repeating a semester is not eligible to prizes and awards.

Officers of the UTPO plan are not admissible to prizes and awards offered to officer cadets.

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.

Medals

The Governor-General's Silver Medal, awarded to the student with the highest academic standing in the Fourth Year.

The Governor-General's Bronze Medal, awarded to the student with the highest academic standing in the First Year.

The Ex-Cadet Club Medals, awarded to the students of the First Year who have made the most progress in their second language.

Sword of Honour

This prize is awarded by the Department of National Defence to the Fourth Year student who best combines high standards of proficiency in each of the academic, military, and sports aspects of his training.

UTPNCM Silver Tray

The UTPNCM Silver Tray is awarded to the student in the University Training Program - Non Commissioned Members - who achieved highest all-around proficiency.

Robert Gervais award

The Robert Gervais trophy, presented by the UTPNCM Graduating Class of 1981, is awarded to the outstanding CMR new intake UTPNCM student.

Proficiency prize

This prize is awarded annually to the student who has achieved the highest overall standing in all subjects in his program of study.

Departmental prizes

A departmental prize is awarded annually to the cadet who has achieved the highest standing in the several courses of a department provided that he has passed his year without conditions and has obtained First Class Honours in these courses.

Marcel Benoit prize

This prize is awarded to the Fourth Year officer cadet who has made the most academic progress since the Preparatory Year.

Bull prize in Computer Science

A Bull prize is awarded to the Fourth Year student in Computing Sciences who has obtained the highest average in the specialized courses of study of the common core provided he has maintained an overall academic average of at least 70 per cent throughout the three years of university.

The Shield of Honour

The Shield of Honour presented by the ex-CMR Cadet Club is awarded to the graduate cadet who, by his altruism towards his fellow students and his degree of interest and involvement most contributed to life at the College.

Other awards

Several other prizes and awards are presented to students who distinguish themselves in specific athletics or military activities.

Chancellor and President

The minister of National Defence, The Honourable W.H. McKnight
P.C., M.P.

Vice-chancellor

Brigadier-General R.A. Dallaire
O.M.M., C.D., A.D.C.
Commandant

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Acting Secretary general and Registrar

President

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Major J.N.D. Labrie
C.D.
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Training: Major J.N.C.Y. Meloche, C.D., p.l.s.c.
Career: Major J.L.S. Lavallée, C.D., p.l.s.c., p.c.s.c., B.Adm. (CMR)
Projects and Bilingualism: Lieutenant-Commander N.S. Greenwood, C.D., B.Sc. (RRMC)

Squadron Commanders

Vaudreuil (No. 1) Squadron
Captain J.E.R. Parent, C.D.

Tracy (No. 2) Squadron
Captain J.M.C. Lemay

Jolliet (No. 3) Squadron
Captain J.P.M. Perreault, B.Eng. (RMC)

Hudson (No. 4) Squadron
Captain M.T.F. Tremblay, B.Eng. (Laval)

Iberville (No. 5) Squadron
Lieutenant (Naval) R.J. Forrington, B.A. (RMC)

Preston (No. 6) Squadron
Captain J.L.F. Lévesque

Montcalm (No. 7) Squadron
Captain J.J.R. Provençal, C.D., B.Adm. (CMR)

Saint-Laurent (No. 8) Squadron
Lieutenant-Commander N.S. Greenwood, C.D., B.Sc. (RRMC)

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Director of Athletics
Major J.H. Lansing, C.D., B.A., B.P.E. (McMaster)

Athletic Administrative Officer
Captain J.A.G. Blais, C.D., B.P.E. (UQAM)

Physical Education Officer
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Chief Instructor
Chief Petty Officer second class D. Théoret, M.M.M., C.D.

University Liaison Officers

Major J.M. Leblanc, C.D., B.A. (UBC)
Captain J.A.J. Villeneuve

Military Training and Drill

Chief Instructor and Regimental Sergeant-Major
Chief Warrant Officer R.M. Charest, C.D.

Instructors

Master Warrant Officer R. Laplante, M.M.M., C.D.
Sergeant E.R. Rocray, C.D.
Sergeant J.C. Michaud

Musical Director

Sergeant J.S. Fréchette, B.Mus., B.Mus.Ed. (Laval)

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Director of Administration

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Roman Catholic Chaplain

CAPTAIN E.T. REYNOLDS
B. Th.
Protestant Chaplain

CAPTAIN J.W.M. MORENCY
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Deputy Director of Administration

CAPTAIN J.G.P.P. ST-JEAN
B.Sc.
Staff Officer - Administrative Services

CAPTAIN J. GAUDET
C.D.
Staff Officer - Technical Services

CAPTAIN J.J.Y. GRENIER
C.D., B.Sc.
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C. NICHOLSON
Staff Officer - Civilian Personnel (Acting)

CAPTAIN J.P.B.R. JOBIDON
D.D.S.
Dental Officer

MASTER WARRANT OFFICER J.A.R.J. ROCHETTE
C.D.
Superintendant of the College Administrative Centre

GENERAL

History and Location

CMR is located on the west bank of the Richelieu River on the southern fringe of the town of Saint-Jean in Québec's Richelieu Valley. The original buildings, still in use at CMR, were built around 1839 and were used by various military units which occupied Fort Saint-Jean. Since the opening of the College in 1952, many new facilities have been added.

The site selected for CMR was historically right for this bilingual institution, Fort Saint-Jean having been closely connected with the history of Canada. Throughout the French regime, the Fort helped maintain the advanced posts guarding the invasion route formed by Lake Champlain and the Richelieu. In the fall of 1775, during the American Revolution, Fort Saint-Jean withstood General Montgomery's siege for 45 days, delaying him to the point that his assault on Québec was severely hampered by the onset of winter and ended in complete failure. The defence of the Fort is a glorious page in our history, not only because of its heroic character, but also because it was the first time English-speaking and French-speaking Canadian soldiers were united in a common cause.

The opening of CMR in 1952 offered French-speaking candidates equal opportunity for a military career by providing a Military College education in their mother tongue. CMR provides a pre-university year of study, which enables the College to admit graduates of secondary schools with junior matriculation. Above all, CMR was established as a bilingual college where young Canadians take courses in their mother tongue (French or English) and learn the other official language. The CMR obtained its own University charter in June 1985.

DEGREE PROGRAMMES OFFERED

CMR offers five-year courses beyond junior matriculation leading to the following degrees:

GENERIC	SPECIFIC
Bachelor of Administration	B. Adm.
Bachelor of Science	B. Sc. (General) B. Sc. (Physics) B. Sc. (Applied Physics) B. Sc. (Physics/Mathematics) B. Sc. (Space Science) B. Sc. (Computing Science concentration: Management/Operational Research/Systems) B. Sc. (Chemistry orientation)
Bachelor of Arts	B.A. (Social Sciences) B.A. (Social Sciences/ Administration/Psychology) B.A. (Military and Strategic Studies) B.A. (Military and Strategic Studies/Psychology) B.A. (Honours Military and Strategic Studies)

Certain other degree courses may require that the student's final two years be completed at a different Canadian Military College.

Preparatory Year students

If you have completed junior matriculation (but not a senior matriculation), you may be eligible for entry into Preparatory Year. It is equivalent to the First Year of collegiate studies (CEGEP pure sciences or arts) in Quebec. The courses to be taken during that year are defined in "Programme Outlines - Preparatory Year" Science and Engineering and Arts options. (See also General Admission Requirements, p. 19-20).

Academic requirements for admission in Preparatory Year Science and Engineering option

Candidates must have completed their junior matriculation. In addition, specific academic requirements for Preparatory Year at CMR include the following:

Quebec Applicants	Ontario candidates	All Other Applicants
Français or English (mother tongue)	OSSD diploma and the following senior division advanced level subjects:	Français or English (mother tongue)
Mathematics (Series 528 or 534 or 538)		Physics
		Chemistry
	English or Français	
		Mathematics
Physics (Series 424 or 434 or 454 or 534)	Mathematics (grades 11 and 12)	(algebra, geometry and trigonometry or relations and functions)
	Physics	
Chemistry (Series 562 or 564)	Chemistry	

The academic requirements in sciences must include:

in Chemistry:

A minimum of one full year of introductory fundamental chemistry is required, including: the scientific method, matter, atomic theory, chemical reactions and stoichiometry, kinetic molecular theory, solutions, atomic structure and the periodic table, chemical bonding, acids and bases.

in Physics:

A minimum of one full year of introductory physics is required, including: Displacement, velocity and constant acceleration using vectors, forces as vectors, mass and weight, Newton's laws, circular motion, work, energy and conservation of energy, momentum and conservation of momentum, electrical charge and field, potential difference, sources, direct current, Ohm's law, waves, heat.

in Mathematics:

A minimum of two full years of introductory mathematics at the upper high school level is required, including trigonometry, logarithms, analytic geometry, fractions, exponents, fractional powers and radicals, and solutions of first degree and second degree equations.

Special considerations:

a. In situations where a student has not taken the required course in Chemistry or in Physics but has demonstrated superior academic potential in other subjects, CMR may recommend provisional admission, conditional upon the student's completing of a Chemistry or Physics course during the year preceding his admission to CMR.

b. In situations where a student lacks some of the course contents listed above, but has completed the requisite year in each subject, CMR may recommend admission, with the understanding that the student may have to take an additional course during his Preparatory Year to make up for his incomplete curriculum.

Academic requirements for admission in the Preparatory Year Arts option

Candidates must have completed successfully the Secondary V in Quebec or the Junior Matriculation in other provinces.

The only specific subject required is Mathematics at the last year of Junior Matriculation level (In Quebec MAT 522, 532, 524, 534, 528 or 538 are acceptable).

Academic requirements for admission in First Year

CMR offers limited First Year entry programs for francophone candidates. Unilingual anglophone candidates have similar opportunities at RMC and RRMC.

Academic prerequisites for First Year entry into Administration and Arts are as follows:

a. CEGEP I or its equivalent completed with success including the compulsory subjects;

b. MAT 201-103 Calculus or its equivalent;

Academic prerequisites for First Year entry into Science are as follows:

a. CEGEP I Pure Science or its equivalent completed with success including the compulsory subjects;

b. MAT 201-103 Calculus;

c. PHY 203-101 Mechanics;

d. CHM 202-101 General Chemistry only for those interested in Physical sciences or Chemistry;

e. furthermore, the candidate should have completed with success three (3) courses among the following list or their equivalent:

201-101 Introduction to Applied Mathematics
201-105 Introduction to Linear Algebra
201-203 Differential and Integral Calculus II
201-408 Computer Programming and Numerical Methods
202-101 General Chemistry
202-201 Solution Chemistry
203-201 Electricity and Magnetism
203-301 Waves and Modern Physics

203-902 Experimental Physics
203-909 Mechanics and Waves
420-911 Introduction to FORTRAN

OTHER ADMISSION REQUIREMENTS

Part-time students

Students who meet the general admission criteria or who were admitted to another university may be admitted at CMR as part-time students upon review of their academic record conditions permitting.

Mature students

Students who do not have the standing required for regular admission, are over 21 years of age and have been out of a full-time educational program at a school or university for two years may be admitted at CMR as mature students.

Advanced standing

Regular, part-time and mature students may be granted advanced standing in CMR course requirements with the following provisions:

a.   the maximum number of course credits awarded on admission may not exceed the combined normal credit load of the two collegiate years and of the first two university level years of any study program at CMR;

b.   no credit will normally be awarded for courses in which the mark obtained is less than 60 per cent;

c.   credits may be granted for recognized courses under the auspices of DND. All such courses must be judged by CMR to be equivalent in content to courses required for a CMR degree.

Special students

Students who are not part of the categories listed above may be admitted at CMR as special students upon review of their academic record.

The Senate

The Senate is composed of the Minister of National Defence, the Commandant of the College, the Principal and Director of Studies, the Deans, the Secretary general and Registrar, and one professor from each of the two academic wing divisions. The Senate is empowered to grant degrees, diplomas and university certificates to members of the Canadian Forces and honourary degrees.

The Faculty Council

The Faculty Council is composed of the Principal and Director of Studies as Chairman, the Director of Cadets, the Deans, the Registrar as Secretary, the Heads of academic departments and one professor from each of the two academic wing divisions as members. The function of the Council is to determine on all matters of an educational character, to foster and encourage Faculty participation in Research in order to sustain academic excellence (Research with a Defence focus

is encouraged), and generally to make recommendations to the Commandant for promoting the interest of the College.

The Faculty Board

The Faculty Board is composed of the Principal and Director of Studies or his representative as Chairman, the Director of Cadets, the Director of Administration, the Registrar as Secretary, all the members of the teaching staff, the Assistant Registrar, the Librarians, the officers of the Military Wing. The function of the Faculty Board is to make recommendations to the Commandant through the Faculty Council on examination results, honours standing, failure, cadet appointments, to exercise academic supervision over officer cadets, and to make recommendations to the Commandant through the Faculty Council for promoting the academic interests of the College.

Library

The College library is an essential part of the educational program of CMR. The collection, comprising over 150,000 volumes and 800 current periodicals, has been chosen to support the teaching and research programs and the general reading needs of the College community. A wide range of audio-visual equipment and services is provided for the use of students and staff.

The ability to find information is essential in every field of endeavour. Librarians cooperate with other faculty members in providing students with individual and group instruction in library use, to ensure that students develop competence in information retrieval.

The computer is used to improve the efficiency of many library services: the library's catalogue is computerized and can be consulted from one of the many computer terminals located throughout the campus; large bibliographic databases outside the library can be searched by the librarian on request; any book or article that the library does not have may be ordered through the computerized inter-library loan system.

During the academic session, the library is open Monday to Friday, from 0800 to 1630 hours and 1945 to 2245 hours, and Saturdays and Sundays, from 1300 to 1700 hours and 1945 to 2245 hours. Otherwise, it is open Monday to Friday, from 0800 to 1630 hours.

Computing Services Centre (CSC)

The Centre provides a wide range of computer services year-round to the College in support of the teaching and training of future Canadian Forces officers. The College computer-user community includes the students, professors, military and civilian management and support personnel.

The Operations Section runs and maintains the heart of the campus computer network, a Bull DPS-8 mainframe computer running the CP6 operating system. It provides data communications and connects the College with major universities and research centres throughout the world via BITNET. The Centre maintains the student records and the library's complete card catalogue providing access to information on the collection from any computer or terminal hooked-up to the central system.

The mainframe computer supports FORTRAN, COBOL, PASCAL and APL in addition to a program library for simulation, statistical analysis, numerical calculation, linear programming and advances mathematical analysis. Special applications and programming requirements are developed by the Application Development and Programming Section.

The Centre supports two super-micro computing labs equipped with networked HP/Apollo engineering stations. The Apollos support Autotrol CAD/CAM software, LISP, ART and PROLOG for artificial intelligence applications and other scientific software. Each laboratory has a laser printer, colour plotter and over 3 gigabytes of hard disk storage providing a state-of-the-art facility for science and engineering students and researchers.

Two micro-computer labs provide IBM-compatible computer systems linked by a local area network (LAN). The software available on the LAN servers include Lotus 1-2-3, Framework 3, dBase IV, WordPerfect, Microsoft C, Turbo Pascal, and others. These labs are accessible to students twenty-four hours a day, seven days a week.

The micro-computer software is supported by the Client Services Section. As well, it provides an electronic publishing and graphic arts service. Included are desktop publishing of documents, brochures, etc.; graphic arts production, drawing, illustrations and paste-up; and consultation service in publishing and graphics, all in support of teaching, research and administration. Client Services also support the pedagogical service at the College. The pedagogical laboratory has available IBM-compatible and MacIntosh computers and a range of peripherals to produce teaching aids.

Pedagogical Services

The mandate of Pedagogical Services is to promote university pedagogy at CMR and to contribute in maintaining high standards of teaching. These services include teaching and training assistance, and comprises the following:

a. Pedagogical Consulting Service. This service consists in helping teachers diagnose pedagogical problems, in finding solutions to remedy these problems, and in assisting in the planning and preparation of their lectures. This service also provides various committees and management with expertise on the development of pedagogical policies and regulations and on the pertinency and the quality of the acquisition and of the use of training aids essential to the maintenance of the teaching quality.

b. Pedagogical Information Service. This service consists in informing the teaching personnel about pedagogical innovations likely to improve their teaching, and in disseminating information of pedagogical interest on symposiums, seminars, workshops, etc. This service also performs the updating of a pedagogical documentation center, the acquisition of documents, and research on special pedagogical applications at CMR.

c. Pedagogical Training Service. This service consists in giving integration and training sessions to new professors, in presenting workshops on various subjects of pedagogical interest, in guiding the teaching personnel in the preparation and production of training aids, and in giving information and training sessions on the use of pedagogical resources.

d. Pedagogical Facilitation Service. This service consists in fostering interest for pedagogy and the professional development of teachers by planning and organizing discussion committees and groups and by planning meetings with expert speakers on special pedagogical subjects.

e. Student Counselling and Consulting Service. This service consists in remaining attentive to the students' needs and in suggesting means to improve their learning skills. This service takes the form of workshops presented to the students to

facilitate their integration into postsecondary studies, to help them develop an effective working methodology, and thus increase their chances of success at the College. This service also includes consulting with students for the presentation of talks, research work, and other educational projects.

Fort Saint-Jean Museum

The Fort Saint-Jean Museum is located in the old guardhouse built around 1850. It is open to the public from 17 May to 19 August, from 0930 to 1630 hours, Tuesday to Sunday inclusively.

The objective of the Museum is to perpetuate the memory of Fort Saint-Jean and to remind the officer cadets of the College's heritage, thus giving them a certain pride in the past. Recognized as an official museum by the Canadian Forces, it is advantageously located in the vicinity of other historic sites, such as Fort Chambly and Fort Lennox.

The Museum's display is centered around its theme, that is the history of Fort Saint-Jean from 1666 to the present. To accomplish this, the exhibits are divided into six periods: two dealing with Fort Saint-Jean in the hands of the French; two dealing with the English Fort Saint-Jean; one depicting the Canadian Fort; and the last one dealing with one of the Canadian Military Colleges, the Collège militaire royal de Saint-Jean.

PROGRAMMES OF STUDY

Distribution of Workload

After the name of each course, there are three digits separated by dashes, for example :

3-1-5

This series of digits indicates how the weekly workload is distributed in a particular course. The first digit indicates the number of periods 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 spent on assignments and individual study to reach the course objectives.

Duration of the Programmes of Study

The duration of each programme of study is normally four or five academic years. The years are designated as follows : Preparatory Year and First Year (College level), Second Year, Third Year and Fourth Year (University level).

Entrance to the Preparatory Year requires the successful completion of junior matriculation or its equivalent. Entrance to First Year requires the successful completion of Preparatory Year or its equivalent.

Programmes of Study in the Faculty of Science and Engineering

COMPUTER SCIENCE (B.Sc.)

The Computer Science programme enables the student to determine the computing needs of an environment, and to implement and supervise the application of the appropriate technology. The programme is designed to meet the diversified needs of the Canadian Forces.

Systems Concentration

The student will acquire the hardware and software knowledge to oversee the efficient operation of a computerized or automated environment.

Operations Research Concentration

The student will learn to conceptualize and design scientific models of real problem situations in the following fields : For example, logistics, ordnance, management of stocks and transportation.

Management Concentration

The student will undertake a quantitative approach to modern management. Emphasis is placed on the use of computing technology in the decision-making process.

PHYSICAL SCIENCE (B.Sc.)

Physics is a reflection of man's observations of the natural world. The Physics programme enables the student to interpret physical phenomena and to learn the experimental techniques used to observe them. Familiarity with physical models of nature and the mathematical language used to describe them will enable the student to apply this knowledge to a wide variety of problems. The student will also be introduced to the important achievements of critical analysis and scientific thought.

Mathematical Physics

Emphasis is placed on the application of models and of mathematical (numerical) methods to physical concepts.

Physics

A well-balanced study of fundamental concepts, of experimental methods and of technology allows the student to discover the physical aspects of nature.

Applied Physics

The student will acquire the capacity to work and think effectively in an advanced technological environment within highly diversified fields of applications.

SPACE SCIENCE (B.Sc.)

The Space Science programme enables the student to discover and comprehend the scientific, technical and human aspects related to the exploration and development of outer space. The programme, based on a rigorous scientific method, provides a thorough grounding in natural sciences and mathematics. During the final two years of study, the student applies this basic knowledge in specialized courses on the development of space operations.

This course is offered only in French at the CMR.

GENERAL SCIENCE (B.Sc.)

Chemistry Option

The Chemistry option enables the student to understand the structure of matter and chemical transformations. Courses emphasize the molecular view of matter and the modern tools of chemistry.

General Option

The General programme allows the student to acquire a modern scientific training without necessarily becoming a specialist. Each student may pursue his/her personal interests in science and those of his/her military classification by an appropriate choice of courses in science, humanities and administration.

Programmes of Study in the Faculty of Administration and Arts

ADMINISTRATION (B.Adm.)

The Administration programme provides the student with the managerial and analytical tools to efficiently administer various types of private and public organizations. The programme provides the student, in the context of administrative problems, with a broad background in business principles and human behaviour. In addition, the student is familiarized with the application of quantitative methods in decision-making.

MILITARY AND STRATEGIC STUDIES (B.A.)

The Military and Strategic Studies programme is of great interest in military, university and professional circles. The programme introduces the student to military history, strategic thought and international relations as well as Canadian political and economic issues. While based primarily on history, political science and international relations, the programme is interdisciplinary and includes courses on technology applied to military matters, defense policy, literature, chemistry, physics, mathematics and military psychology.

Four distinct options are available :

B.A. (Honours)	**Military and Strategic Studies**
B.A. (Major)	**Military and Strategic Studies**
(Minor)	**Military Psychology**
B.A.	**Military and Strategic Studies**

SOCIAL SCIENCES (B.A.)

This multidisciplinary programme is offered in conjunction with five other departments to give the student a basic and comprehensive formation in Social Sciences. The programme, based on the study of history, economics, political science, sociology, psychology and literature, has three distinct options :

B.A. (Major)	**Social Sciences**	**(60 credits)**
(Minor)	**Psychology**	**(30 credits)**
B.A. (Major)	**Social Sciences**	**(60 credits)**
(Minor)	**Administration**	**(30 credits)**
B.A.	**Social Sciences**	**(90 credits)**

Each option allows the student to concentrate or balance his/her programme over one or more disciplines.

General Admission Requirements (College Militaire Royal)

Candidates must meet the requirements of each programme and have the permission of the Heads of Department and the Faculty Dean.

Admission Requirements into Second Year B.Sc.

Candidates must have successfully completed the equivalent of either the Science/Engineering programme of collegial studies at CMR or First Year Science/Engineering at one of the Canadian Military Colleges (CMC's).

Admission Requirements into Third Year B.Sc. (Computer Science)

Candidates must have successfully completed the equivalent of Second Year in either Computer Science at CMR or Science/Engineering at one of the CMC's. In addition, candidates must have successfully completed MAT 212 and MAT 251 (or the equivalent) and must satisfy the specific requirements below.

B.Sc. (Computer Science)   Systems Concentration

Candidates must have obtained a general average of 60 percent in Second Year.

B.Sc. (Computer Science)   Operations Research Concentration
Management Concentration

Candidates must have obtained a general average of 55 percent in Second Year.

Admission Requirements into Third Year B.Sc. (Physical Science)

Candidates must have successfully completed the equivalent of Second Year in either Physical Science at CMR or Science/Engineering at one of the CMC's. In addition, candidates must have successfully completed MAT 212 and MAT 251 (or the equivalent) and must satisfy the specific requirements below.

B.Sc. (Physical Science)   Mathematical Physics
Physics

Candidates must normally have obtained a minimum combined average of 60 percent in Mathematics and Physics.

B.Sc. (Physical Science)   Applied Physics

Candidates must have obtained a minimum combined average of 55 percent in Mathematics and Physics.

Admission Requirements into Third Year B.Sc. (Space Science)

Candidates must have successfully completed the equivalent of Second Year in either Space Science/Physics or Engineering at one of the CMC's. In addition, candidates must have obtained a minimum combined average of 55 percent in Mathematics and Physics.

Admission Requirements into Third Year B.Sc. (General)

Candidates must have successfully completed the equivalent of Second Year in Science/Engineering at one of the CMC's. In addition, candidates must satisfy the specific requirement below.

B.Sc. (General) Chemistry Option

Candidates must have successfully completed CHM 241, CHM 242 and CHM 292 (or the equivalent).

Admission Requirements into B.Adm. (Administration)

Entry into the B.Adm. programme can be made at the end of First or Second Year subject to a review of the candidate's academic record. It is recommended that those students wishing to transfer at the end of Second Year take a course in accounting.

Admission Requirements into B.A. (Social Sciences)

Entry into Social Sciences programme is open to candidates from the three CMC's who have successfully completed either their First Year or their Second Year in Arts and Humanities. Candidates from other programmes may be accepted subject to a review of their academic record.

Admission Requirements into B.A. (Military and Strategic Studies)

Entry to the Military and Strategic Studies programme is open to candidates from the three CMC's who have successfully completed either :

1) First Year at RMC or RRMC,
2) Second Year in Arts or Administration, and the prerequisite courses from RMC or RRMC, or
3) Second Year in Military and Strategic Studies at CMR.

Candidates from other programmes may be accepted subject to a review of their academic record.

CONDITIONS FOR TRANSFER FROM RRMC AND CMR INTO THE
THIRD YEAR DEGREE COURSES AT RMC

GENERAL

General conditions for admission to Third Year courses of study leading to a degree at RMC are as prescribed in the RMC Calendar and the RMC Academic Regulations. However, admission to all degree programmes is granted only with the approval of the Head of Department concerned. Heads of Departments at RMC are always available to give advice concerning preparation for, and admission to, their degree programmes. General enquiries should be directed to the Registrar, Royal Military College of Canada, Kingston, Ontario K7K 5L0.

ENTRY REQUIREMENTS - RMC DEGREE IN ARTS (B.A.)

The general requirement for admission to all Third Year Arts (B.A.) programmes at RMC is met by successful completion of any one of the Second Year courses of study available through RMC, CMR or RRMC.

Entry into Honours is normally limited to students who pass at the end of the Second Year with at least 66 per cent in the subjects of the Honours course of study, and an overall average of 60 per cent will also normally be required. The department concerned may refuse a student permission to enter Honours.

ENTRANCE REQUIREMENTS FOR RMC DEGREES IN SCIENCE (B.SC.)

A Second Year course of study in Engineering and Science is a prerequisite for admission to any of the following B.Sc. degree programmes which are to be offered. Students from engineering and/or science in Second Year at CMR or RRMC will be given admission consideration.

a. Science (Applied)

    This programme is designed for the future officer with interests in the military and civilian applications of science. A pass standing in Second Year is required for admission.

b. Space Science

    This interdisciplinary programme is designed for students with an interest in the space environment. Prescribed courses in physics, mathematics and chemistry are given, and normally a 55 per cent average in Second Year is required for admission.

c. General Science

    The programme offers a general exposure to Science, and requires pass standing in Second Year for admission.

d. Major and Minor Concentrations:

    Major in Applied Mathematics
    Major in Applied Mathematics (Physical Sciences)
    Major in Applied Mathematics, Minor in Physics
    Major in Applied Mathematics, Minor in Chemistry
    Major in Physics
    Major in Physics, Minor in Mathematics

Major in Physics, Minor in Chemistry
Major in Chemistry
Major in Chemistry, Minor in Physics
Major in Chemistry, Minor in Mathematics

Admission to a programme with a Major Concentration, or a Major and a Minor Concentration, normally requires a 55 per cent average in Second Year Engineering or Science.

e. Honours Courses of Study

In order to qualify for a B.Sc. (Hons) a student must apply for admission to an Honours programme by the end of the Third Year and must sustain an average of 66 per cent or better in particular courses prescribed by the Division of Science. An Honours degree will not be granted to any student who has not completed all the requirements of the Second Year Engineering and Science programme.

ENTRY REQUIREMENTS FOR RMC DEGREES IN ENGINEERING (B.ENG.)

To enter a Third Year engineering programme, a student must have the approval of the Head of Department or Professor in charge of the programme concerned. This normally requires the successful completion of the Second Year engineering programme at RMC, RRMC or CMR with the following minimum considerations:

Engineering Physics:	66 per cent combined average in Mathematics, Physics and Chemistry
Fuels and Materials Engineering:	55 per cent combined average in Chemistry, Mathematics and in Physics
Civil Engineering:	55 per cent combined average in Mathematics, Physics and Chemistry
Computer Engineering:	55 per cent combined average in Mathematics, Physics and Chemistry
Electrical Engineering:	55 per cent combined average in Mathematics, Physics and Chemistry
Engineering and Management:	55 per cent combined average in Mathematics, Physics and Chemistry
Mechanical Engineering:	55 per cent combined average in Mathematics, Physics and Chemistry.

CONDITIONS FOR TRANSFER FROM THE RMC AND CMR
INTO THIRD YEAR DEGREE COURSES AT RRMC

The following programmes of study are available at RRMC to students on completion of Second Year at RRMC, CMR or RMC.

Bachelor of Science in Physics and Oceanography

The purpose of this programme is to produce general service officers who are capable of working in land, sea and air environments; who have a sound knowledge of basic physics, chemistry, and mathematics; who have an appreciation of general engineering subjects; and who will appreciate those aspects of the social sciences and humanities relevant to the military profession and ethic. The programme fits students for military service in most classifications upon graduation, and is a suitable basis for further academic and military training.

The purpose of specialization in physics and oceanography is to learn how to apply physical laws and use the techniques of the exact sciences to solve problems. The student studies the characteristics of the environments in which military forces operate...the structure of the earth, the ocean bed, the air-sea interface including ice, the atmosphere and space, and especially the water column. Chemical and biological oceanography are studied, but there is more emphasis upon physical oceanography because it is more closely related to military problems. Course details are given in the RRMC calendar.

The Physics and Oceanography degree is offered as a Combined Major degree, and exceptional students may be awarded a Combined Major degree with Honours upon completion of additional requirements. The Honours programme is required by some engineering classifications. Either the Combined Major or Honours programmes are suitable preparation for graduate work in any of several fields. Note that to become a fully professional oceanographer requires graduate study, as in many other professions.

Entry requires satisfactory completion of Second Year in any CMC science or engineering programme of study which includes Mathematics RR 241, or its equivalent, and a weighted grade average in mathematics, science and engineering subjects of a least 55 per cent. Mathematics RR 252 and Engineering RR 232, or their equivalents, are also very desirable. For admission to the Honours programme, completion of Third Year in the Combined Major programme in Physics and Oceanography with a weighted average in courses in mathematics, science, and engineering of a leat 66 per cent is required.

Third Year enrolment may be limited in numbers. Preference will be given to students in accordance with their overall academic and military performance.

Bachelor of Science in Physics and Computer Science

The purpose of specialization in Physics and Computer Science is to learn how to apply physical laws and to solve problems using or involving computers. A useful, well established and relatively stable background is provided in the natural sciences, with the greatest specialization in physics. As well, an entry is made into the volatile and rapidly developing discipline of computer science. Knowledge of natural science will remain relevant and useful, but some knowledge of computer technology will become obsolete in a few years. The purpose, therefore, is to provide a useful knowledge of current technology, particularly those parts of interest to the military, but also sufficient theoretical background to enable the student to keep up with developments in this growing field.

The physics part of the programme is the same as that in the "Combined Major" in Physics and Oceanography. The computer science curriculum is based upon the core curricula recommended by Committees of the Association of Computing Machinery (ACM) and the Institute of Electrical and Electronic Engineering (IEEE). The IEEE part of the curriculum places a greater emphasis upon militarily relevant hardware than does that of the ACM.

The Physics and Computer Science degree is offered as a Combined Major degree and exceptional students may be awarded a Combined Major degree with Honours upon completion of additional requirements.

Entry to the programme requires satisfactory completion of Second Year in a CMC science or engineering programme of study which includes Mathematics RR 241 and Mathematics RR 252 or their equivalents. A weighted average of at least 55 per cent is required in mathematics, science and engineering courses. For admission to the Honours programme, completion of Third Year in the Combined Major programme with a weighted average in courses in mathematics, science and engineering of a least 66 per cent is required.

Third Year enrolment will be limited in numbers. Preference will be given to officer cadets in accordance with their overall academic and military performance.

Bachelor of Science in General Science

The B.Sc. programme in General Science is normally entered from one of the other science programmes. It has the same purpose as the others, and therefore has a core of engineering, mathematics and physics courses. The courses and standards are exactly the same as those of the other programmes, but the choice of electives is more flexible and fewer credits are required for the degree.

The General Science programme is designed to give a student a broad background in all basic aspects of science with a choice of two concentrations depending upon the student's particular interests. Concentrations are available in computer science, engineering science, mathematics, oceanography, and physics with the following joint concentrations being permitted:

(1)   Computer Science and Mathematics;

(2)   Computer Science and Physics;

(3)   Engineering Science and Mathematics;

(4)   Engineering Science and Oceanography;

(5)   Engineering Science and Physics;

(6)   Mathematics and Oceanography;

(7)   Mathematics and Physics;

(8)   Oceanography and Physics.

Entry to the programme requires satisfactory completion of Second Year in any CMC science or engineering programme of study which includes Mathematics RR 241 or its equivalent.

PROGRAMMES OF STUDY

Bachelor of Arts in Military and Strategic Studies

The programme in Military and Strategic Studies, offered at the General and Honours levels, gives students a sound grounding in military history, strategic thought, international relations, as well as in Canadian political and economic issues. Three areas of concentration are available with the following joint concentrations being permitted:

(1)   History and International Politics;

(2)   Politics and Economics;

(3)   History and Literature.

Despite its interdisciplinary nature, students can achieve considerable subject specialization through the Honours stream.

The Military and Strategic Studies degree builds upon the existing two-year course of studies in effect at all Canadian Military Colleges. Accordingly, students who have satisfactorily completed the Second Year of any programme of study at any CMC are eligible for admission to the General programme. For admission to the Honours programme a student must have completed Second Year with a minimum of second class honours. The programme is sufficiently flexible to enable students who, during their initial two years, may not have taken courses that are considered essential to "core subjects" in the Third and Fourth Years, to do so.

Bachelor of Science in Applied Military Psychology

The B.Sc. programme in Applied Military Psychology is designed to give a student a broad background in the behaviour sciences while permitting the study of aspects of science relating to the field of human factors in engineering. In general, the programme includes all the required Military Leadership and Applied Psychology courses from the B.A. programme plus the required number of science elective courses to meet the requirements for the B.Sc. degree.

Entry to the programme requires satisfactory completion of Second Year in a CMC science or engineering programme of study.

Bachelor of Arts (B.A.) in Applied Military Psychology

The Applied Military Psychology programme is designed to meet the need of the Canadian Forces for leaders trained in the behaviourial sciences. It focuses on developing an understanding of human behaviour and cognitive processes from a physiological perspective. An appreciation of the functioning and integration of the central, peripheral, autonomic and endocrine systems will allow students to study sensory and perceptual processes, cognitive issues such as motivation, topics related to the man/machine interface, and organizational behaviour. The program also provides an introduction to research methods including appropriate analytical procedures.

The foregoing areas of study will provide the foundations for the study of topics in Applied Military Psychology. In part, these topics include: the effects of sustained operation, an examination of fear, courage, transmeridional deployment and psychological warfare. In addition the program focuses on the study of leadership and its integration into the area of Applied Military Psychology.

Students in the Honours programme will also study psychological measurement, and will complete a research project of direct relevance to the Canadian Forces in an area of Applied Military Psychology.

On graduation students will have completed an educational programme relevant to their future careers while simultaneously meeting the requirements for graduate studies in psychology at other institutions.

The program builds on the two year courses of study in effect at all Canadian Military Colleges. Therefore, students are eligible for admission into the Third Year of study at RRMC.

FURTHER INFORMATION

More details on the above programmes may be obtained from the Registrar or from the Deans.

Preparatory Year - Science and Engineering

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Introduction to Applied Mathematics : 201-101	2	1	3	-	-	-	
General Chemistry : 202-111	(3)	(2)	(5)	-	-	-	(a)
Mechanics : 203-101	-	-	-	2	2	4	
General Chemistry : 202-101	-	-	-	3	2	5	
Modern and Contemporary History from 1789 to the Present : 330-916	3	-	3	(3)	-	(3)	
Introduction to Economics I : 383-920	(3)	-	(3)	3	-	3	
Linear Algebra : 201-105	2	1	3	2	1	3	
Differential and Integral Calculus : 201-103	2	1	3	2	1	3	
Tutorial classes (Mathematics, Chemistry, Physics)	-	(2)	(2)	-	(3)	(3)	
English Literature 603-101	3	-	3	-	-	-	(b)
English Literature 603-201	-	-	-	3	-	3	(b)
Second Language : French (FLS)	4	-	4	4	-	4	
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who take course 202-111 will take course 383-920 during the second term.
(b)   At the beginning of the second term, students take a speed reading course.

Preparatory Year - Arts

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Introduction to Applied Mathematics : 201-102	2	1	3	-	-	-	
Principles of Physics : 203-990	-	-	-	3	-	3	
Development and the environment : 202-901	-	-	-	3	-	3	
Modern and Contemporary History from 1789 to the Present : 330-915	3	-	3	(3)	-	(3)	
Introduction to Economics I : 383-920	(3)	-	(3)	3	-	3	
Linear Algebra : 201-115	2	1	3	2	1	3	
Differential and Integral Calculus : 201-113	2	1	3	2	1	3	
Tutorial classes (Mathematics)	-	(2)	(2)	-	(1)	(1)	
English Literature 603-101	3	-	3	-	-	-	(a)
English Literature 603-201	-	-	-	3	-	3	(a)
Second Language : French (FLS)	4	-	4	4	-	4	
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) At the beginning of the second term students take a speed reading course.

First Year - Science and Engineering

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Electricity : 203-201	2	2	4	-	-	-	
Mechanics and Waves : 203-909	2	1	3	-	-	-	
Chemistry of Solutions : 202-201	3	2	5	-	-	-	
Introduction to Psychology I : 350-101	3	-	3	-	-	-	
Introduction to Computer Programming : 420-920	2	1	3	-	-	-	
Differential and Integral Calculus II : 201-203	2	1	3	-	-	-	
Computer Programming and Numerical Methods : 201-408	-	-	-	3	-	3	
Waves and Optics : 203-301	-	-	-	2	2	4	
Experimental Physics (Magnetism and Circuits) : 203-902	-	-	-	2	3	5	
Political and Social Philosophy : 340-225	-	-	-	3	-	3	
Differential and Integral Calculus III : 201-303	-	-	-	3	2	5	
English Literature 603-301	3	-	3	-	-	-	
English Literature 603-401	-	-	-	3	-	3	
Second Language : French (FLS)	4	-	4	4	-	4	(a)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who have not attained the integral level of (4433) in French as a Second Language must take this course.

First Year - Arts

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Economic Geography of Canada : 320-901	3	-	3	-	-	-	
Introduction to Psychology I : 350-101	3	-	3	-	-	-	
Decolonization & Problems of the Third World : 330-983	3	-	3	-	-	-	
Political and Social Philosophy : 340-225	3	-	3	-	-	-	
Physical Sciences : 203-927	3	-	3	-	-	-	
Introduction to Computer Science : 420-900	2	1	3	-	-	-	
Differential and Integral Calculus II : 201-213	-	-	-	3	2	5	
Introduction to Economics II : 383-921	-	-	-	3	-	3	
Introduction to Psychology II : 350-201	-	-	-	3	-	3	
Canadian History from the Beginning to the Present : 330-925	-	-	-	3	-	3	
Topics in Administration : 410-102	-	-	-	3	-	3	
English Literature 603-301	3	-	3	-	-	-	
English Literature 603-401	-	-	-	3	-	3	
Second Language : French (FLS)	4	-	4	4	-	4	(a)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who have not attained the integral level of (4433) in French as a Second Language must take this course.

Second Year - Engineering[1]

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
ING 210 Engineering Graphics I	1	2	3	-	-	-	
MAT 212 Linear Algebra	3	1	4	-	-	-	
MAT 221 Differential and Integral Calculus IV	3	-	3	-	-	-	
PHY 211 Dynamics	2	1	3	-	-	-	
PHY 231 Waves and Particles	3	-	3	-	-	-	
PHY 291 Experimental Physics	-	2	2	-	-	-	
CHM 241 Physical Chemistry I	3	-	3	-	-	-	
MLM 221 Social Psychology	3	-	3	-	-	-	
ING 220 Engineering Graphics II	-	-	-	1	2	3	
ING 230 Strength of Materials	-	-	-	3	1	4	
MAT 222 Differential and Integral Calculus V	-	-	-	3	-	3	
MAT 223 Differential and Integral Calculus VI	-	-	-	(3)	-	(3)	(a)
MAT 251 Probability and Statistics	-	-	-	3	-	3	
PHY 222 Electromagnetism	-	-	-	3	-	3	
PHY 262 Introduction to Quantum Physics	-	-	-	2	1	3	
PHY 292 Experimental Physics	-	-	-	-	2	2	
CHM 242 Physical Chemistry II	-	-	-	3	-	3	
ENG 211 Utopian Literature	-	-	-	2	-	2	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(1)   This program should normally be taken by students who intend to take Third Year Engineering or Honours Science at RMC, or Physics and Physical Oceanography at RRMC. It may also be taken by students who intend to register in any of the science options offered in Third Year at CMR.

(a)   Optional course - MAT 223 is recommended for admission into Honours Mathematical Physics at RMC.

(b)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - B.Sc. General

(chemistry orientation)[1]

	Periods per week						
	First Term			Second Term			
Courses	Lect.	Lab.	Total	Lect.	Lab.	Total	Notes
MAT 221 Differential and Integral Calculus IV	3	-	3	-	-	-	
PHY 231 Waves and Particles	3	-	3	-	-	-	
PHY 291 Experimental Physics	-	2	2	-	-	-	
CHM 241 Physical Chemistry I	3	-	3	-	-	-	
CHM 291 Experimental Chemistry	-	2	2	-	-	-	
CHM 321 Organic Chemistry I	2	2	4	-	-	-	
ING 210 Engineering Graphics I	(1)	(2)	(3)	-	-	-	(a)
MLM 221 Social Psychology	3	-	3	-	-	-	
MAT 222 Differential and Integral Calculus V	-	-	-	3	-	3	
PHY 222 Electromagnetism	-	-	-	3	-	3	
CHM 242 Physical Chemistry II	-	-	-	3	-	3	
CHM 292 Experimental Chemistry	-	-	-	-	2	2	
CHM 322 Organic Chemistry II	-	-	-	2	2	4	
ENG 211 Utopian Literature	-	-	-	2	-	2	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(1) Officer cadets may choose the General B.Sc. without chemistry orientation; in such cases the choice of courses is made under the direction of the Dean of Science and Engineering.

(a) Recommended elective course.
(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.
(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Languages Centre.

Second Year

Physics, Mathematical Physics, Applied Physics, Space Science

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 211 Dynamics	2	1	3	-	-	-	
PHY 231 Waves and Particles	3	-	3	-	-	-	
PHY 291 Experimental Physics	-	2	2	-	-	-	
CHM 241 Physical Chemistry I	3	-	3	-	-	-	
MAT 212 Linear Algebra	3	1	4	-	-	-	
MAT 221 Differential and Integral Calculus IV	3	-	3	-	-	-	
MLM 221 Social Psychology	3	-	3	-	-	-	
PHY 222 Electromagnetism	-	-	-	3	-	3	
PHY 262 Introduction to Quantum Physics	-	-	-	2	1	3	
PHY 292 Experimental Physics	-	-	-	-	2	2	
CHM 242 Physical Chemistry II	-	-	-	3	-	3	
MAT 222 Differential and Integral Calculus V	-	-	-	3	-	3	
MAT 251 Probability and Statistics	-	-	-	3	-	3	
ENG 211 Utopian Literature	-	-	-	2	-	2	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - Computer Science[1]

Systems, Operational Research, Management

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	Notes
INF 352 Structured Programming	3	-	3	-	-	-	
MAT 212 Linear Algebra	3	1	4	-	-	-	
MAT 221 Differential and Integral Calculus IV	3	-	3	-	-	-	
PHY 291 Experimental Physics	-	2	2	-	-	-	
PHY 426 Logic Circuit Design	2	2	4	-	-	-	
MLM 221 Social Psychology	3	-	3	-	-	-	
INF 361 Computer Organization	-	-	-	2	-	2	
INF 442 Data Structures	-	-	-	3	-	3	
MAT 222 Differential and Integral Calculus V	-	-	-	3	-	3	
MAT 251 Probability and Statistics	-	-	-	3	-	3	
PHY 427 Microprocessor System Design	-	-	-	2	2	4	
ENG 211 Utopian Literature	-	-	-	2	-	2	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(1) Students who intend to complete their undergraduate studies at CMR in Computer Science should normally take this program of studies.

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - Administration

Courses	Periods per week		Notes
	First Term	Second Term	
ADM 201 Management	3	-	
ADM 231 Accounting I	3	-	
ADM 242 Probability and Statistics	3	-	
MLM 221 Social Psychology	3	-	
SCH 221 Political Science	3	-	
ENG 212 English Literature	3	-	
ADM 232 Accounting II	-	3	
ADM 243 Applied Statistics	-	3	
ADM 251 Communication and Writing Skills	-	3	
SCH 222 Canadian Political Institutions	-	3	
EMS 223 International Relations	-	3	
Seminars, Symposia, Industrial Visits	3	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - B.A. (Social Sciences)

Courses	Periods per week		Notes
	First Term	Second Term	
MLM 221 Social Psychology	3	-	
SCH 221 Political Science	3	-	
SCH 252 Introduction to Canadian Studies	3	-	
ADM 242 Probability and Statistics	3	-	
ENG 212 English Literature	3	-	
SCH 222 Canadian Political Institutions	-	3	
EMS 232 Military History of Canada	-	3	
SCH 254 Canadian Society	-	3	
SCH 220 History of Canada	-	3	
ENG 251 Communication and Writing Skills	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - B.A. with Major in Social Sciences
and Minor in Military Psychology
or in Administration

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 221 Political Science	3	-	
*MLM 221 Social Psychology	3	-	
ADM 242 Probability and Statistics	3	-	
ENG 212 English Literature	3	-	
SCH 222 Canadian Political Institutions	-	3	
EMS 232 Canadian Military History	-	3	
SCH 254 Canadian Society	-	3	
ENG 251 Communication and Writing Skills	-	3	
Minor in Military Psychology : 2 courses			
MLM 232 Psychology of Aggressive Behaviour	-	3	
MLM 221 Social Psychology	3	-	
Minor in Administration : 2 courses			
ADM 201 Management	3	-	
ADM 231 Accounting I	3	-	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

* Students opting for Minor in Psychology should replace by a course in Social Sciences.

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Second Year - B.A. (Military and Strategic Studies)

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 216 Classical Strategy	3	-	
SCH 221 Political Science	3	-	
ADM 242 Probability and Statistics	3	-	
MLM 221 Social Psychology	3	-	
ENG 212 English Literature	3	-	
SCH 222 Canadian Political Institutions	-	3	
EMS 223 International Relations	-	3	
EMS 232 Military History of Canada	-	3	
MAT 236 Mathematical Models of Combat	-	3	
ENG 251 Communication and Writing Skills	-	3	
MLM 232 Psychology of Aggressive Behaviour	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. Mathematical Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 311 Classical Mechanics I	3	1	4	-	-	-	
MAT 322 Mathematical Methods of Physics I	3	1	4	-	-	-	
MAT 328 Analysis I	3	-	3	-	-	-	
MAT 461 Numerical Analysis	3	-	3	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
PHY 322 Electromagnetic Waves and Applications	-	-	-	3	1	4	
PHY 341 Statistical Physics	-	-	-	3	-	3	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
MAT 422 Mathematical Methods of Physics II	-	-	-	3	1	4	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 311 Classical Mechanics I	3	1	4	-	-	-	
PHY 323 Electronics and Instrumentation	3	3	6	-	-	-	
PHY 426 Logic Circuit Design	2	2	4	-	-	-	
MAT 322 Mathematical Methods of Physics I	3	1	4	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
PHY 322 Electromagnetic Waves and Applications	-	-	-	3	1	4	
PHY 341 Statistical Physics	-	-	-	3	-	3	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
MAT 422 Mathematical Methods of Physics II	-	-	-	3	1	4	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. Applied Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 323 Electronics and Instrumentation	3	3	6	-	-	-	
PHY 426 Logic Circuit Design	2	2	4	-	-	-	
MAT 322 Mathematical Methods of Physics I	3	1	4	-	-	-	
ING 210 Engineering Graphics I	1	2	3	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
PHY 322 Electromagnetic Waves and Applications	-	-	-	3	1	4	
PHY 427 Microprocessor System Design	-	-	-	2	2	4	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
MAT 422 Mathematical Methods of Physics II	-	-	-	3	1	4	
INF 361 Computer Organization	-	-	-	2	-	2	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. Space Science

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 311 Classical Mechanics I	3	1	4	-	-	-	
PHY 345 Space Sciences	2	1	3	-	-	-	
MAT 322 Mathematical Methods of Physics I	3	1	4	-	-	-	
ING 375 Simulation and Control	3	1	4	-	-	-	
EMS 329 Space Policies and Legal Regimes	3	-	3	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
PHY 316 Mechanics of Fluids	-	-	-	3	-	3	
PHY 322 Electromagnetic Waves and Applications	-	-	-	3	1	4	
PHY 350 Space Systems	-	-	-	3	1	4	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. (Computer Science)

Concentration : systems

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
INF 362 Real-Time Systems and Interfaces	3	-	3	-	-	-	
INF 363 Structured System Analysis	3	-	3	-	-	-	
MAT 461 Numerical Analysis	3	-	3	-	-	-	
PHY 323 Electronics and Instrumentation	3	3	6	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
INF 341 Algorithms	-	-	-	3	-	3	(a)
INF 443 Data Base Management Systems	-	-	-	3	-	3	
INF 461 Operating Systems	-	-	-	3	-	3	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) May be replaced by another course depending upon the availability of courses in the Department of Computer Sciences and Engineering.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. (Computer Science)

Concentration : operational research

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
MAT 328 Analysis I	3	-	3	-	-	-	
MAT 471 Operations Research	3	-	3	-	-	-	
MAT 475 System Simulation	3	-	3	-	-	-	
INF 362 Real-Time Systems and Interfaces	3	-	3	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
INF 341 Algorithms	-	-	-	3	-	3	(a)
INF 461 Operating Systems	-	-	-	3	-	3	
MAT 329 Mathematics of Signal Analysis	-	-	-	3	-	3	
MAT 351 Mathematical Statistics I	-	-	-	3	-	3	
MAT 421 Graphs and Networks	-	-	-	3	-	3	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) May be replaced by another course depending upon the availability of courses in the Department of Computer Sciences and Engineering.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. (Computer Science)

Concentration : management

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
INF 362 Real-Time Systems and Interfaces	3	-	3	-	-	-	
INF 363 Structured System Analysis	3	-	3	-	-	-	
ADM 231 Accounting I	3	-	3	-	-	-	
ADM 314 Operations Management	3	-	3	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
INF 443 Data Base Management Systems	-	-	-	3	-	3	
INF 461 Operating Systems	-	-	-	3	-	3	
MAT 351 Mathematical Statistics I	-	-	-	3	-	3	
ADM 332 Management Accounting I	-	-	-	3	-	3	
SCH 220 History of Canada	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.Sc. General

(chemistry orientation)[1]

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
CHM 341 Electrochemistry	2	2	4	-	-	-	
CHM 312 Analytical Chemistry	1	2	3	-	-	-	
MAT 212 Linear Algebra	3	1	4	-	-	-	(a)
PHY 323 Electronics and Instrumentation	3	3	6	-	-	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	3	-	-	-	
Elective course	3	-	3	-	-	-	(d)
MAT 223 Differential and Integral Calculus VI	-	-	-	3	-	3	
MAT 251 Probability and Statistics	-	-	-	3	-	3	(a)
MAT 415 Applied Modern Algebra	-	-	-	3	-	3	
SCH 220 History of Canada	-	-	-	3	-	3	
Elective course	-	-	-	3	-	3	(d)
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(1) Officer cadets may choose the General B.Sc. without chemistry orientation; in such cases, the choice of courses is made under the direction of the Dean of Science and Engineering.

(a) For students who have not taken this course in Third Year.
(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.
(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.
(d) Two elective courses in the Faculty of science and engineering.

Third Year - Administration

Courses	Periods per week		Notes
	First Term	Second Term	
ADM 314 Operations Management I	3	-	
ADM 331 Finance	3	-	
ADM 342 Operations Research I	3	-	
ADM 343 Management Information Systems I	3	-	
ADM 352 Marketing	3	-	
SCH 314 Microeconomics Analysis	3	-	
ADM 323 Introduction to Civil and Military Law	-	3	
ADM 332 Management Accounting I	-	3	
ADM 350 Management Information Systems II	-	3	
MLM 322 Organizational Psychology	-	3	
SCH 313 Macroeconomics Analysis	-	3	
EMS 327 Introduction to Military Strategy	-	3	
Seminars, Symposia and Industrial Visits	3	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.A. (Social Sciences)

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 311 Economic History of Canada	3	-	
SCH 312 Canadian Economic and Social History	3	-	
SCH 319 The main currents of the 20th century	3	-	
ENG 301 Canadian Literature in English I : The novel	3	-	
SCH 313 Macroeconomic Analysis	-	3	
EMS 223 International Relations	-	3	
EMS 450 Security Problems in the Third World II	-	3	
ADM 323 Introduction to Civil and Military Law	-	3	
MLM 322 Organizational Psychology	-	3	
ENG 302 Canadian Literature in English II : The short story	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.A. with Major in Social Sciences and Minor in Military Psychology or in Administration

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 311 Economic History in a Social Context	3	-	
SCH 312 Canadian Economic and Social History	3	-	
SCH 319 The main currents of the 20th century	3	-	
SCH 313 Macroeconomic Analysis	-	3	
EMS 223 International Relations	-	3	
*MLM 322 Organizational Psychology	-	3	
Minor in Military Psychology : 6 courses			
MLM 331 Leadership Role in the Process of a Subordinate Development	3	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	
MLM 315 Psycho-sociology of conflicts	3	-	
MLM 312 Applied Military Psychology	-	3	
MLM 322 Organizational Psychology	-	3	
MLM 342 Small Group Psychology	-	3	
Minor in Administration : 3 courses			
ADM 243 Applied Statistics	3	-	
ADM 424 Public Administration	3	-	
ADM 323 Introduction to Civil and Military Law	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

*   Students opting for Minor in Psychology should replace this course by a course in Social sciences.

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.A. with Honours in Military and Strategic Studies

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 317 Defence Economics	3	-	
EMS 328 Introduction to Public International Law	3	-	
EMS 360 Concepts and Methods in International Relations	3	-	
MLM 315 Psycho-sociology of conflicts	3	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	
LIT 340 Canadian Literature and Military Experience	3	-	
EMS 319 Diplomacy and Wars of the 20th Century	-	3	
EMS 324 Soviet Defence Policy	-	3	
EMS 325 Security Issues in the Third World I	-	3	
EMS 326 Nuclear Strategy	-	3	
PHY/CHM 399 Technology of Weapons	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Third Year - B.A. with Major in Military and Strategic Studies

and Minor in Military Psychology

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 360 Concepts and Methods in International Relations	3	-	
MLM 315 Psycho-sociology of conflicts	3	-	
MLM 331 Leadership Role in the Process of a Subordinate Development	3	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	
Two elective courses	6	-	(a)
EMS 324 Soviet Defence Policy	-	3	
EMS 325 Security Issues in the Third World I	-	3	
EMS 326 Nuclear Strategy	-	3	
MLM 312 Applied Military Psychology	-	3	
MLM 322 Organizational Psychology	-	3	
MLM 342 Small Group Psychology	-	3	
Second Language : French (FLS)	(3)	(3)	(b)(c)
Physical Education	2	2	
Drill	1	1	

(a) **First term**
  EMS 328 Introduction to Public International Law
  EMS 329 Space Policies and Legal Regimes
  ENG 310 War and Literature (First term)
  SCH 317 Defence Economics
  SCH 311 Economic History in a Social Context
  SCH 313 Macroeconomic Analysis
  Timetable and personnel permitting.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

PROGRAMME OUTLINES

Third Year - B.A. (Military and Strategic Studies)

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 360 Concepts and Methods in International Relations	3	-	
MLM 315 Psycho-sociology of conflicts	3	-	
MLM 341 Leadership and Management from a Behavioral Science Perspective	3	-	
Two elective courses	6	-	(a)
EMS 324 Soviet Defence Policy	-	3	
EMS 325 Security Issues in the Third World I	-	3	
EMS 326 Nuclear Strategy	-	3	
Two elective courses	-	6	(a)
Second Language : French (FLS)	(3)	(3)	(b)(c)
Physical Education	2	2	
Drill	1	1	

(a)   **First term**
   EMS 328   Introduction to Public International Law
   EMS 329   Space Policies and Legal Regimes
   FRA 310   Guerre et Littérature   (Not offered)
   SCH 317   Defence Economics
   SCH 311   Economic History in a Social Context
   SCH 313   Macroeconomic Analysis
   Second term
   ADM 332   Management Accounting I
   ENG 310   Military Readings   (Second term)
   PHY/CHM 399 Technology of Weapons
   SCH 312   Canadian Economic History
   EMS 319   Diplomacy and Wars of the 20th Century
   Timetable and personnel permitting.

(b)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.Sc. Mathematical Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	Notes
PHY 331 Physical Optics	3	1	4	-	-	-	
PHY 451 Quantum Mechanics	3	1	4	-	-	-	
PHY 493 Project	-	3	3	-	-	-	
PHY 342 Quantum Statistical Physics	3	-	3	-	-	-	(a)
PHY 412 Classical Mechanics II	(3)	(1)	(4)	-	-	-	(a)
MAT 330 Methods of Optimization	3	-	3	-	-	-	(a)
PHY 361 Atomic and Nuclear Physics	-	-	-	3	-	3	
PHY 473 Solid State Physics	-	-	-	3	-	3	
PHY 494 Project	-	-	-	-	3	3	
PHY 316 Mechanics of Fluids	-	-	-	3	-	3	(b)
PHY 422 Radiation	-	-	-	(3)	-	(3)	(b)
MAT 351 Mathematical Statistics I	-	-	-	(3)	-	(3)	(b)
MAT 411 Numerical Methods in Linear Algebra	-	-	-	(3)	-	(3)	(b)
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Seminars	-	1	1	-	1	1	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(c)(d)
Physical Training	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Two elective courses.
(b) One elective course.
(c) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.
(d) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Languages Centre.

PROGRAMME OUTLINES

Fourth Year - B.Sc. Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	Notes
PHY 331 Physical Optics	3	1	4	-	-	-	
PHY 451 Quantum Mechanics	3	1	4	-	-	-	
PHY 491 Experimental Physics and Project	-	6	6	-	-	-	
PHY 334 Signal Processing	(3)	(1)	(4)	-	-	-	(a)
PHY 342 Quantum Statistical Physics	3	-	3	-	-	-	(a)
PHY 412 Classical Mechanics II	(3)	(1)	(4)	-	-	-	(a)
PHY 361 Atomic and Nuclear Physics I	-	-	-	3	-	3	
PHY 473 Solid State Physics	-	-	-	3	-	3	
PHY 492 Experimental Physics and Project	-	-	-	-	6	6	
PHY 316 Mechanics of Fluids	-	-	-	3	-	3	(b)
PHY 362 Electro-optics	-	-	-	(3)	(1)	(4)	(b)
PHY 422 Radiation	-	-	-	(3)	-	(3)	(b)
PHY 427 Microprocessor System Design	-	-	-	(2)	(2)	(4)	(b)
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Seminars	-	1	1	-	1	1	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(c)(d)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) One elective course.
(b) One elective course.
(c) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.
(d) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.Sc. Applied Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 331 Physical Optics	3	1	4	-	-	-	
PHY 334 Signal Processing	3	1	4	-	-	-	
PHY 493 Project	-	3	3	-	-	-	
INF 352 Structured Programming	3	-	3	-	-	-	
INF 362 Real-Time Systems and Interfaces	3	-	3	-	-	-	
PHY 324 Introduction to Robotics	-	-	-	3	1	4	
PHY 362 Electro-optics	-	-	-	3	1	4	
PHY 494 Project	-	-	-	-	3	3	
ADM 470 Project Management	-	-	-	3	-	3	
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Seminars	-	1	1	-	1	1	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.S. Space Science

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PHY 411 Spacecraft Dynamics and Control	3	1	4	-	-	-	
PHY 460 Remote Sensing and Image Processing	3	1	4	-	-	-	
PHY 495 Space Science Project	-	3	3	-	-	-	
MAT 451 System Safety, Reliability and Maintainability	3	1	4	-	-	-	
INF 360 Real-Time System Practice	2	2	4	-	-	-	
PHY 324 Introduction to Robotics	-	-	-	3	1	4	
PHY 362 Electro-Optics	-	-	-	3	1	4	
PHY 455 Space Operations	-	-	-	3	1	4	
PHY 496 Space Science Project	-	-	-	-	3	3	
ADM 470 Project Management	-	-	-	3	-	3	
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
PHY 499 Space Science Seminars	-	1	1	-	1	1	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.Sc. (Computer Science)

Concentration : systems

Courses		Periods per week						Notes
		First Term			Second Term			
		Lect.	Lab.	Total	Lect.	Lab.	Total	
INF 371 Data Communications		3	-	3	-	-	-	
INF 421 Introduction to Software Engineering		3	-	3	-	-	-	(a)
INF 432 Foundations of Computer Science		(3)	-	(3)	-	-	-	(a)
INF 493 Project		-	3	3	-	-	-	
MAT 463 Automata and Formal Languages		3	-	3	-	-	-	
MAT 475 System Simulation		3	-	3	-	-	-	
PHY 334 Signal Processing		3	1	4	-	-	-	
INF 441 Compiler Construction		-	-	-	3	-	3	
INF 462 Computer Architecture		-	-	-	3	-	3	
INF 471 Computer Graphics		-	-	-	3	-	3	
INF 493 Project		-	-	-	-	3	3	
MLM 422 Behaviour in a Military Setting		-	-	-	3	-	3	
Second Language : French (FLS)		(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education		-	2	2	-	2	2	
Drill		-	1	1	-	1	1	

(a) One elective course.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.Sc. (Computer Science)

Concentration : operational research

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
INF 432 Foundations of Computer Science	3	-	3	-	-	-	(a)
INF 493 Project	-	3	3	-	-	-	
MAT 330 Methods of Optimization	3	-	3	-	-	-	
MAT 461 Numerical Analysis	3	-	3	-	-	-	
MAT 463 Automata and Formal Languages	3	-	3	-	-	-	
INF 493 Project	-	-	-	-	3	3	
MAT 413 Codes	-	-	-	3	-	3	
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Elective course	3	-	3	9	-	9	(b)
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(c)(d)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) May be replaced by another course depending upon the availability of resources in the Department of Computer Sciences and Engineering.

(b) The student must choose three courses among those offered in Literary Studies, in Computer Sciences, in Mathematics, in Social Sciences and in Physics, provided that he has the pre-requisites and that he obtains the approval of the department which offers the selected courses as well as the approval of the programme coordinator.

(c) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(d) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities the Second Language Centre.

Fourth Year - B.Sc. (Computer Science)

Concentration : management

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
INF 451 Office Automation	3	-	3	-	-	-	(a)
INF 493 Project	-	3	3	-	-	-	
MAT 461 Numerical Analysis	3	-	3	-	-	-	
MAT 471 Operations Research	3	-	3	-	-	-	
MAT 475 System Simulation	3	-	3	-	-	-	
ADM 331 Finance	3	-	3	-	-	-	
INF 471 Computer Graphics	-	-	-	3	-	3	
INF 493 Project	-	-	-	-	3	3	
ADM 350 Management Information Systems II	-	-	-	3	-	3	
ADM 435 Logistics Management	-	-	-	3	-	3	
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(b)(c)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(a) May be replaced by another course depending upon the availability of resources in the Department of Computer Sciences and Engineering.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

PROGRAMME OUTLINES

Fourth Year - B.Sc. General

(chemistry orientation)[1]

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
CHM 421 Organic Chemistry III	2	2	4	-	-	-	
CHM 491 Experimental Chemistry and PROJECT	-	6	6	-	-	-	
INF 352 Structured Programming	3	-	3	-	-	-	
MAT 471 Operations Research	3	-	3	-	-	-	
CHM 362 Quantum Chemistry and Spectroscopy	-	-	-	2	2	4	
CHM 372 Inorganic Chemistry	-	-	-	2	2	4	
CHM 492 Experimental Chemistry and PROJECT	-	-	-	-	6	6	
MLM 422 Behaviour in a Military Setting	-	-	-	3	-	3	
Seminars	-	1	1	-	1	1	
Second Language : French (FLS)	(3)	-	(3)	(3)	-	(3)	(a)(b)
Physical Education	-	2	2	-	2	2	
Drill	-	1	1	-	1	1	

(1) Officer cadets may choose the General B.Sc. without chemistry orientation; in such cases, the choice of courses is made under the direction of the Dean of Science and Engineering.

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - Administration

Courses	Periods per week		Notes
	First Term	Second Term	
ADM 412A Strategic Management 1	3	-	
ADM 424 Public Administration	3	-	
ADM 460 Project in Administration	1½	-	
ADM 412B Strategic Management 2	-	3	
ADM 460 Project in Administration	-	1½	
MLM 422 Behaviour in a Military Setting	-	3	
6 electives	9	9	
Seminars, Symposia and Industrial Visits	3	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

POLICY		**SESSION**
ADM 411	Decision Making	I
ADM 413	Organizational Theory	I
ADM 425	International Management	II
ADM 470	Project Management	II
SCH 311	Economic History in Social Context	I
SCH 312	Canadian Economic History	II
SCH 412	Managerial Economics	I

HUMAN RESOURCES		**SESSION**
ADM 413	Organizational Theory	I
ADM 421	Personnel Management	I
ADM 425	International Management	II
ADM 463	Industrial Relations	II
MLM 312	Applied Military Psychology	II
MLM 412	Job Adjustment & Personality	I

LOGISTICS		
ADM 421	Personnel Management	I
ADM 431	Operational Auditing	II
ADM 432	Management Accounting II	I
ADM 433	Introduction to Tax	II
ADM 435	Logistics Management	II
ADM 470	Project Management	II
SCH 412	Managerial Economics	I

MANAGEMENT/COMPUTER SCIENCE		
ADM 435	Logistic Management	II
ADM 441	Operations Research II	II
ADM 470	Project Management	II
INF 363	Structured Systems Analysis	I
INF 443	Data Base Management Systems (DBMS)	II
MAT 475	System Simulation	I
ADM 414	Operations Management II	I

Fourth Year - B.A. (Canadian Studies and Administration)

Courses	Periods per week		Notes
	First Term	Second Term	
MAJOR : 7 courses			
ENG 401 Canadian Literature in English III : Poetry	3	-	
FRA 401 Littérature et société III	3	-	
SCH 452 Forms of Expression and Interpretation	3	-	
ENG 402 Canadian Literature in English IV : Drama, film, and television	-	3	
FRA 402 Littérature et société IV	-	3	
EMS 415 Canadian Defence Policy	-	3	
SCH 254 Canadian Society	-	(3)	
MLM 422 Behaviour in a Military Setting	-	3	
MINOR : 2 courses			
. **Option 1**			(a)
ADM 413 Organizational Theory	3	-	
ADM 323 Introduction to Civil and Military Law	-	3	
SCH 313 Macroeconomic Analysis	-	3	
. **Option 2**			(b)
ADM 411 Decision Making	3	-	
ADM 470 Project Management	-	3	
ADM 463 Industrial Relations	-	3	
Second Language : French (FLS)	(3)	(3)	(c)(d)
Physical Education	2	2	
Drill	1	1	

(a) For students who opt for general quantitative administration.

(b) For students who opt for management of human resources.

(c) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(d) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.A. with Honours in Military and Strategic Studies

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 328 Introduction to Public International Law	3	-	
EMS 417 Low Intensity Conflict	3	-	
EMS 426 Comparative Defence Policy	3	-	
EMS 428 American Defence Policy	3	-	
EMS 444 Germany and European Security	3	-	
EMS 415 Canadian Defence Policy	-	3	
EMS 419 Current Strategic Issues	-	3	
EMS 440 Arms Control and Disarmament	-	3	
EMS 450 Security Issues in the Third World II	-	3	
MLM 422 Behaviour in a Military Setting	-	3	
EMS 460 Research Paper in Military and Strategic Studies	3	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a)   Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b)   In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.A. with Major in Military and Strategic Studies

and Minor in Military Psychology

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 417 Low Intensity Conflict	3	-	
EMS 428 American Defence Policy	3	-	
EMS 444 Germany and European Security	3	-	
MLM 412 Job Adjustment and Personality	3	-	
One elective course	3	-	(a)
EMS 415 Canadian Defence Policy	-	3	
EMS 419 Current Strategic Issues	-	3	
EMS 440 Arms Control and Disarmament	-	3	
EMS 450 Security Issues in the Third World II	-	3	
MLM 422 Behaviour in a Military Setting	-	3	
Second Language : French (FLS)	(3)	(3)	(b)(c)
Physical Education	2	2	
Drill	1	1	

(a) **First term**
ADM 411 Decision Making
EMS 328 Introduction to Public International Law
ENG 405 Great Books of the Western World (Not offered)
EMS 426 Comparative Defence Policy
Timetable and personnel permitting.

(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.A. (Military and Strategic Studies)

Courses	Periods per week		Notes
	First Term	Second Term	
EMS 417 Low-Intensity Conflict	3	-	
EMS 428 American Defence Policy	3	-	
EMS 444 Germany and European Security	3	-	
Two elective courses	6	-	(a)
EMS 415 Canadian Defence Policy	-	3	
EMS 419 Current Strategic Issues	-	3	
EMS 440 Arms Control and Disarmament	-	3	
EMS 450 Security Issues in the Third World II	-	3	
MLM 422 Behaviour in a Military Setting	-	3	
Second Language : French (FLS)	(3)	(3)	(b)(c)
Physical Education	2	2	
Drill	1	1	

(a) **First term**
   ADM 411 Decision Making
   EMS 328 Introduction to Public International Law
   EMS 426 Comparative Defence Policy
   ENG 405 Great Books of the Western World (Not offered)
   MLM 412 Job Adjustment and Personality
   Timetable and personnel permitting.
(b) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.
(c) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

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Fourth Year - B.A. with Major in Social Sciences
and Minor in Military Psychology
or in Administration

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 452 Forms of Expression and Interpretation	3	-	
SCH 460 Social Sciences, Methodology (I)	3	-	
*ADM 413 Organization Theory	3	-	
EMS 415 Canadian Defence Policy	-	3	
SCH 424 Canada and its North American Environment	-	3	
SCH 460 Social Sciences, Application (II)	-	3	
**MLM 422 Behaviour in a Military Setting	-	3	
Minor in Military Psychology : 2 courses			
MLM 412 Job Adjustment and Personality	3	-	
MLM 422 Behaviour in a Military Setting	-	3	
Minor in Administration : 5 courses			
ADM 411 Decision Making Process	3	-	
ADM 413 Organization Theory	3	-	
ADM 421 Personnel Management	3	-	
ADM 463 Industrial Relations	-	3	
ADM 470 Project Management	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

* Students opting for Minor in Administration should replace this course by another courses from the Major in Social Sciences.

** Students opting for Minor in Psychology should replace this course by another course from the Major in Social Sciences.

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Fourth Year - B.A. (Social Sciences)

Courses	Periods per week		Notes
	First Term	Second Term	
SCH 452 Forms of Expression and Interpretation	3	-	
SCH 460 Social Sciences, Methodology (I)	3	-	
ADM 413 Organizational Theory	3	-	
ENG 401 Canadian Literature in English III : Poetry	3	-	
EMS 415 Canadian Defence Policy	-	3	
SCH 424 Canada and its North American Environment	-	3	
SCH 460 Social Sciences, Application (II)	-	3	
ADM 463 Industrial Relations	-	3	
MLM 422 Behaviour in a Military Setting	-	3	
ENG 402 Canadian Literature in English IV : Drama, film, and television	-	3	
Second Language : French (FLS)	(3)	(3)	(a)(b)
Physical Education	2	2	
Drill	1	1	

(a) Students who have not attained the integral level (4433) in French as a Second Language (FLS) must take this course.

(b) In order to maintain their knowledge of French as a Second Language, English-speaking students who have reached the integral level may, if they wish : (i) opt for ONE university course in French as the timetable permits, with the approval of the department which offers the selected course or (ii) take a second language course according to the possibilities within the Second Language Centre.

Credit

a.   A credit is a unit which allows Le Collège militaire royal de Saint-Jean to assign a numerical value to the workload (university level) required of a student so that he may reach the goals of a teaching or research activity.

b.   A credit represents 45 hours or periods per 15 week term devoted by the student in a learning activity (courses, research, laboratories, seminars, individual work).

c.   For example, a credit corresponds to the following weekly load during a 15 week term:

one period of classroom teaching and
two hours of individual work
or
one period of classroom teaching,
one period of practical work and
one hour of individual study; etc...

d.   Let us take for example:

202-201   **Chemical Solutions**   **3-2-4**

The three numbers on the right (3-2-4) represent the weighting of this course:

the first: the number of teaching periods per week;

the second: the number of periods of practical exercises per week;

the third: the number of hours devoted to individual work per week.   Hence 3+2+4=9; 9x15=135; 135/45=3.   This course therefore carries three credits.

Unit

A unit allows Le Collège militaire royal de Saint-Jean to assign a numerical value to the workload (collegial level) required of a student so that he may reach the goals of a teaching or research activity.   The calculation of a unit is done the same way as for the credit.

DEPARTMENT OF ADMINISTRATIVE SCIENCES

Head of Department	Jocelyn Gagné, C.D., B.Com., M.B.A.
Associate Professors	Mokhtar Amami, Lic.Sc.Eco., Ph.D., Ing. (sabbatical leave)
	Paul Boisclair, B.A., B.Com., M.B.A.
	Guy Lizotte, B.Com., M.B.A., Dip. en informatique (M.I.T.)
	Armand St-Pierre, B.Sc., B.Com., B.Sc.compt., R.I.A., C.G.A., M.B.A.
Assistant Professor	Pierre Trahan, C.D., B.Admin., M.B.A.
Lecturers	Major Rodrigue Girard, C.D., B.Adm., M.B.A.
	Major Daniel Pinard, C.D., B.Adm., M.B.A.
	Captain Michel Vachon, C.D., B.Sc., M.Sc.
Part-time Lecturers	Robert Beauregard, B.Adm., M.B.A., C.A.
	René Gélinas, B.A.A., Ph.D.
	Paul Goineau, B.A. Sc. Econ., M.B.A.
	Peter Turner, B.A., LL.L.

410-102 **Introduction to Administration** **3-0-3**
(2 units)

The objectives are: to introduce the student to the principles, tools and functions which direct the daily operations and growth of any lucrative organization; to increase the sensitivity of the student towards the numerous problems that a manager must face on a daily basis and also to acquire the necessary aptitudes that a manager must possess in order to face these problems; and to obtain certain guidelines which will permit the student to further integrate additional notions throughout the Bachelor degree.

After dealing with business in the economic environment, forms of business ownership, overview of management, decision making process and the financial statements, special attention is directed to the management process: planning, organizing, directing and controlling. Finally, in order to visualize the enterprise as a whole the student will be exposed to the management disciplines: marketing, finance, production, organizational behaviour, information systems and strategy.

ADM 201 **Management** **3-0-6**
(3 credits)

The objective of this course is to provide a university level overview of management, managers and organization.

After learning what management is, what managers do, and the evolution of management thought, the student will study the functions of management: planning, organizing, directing, staffing and controlling. The last part of the course will consider leadership.

ADM 231 **Accounting I** **3-0-6**
(3 credits)

The objective of this course is to introduce the student to the procedure of bookkeeping and the presentation of financial statements.

The student will learn to register transactions in the different journals, to classify them in the accounts of the general ledger and to summarize them in the financial statements by closing the books with the help of the worksheet.

ADM 232   Accounting II   3-0-6
P ADM 231   (3 credits)

This course is aimed at providing the student with a better understanding of the financial and legal information conveyed by accounting data.

By the end of the course the student should be able to deal with accounting data of the various legal forms of enterprise. He will also have acquired a basic knowledge of managerial accounting and of some advanced topics in financial accounting such as consolidations and price level changes. At the end the student should also be able to utilize some analytical tools such as: statement of changes in the financial position, break-even analysis and ratios.

ADM 242   Probability and Statistics   3-0-6
P 201-213   (3 credits)

The aim of this first course in statistics is to familiarize the student with basic probability and statistical concepts as they apply in a business or economic context.

The main subjects will be: Introduction and object of probability and statistics. Descriptive statistics. Probabilities and their laws. Conditional probabilities and Baye's theorem. Random variables. Discrete probability distribution models: binomial and Poisson. Continuous probability distribution models; normal and student. The central limit theorem. Sampling distributions. Point and interval estimation. Hypothesis testing. Simple linear regression.

ADM 243   Applied Statistics   3-0-6
P ADM 242   (3 credits)

This course in statistics aims to familiarize the student with the different methods of analysis used in statistics. Particular emphasis is placed on interpreting results by means of a computer analysis.

The following subjects will be taught: descriptive statistics, hypothesis testing: one and two populations. Variance Analysis. Simple and multiple linear regression. Time series analysis and forecasting.

ADM 251   Communication and Writing Skills   3-0-6
                                                             (3 credits)

The course focuses upon oral communication and writing skills adapted to the needs of the students. It covers the grammatical aspects, pausing to study the language of business, and to offer certain models as a guide for the students, while requiring that the students prepare several practical exercises both written and oral.

ADM 314   Operations Management I   3-0-6
P ADM 242, ADM 243   (3 credits)

The main purpose of the course is to understand how goods and services are provided. Subjects covered: 1) develop a conceptual understanding of the operations management and long term decisions: product design and process selection in manufacturing and services, information technology and its implications on manufacturing, capacity planning and facility layout design; 2) have a clear comprehension of operational decisions: production system planning, production and control, inventory management and 3) understand the fundamental factors underlying productivity and contemporary industrial relations.

ADM 323   **Introduction to Civil and Military Law**   **3-0-6**
(3 credits)

The aim of this course is to give a general understanding of the law which will be useful to future officers in the performance of their duties and in their personal lives. Emphasis is on Quebec Civil Law particularly with commercial aspects, corporations, with some treatment of military law.

Subjects covered are: The meaning and sources of law and administration of justice. Contracts and obligations. Civil responsibility (torts). Bills of exchange. Federal and provincial corporations. Bankruptcy, matrimonial law, and consumer protection law.

The section on military law will deal with jurisdiction, arrest, military tribunals, procedure and the Charter of Rights.

ADM 331   **Finance**   **3-2-4**
P ADM 231   (3 credits)

The objective of this course is to introduce the student to the principles of the financial function of an enterprise. Having defined the function and described its operational context the course addresses the specifics of financial management. It deals with financial management techniques and principles. The course is both a theoretical and practical introduction to financial administration.

The course includes the following theories: financial analysis, financial planning and control, cash management, financial and operating leverage, financial evaluation and cost of capital, financial markets and financing through stocks, loans, warrants, etc.

ADM 332   **Management Accounting I**   **3-0-6**
P ADM 231   (3 credits)

The emphasis will be on the internal uses of accounting data by managers in directing the affairs of organizations; setting objectives, making decisions and evaluating results.

Although the emphasis is on the uses of accounting data, management accounting principles will be taught in enough depth to ensure full comprehension of this subject.

ADM 342   **Operations Research I**   **3-0-6**
(3 credits)

The aim of this course is to develop the ability of future managers and leaders to approach practical management problems using the analytical methods of management science. An overview of the nature and applications of management science will be initially provided. Then the students will be introduced to some of the most widely used "deterministic" techniques as well as to some elements of decision theory. Through the application of those methods students will learn how to formulate practical problems, how to solve them manually or with the help of the computer, and finally to interpret the results as they might have to do as managers in a large organization.

ADM 343   **Management Information Systems I**   **3-0-6**
(3 credits)

The objectives of this course is to provide a solid technical perspective in the concepts essential to analyze and understand the capabilities and limitations of information technology so one can be an effective user of computers.

Concepts covered are: introduction to information systems, computer based information systems, role of information technology in organizations. Technical foundations of information systems: computers and information processing, introduction to computer architecture, input-output processor, memory technology, primary and secondary memory, future trends; information systems software, operating system software, application software, very-high-level languages, integrated softwares; data management, systems, organizational area networks, use of computer networks for competitive advantage; management issues and decisions related to information technology.

ADM 350   **Management Information Systems II**   **3-0-6**
P ADM 343   (3 credits)

The objective of this course is to provide a solid organizational perspective in the concepts essential to the analysis, design development, implementation and use of MIS in organizations.

Subjects covered are: typologies of information systems (I/S); strategic role of I/S in organizations and management: I/S and organizations; I/S and decision making. Concepts, tools and techniques for systems building; systems development life cycle, approaches and techniques for understanding information requirements, development life cycle alternatives: prototyping, packages and end-user development; managing end-user computing. Building decision support systems; knowledge-based expert systems. Managing implementation. Managing I/S resources.

ADM 352   **Marketing**   **3-0-6**
       (3 credits)

The objective of this course is to analyze marketing problems and the variables that must be considered in the decision making model of the manager. The course consists of eight (8) different themes including the environment, the marketplace, the products and services, the distribution, the promotion, the image management and the practice of marketing.

Consequently, the student will familiarize himself with the terms and concepts of marketing; be aware of the environment in which the marketing manager must work; be familiar with the tools and techniques available to today marketing managers; be able to evaluate and criticize the different models used in the decision making; and be able to establish his own decision models integrating the controllable variables.

ADM 411   **Decision making process**   **3-0-6**
       (3 credits)

The aim of this course is to analyze the process that leads to a high quality decision. With the help of case studies and a review of some of the existing literature on the subject, the students will become familiar with the different models that have been developed in order to make this process more logical. He will also become aware of the human problems distracting the decision maker from that logic. The course will deal with decision making situations by individuals, small groups and large organizations. Some of the available time will also be utilized to compare the military decision making process with the managerial process.

ADM 412   **Strategic Management**   **3-0-6**
P ADM 314, ADM 331, ADM 332, ADM 352, MLM 322   (6 credits)

The objective of this course is to develop the ability of future managers to (1) think about management problems comprehensively, and (2) take those actions which best contribute to the effectiveness of the whole organization, not just their own department. To this end, the course focuses on: (1) diagnosing an organization's internal and external environment, (2) identifying, creating and evaluating strategy, (3) planning functional tactics for achieving objectives, (4)

implementing strategy and tactics, and (5) controlling and changing objectives, strategy and tactics in an ongoing operation.

The orientation of this course is practical and requires the students to call upon knowledge acquired in the functional disciplines of management. Students are presented with a wide variety of management problems in many different settings.

ADM 413 **Organization Theory** **3-0-6**
(3 credits)

The objective of this course is to develop the ability of future managers to (1) design and modify organizations so that they are adapted to their contingent situation; (2) to resolve problems arising within an ongoing organization. To this end various theories of organization will be studied and the students will be required to apply these theories to real-world situations.

ADM 414 **Operations Management II** **3-0-6**
P ADM 314, ADM 342, ADM 243 (3 credits)

The objective of this course is to establish a synthesis that incorporates concepts and techniques related to production systems. Production systems: components, planning and control. Innovation process: developmemt methodologies and innovation, protection, marketing and strategy; automated manufacturing systems: industrial robots, flexible manufacturing systems, computer aided design/computer aided manufacturing systems (CAD/CAM systems), workstations; cases.

ADM 421 **Human Resources Management** **3-0-6**
P MLM 322 (3 credits)

The aim of this course is to familiarize the future manager with the human resources (HR) management function in the organization.

The course defines the structural support as well as the functional and operational responsibilities in regard to HR management. Also it deals with the role of HR management function which is to provide the organization with an effective work force. More specifically, HR management consists of planning, attracting, developing, using, evaluating and maintaining effective human resources within an organization.

Always from the perspective of the HR manager, the course will also deal with change management and organizational development, productivity management and participative management, and will introduce industrial relations. The last part of the course will consider the future challenges of HR management.

ADM 424 **Public Administration** **3-0-6**
(3 credits)

The objective of this course is to familiarize future public administrators of the Department of National Defence with the public sector environment of the department, namely other public sector departments and corporations, regulatory commissions and such central agencies as the Cabinet, Cabinet Committees and their secretariats, the Treasury Board, the Auditor General, the Receiver General and the Department of Supply and Services. This is achieved by presenting the policy and expenditure management system (PEMS) starting from the official Estimates Documents.

ADM 425   International Management   **3-0-6**
P ADM 314, ADM 331, ADM 332, ADM 352, MLM 322   (3 credits)

The objectives of this course are to familiarize the students with the concepts of the international management, and to know the variables that will influence the manager, his behaviour and his decision making.

The course will give the basic knowledge in international business theories, foreign exchange and international money market, international trade framework and trade barriers (GATT, CEE, Free Trade, etc.), international legal environment, national controls over international transfers, methods of evaluating projects, definition of a global strategy, economic evaluation and demand assessment, assessment of risk, organization of international operations, cross-cultural management and behaviour technology transfers, comparison and standards of accounting systems, production, finance and personnel.

ADM 431   Operational Auditing   **3-0-6**
                                                            (3 credits)

The objectives of this course are: to introduce the students to the main principles of operational auditing, to analyze the main functions of organizations as seen through the eyes of an operational auditor and to present each student with a real problem which requires the development of a sound operational audit program.

The course covers the following topics: introduction to the concept of operational auditing, the steps of operational auditing, management auditing, auditing the information system, the computer system, the Marketing function, the Production function, the Procurement function, the Human Resource function and the Financial function.

ADM 432   Management Accounting II   **3-0-6**
P ADM 332   (3 credits)

The objective of this course is to familiarize the students with the accounting planning and control process in the Armed Forces. This course will help the students to understand the financial reporting system of the Armed Forces.

ADM 433   Introduction to Income Tax   **3-0-6**
                                                            (3 credits)

The objective of this course is to familiarize the students with the Income Tax Act and its impact on business operations and onto ourselves. The study of the Act reinforced by practice through case studies and problems, will enable the students to fully appreciate the significance of income tax factors on business, and individual investment decisions.

ADM 435   Logistics Management   **3-0-6**
P ADM 342, ADM 314, ADM 243   (3 credits)

The objective of this course is to introduce logistics system concepts and understand analysis and techniques for developing and managing logistics systems.

Main subjects covered are: 1) maximization of economic value of products and materials by providing them timely and at a reasonable cost; 2) understand integrated logistics system concept, identification of necessary interfaces among various organizational function areas, optimizing and managing these interfaces; 3) logistics as a competitive factor. Main concepts covered: integrated logistics, integrated logistics support, system life cycle, maintenance, reliability,

transportation systems, inventory management (MRP, DRP, MRP II), information systems logistics, decision support logistics and expert systems logistics. Logistics costs analysis, methods for system analysis, test and evaluation, and system operation and support.

ADM 441   **Operations Research II**   3-0-6
P ADM 342   (3 credits)

The aim of the course is to round out the students' knowledge of operations research by building on the foundations established in the introductory course - Operations Research I. The emphasis will be on the presentation of various O.R. techniques in the areas of linear programming, integer programming, non-linear programming and dynamic programming, and the application of these techniques to problems found in the domain of administration and commerce. The following topics will be covered: the dual simplex algorithm, the revised simplex algorithm, branch and bound methods and the cutting plane method for integer programming, convexity and dynamic programming. Specific applications will be studied through the use of cases and problems.

ADM 460   **Project in Administration**   1-0-8
                                                                     (3 credits)

This course consists of a team project extending over the two semesters of the final year of the program.

The projects provide the students with a real life situation where they can apply concepts and techniques studied theoretically during their whole program of study. The team establishes contact with an existing organization within or outside of the CMR. Projects are selected by the students. However the supervisors may assist in the search of a project. After a phase of familiarization with the area of interest in the organization and a description of its environment, the team defines with the client a specific area of intervention where it will assist the organization in resolving a concrete problem. The practical usefulness of the project for the client is one of the evaluation criteria.

OBJECTIVES OF THE COURSE

1) To review some of the concepts and theories introduced during the BAdm program and acquire a deeper knowledge of specific techniques brought to bear in the course of the intervention in a real organization.

2) To familiarize themselves with the internal climate of an organization, in the private or in the public sector. To experience the differences that exist between administrative sciences and administrative art and the difficulties encountered when one attempts to apply theories in real life settings.

3) To establish a diagnosis, and to relate to a specific problem with the global context of the organization. To demonstrate some expertise in a specific field, develop some maturity and skills as managers, capable of intervening in a complex situation, of applying techniques to resolve practical problems. To learn to make relevant recommendations after careful analysis, to present them orally and in writting to the client and to their classmates.

ADM 463   **Industrial Relations**   3-0-6
P ADM 421   (3 credits)

This course introduces the students to the concepts and processes of certification of bargaining units and agents, preparation, negociation, conciliation, arbitration, strike, mediation and

day to day administration of collective agreements, especially the administration and adjudication of grievances.

The emphasis is placed on the federal civil service sector, namely on the Public Service Staff Relations Act (PSSRA), on the regulations and decisions of its administrative tribunal (PSSRB), on labor unions such as the Public Service Alliance of Canada and its departmental elements, on the employer, namely Treasury Board, with its personnel administration regulations and guidelines and DND with its Civilian Personnel Administrative Orders (CPAO).

The focus of the research assignment is on the role and environment of the first line officer involved in civilian personnel administration at local Canadian Forces Base Level.

ADM 470   **Project Management**   **3-0-6**
(3 credits)

The main objectives of this course are to: get acquainted with project management and be able to differentiate the specificities compared to management as a whole; learn and fully comprehend how enterprises integrate project management in their daily operations; acquire a systemic approach of project management; how to manage a small project. The knowledge of management practices is requested by the candidates in order to reach the above mentioned objectives.

Seminars   **0-3-6**

The objective of the seminars in administration is to complement the regular curriculum in exposing the most recent developments in a particular field to the students.

Guest speakers are usually managers from the private, public or military sectors, or professors of other universities. They are chosen for their distinction and expertise in a specific field of the administrative sciences.

DEPARTMENT OF CHEMISTRY

Head of the Department	James L. Thompson, B.A., M.A., Ph.D., P.Chem.
Professor	Joseph Zauhar, B.Sc., M.Sc., D.Sc., P.Chem.
Associate Professors	Sreenivas Ashtakala, B.Sc., B.Ch.E., M.A.Sc., Ph.D.
	Fernand Bissonnette, B.Sc., M.Sc., Ph.D., P.Chem.
Assistant Professors	Gilles Caron, B.Sc., M.Sc., Ph.D., P.Chem.
	Gabriel Lord, B.A., B.Sc., M.Sc., Ph.D.
	Pierre Smith, B.Sc., Ph.D.

202-111   **General Chemistry**   3-2-3
(2.66 units)

The aim of this introductory course is to provide students who have not completed two full year courses in chemistry at the secondary school level with the background required for chemistry 202-101. The course touches on the following topics: atoms and molecules, atomic theory, symbols and formulas, atomic and molecular masses, some laws of chemistry, the mole concept, atomic structure and isotopes, the periodic classification of the elements, the gas laws, ideal gases, partial pressures, and diffusion. Other topics include the formation of compounds, octet rule, ionic and covalent bonds, nomenclature, empirical and molecular formulas, chemical reactions, equations and balancing of equations, types of reactions, interpretation of an equation, and stoichiometric calculations. Endothermic and exothermic reactions, heats of formation, combustion, fusion, and solution are also part of the curriculum as are solutions and qualitative and quantitative expressions of their concentrations. Experiments on the basic principles of chemistry acquaint the student with the use of simple laboratory apparatus.

202-101   **General Chemistry**   3-2-3
P 202-111 or two one-year high school courses.   (2.66 units)

The purpose of this course is to expand the student's basic knowledge of chemistry and to prepare him for studies in engineering, science, and related fields. The theme of the course is basic ideas of the structure of matter: modern atomic theory, the periodic table (electronic structures of the elements, the aufbau principle, Pauli's principle, Hund's rule), chemical bonds (ionic, covalent, and metallic), bond polarity, hydrogen bonding, van der Waals forces, stereochemistry. The relation of chemical bonding to chemical properties, states of matter, the gas laws, crystal lattices, liquids, and phase changes are also studied. The laboratory work illustrates the lecture material. Emphasis is placed on the precision of measurements and logical deduction.

202-201   **Solution Chemistry**   3-2-3
P 202-101   (2.66 units)

This course provides science and engineering students with a more detailed knowledge of solutions and chemical equilibria, and an introduction to chemical kinetics and electrochemistry. The curriculum includes: solutions and expressions of concentration, colloids, chemical kinetics, chemical equilibria in the gas phase, and ionic equilibria. Faraday's law, oxidation and reduction, and electrochemical cells are also studied. Laboratory work provides experience with volumetric analysis, pH measurement, colligative properties, chemical kinetics, colorimetry, oxidation-reduction, and automatic data acquisition.

202-901 **Development and the environment** **3-0-3**
(2 units)

This course imparts to beginners the most fundamental notions of chemistry and the analysis of environmental problems. The basic ideas of mixtures, elements, compounds, and structure-property relations are discussed. Chemical calculations related to energy production and waste are treated. Some case studies of energy production will be presented. These may include electric power generation by using fossil fuels, nuclear energy, hydraulic energy, and other energy sources.

203-927 **Physical Sciences** **3-0-3**
P 202-101 (2 units)

The aim of this course is to give officer cadets in the non-science options some insight into the development and applications of science. Half of the lectures, devoted to environmental subjects, are given by the chemistry department. The major themes are air pollution and water pollution. In discussion of the atmospheric environment emphasis is on the principal air pollutants: CO_x, SO_x, C_xH_y, N_xO_y, and particulates. The automobile as a source of pollutants is a major topic. Lectures on the water environment deal with sources of pollution, classes of pollutants, eutrophication, biochemical oxygen demand, and potable water. Other topics include the treatment of waste waters, pesticides, and mercury in the environment. (Complementary course in physics: see physics department, course 203-927).

CHM 241 **Physical Chemistry I** **3-0-6**
P 202-201 (3 credits)

The purpose of Physical Chemistry I is to give the student the chemical prerequisites for engineering and science courses. The curriculum includes: the ideal gas law, the kinetic theory of ideal gases, deduction of the empirical gas laws, applicability of the ideal gas laws and the van der Waals equation, specific heats of gases, critical phenomena of liquids (Andrews isotherms, van der Waals constants), the first law of thermodynamics, and thermochemistry and its applications.

CHM 242 **Physical Chemistry II** **3-0-6**
P CHM 241 (3 credits)

The objectives of this course are those of Physical Chemistry I. The curriculum includes: the Carnot cycle, thermodynamic efficiency, the second law of thermodynamics, entropy and free energy, the activity concept, phase equilibria, heterogeneous systems, and the phase rule. Electrochemistry, electromotive force and thermodynamics, electrochemical cells, corrosion of metals and corrosion protection are also studied.

CHM 291 **Experimental Chemistry** **0-2-1**
P CHM 241 (1 credit)

This course complements Physical Chemistry I. The student applies in the laboratory the principles learned in the classroom. Experiments include determination of the molar mass and the

density of a gas, temperature dependence of vapour pressure, heat of vapourization, heat of reaction, and determination of a transition point.

CHM 292   **Experimental Chemistry**   **0-2-1**
P CHM 241, CHM 291, CHM 242   (1 credit)

This course is a continuation of CHM 291 and has the same goals. The laboratory work includes: the phase diagram of a binary system, ternary phase diagrams, electrode potentials, electrochemical cells, concentration cells, the thermodynamics of cells, and potentiometric titrations.

CHM 312   **Analytical Chemistry**   **1-2-3**
P CHM 242, MAT 251   (2 credits)

In this course several concepts basic to analytical chemistry such as chemical equilibrium, solubility, activity, and the Nernst equation are reviewed. Instrumental analysis including: methods of separation, instrumental chromatography, gravimetry, complexometric and potentiometric titrations, electrogravimetric and coulometric methods, voltammetry, and spectroscopic methods of analysis are studied.

CHM 321   **Organic Chemistry I**   **2-2-5**
P 202-201   (3 credits)

This course is to acquaint students with the elements of organic chemistry and their applications in the laboratory. Emphasis is placed on properties, structures and syntheses of aliphatic compounds. Concepts of stereochemistry, reaction mechanisms, and types of reagents are introduced. Benzenoid compounds are discussed. The reactions of organic functional groups are studied in the laboratory.

CHM 322   **Organic Chemistry II**   **2-2-5**
P CHM 321   (3 credits)

The material in this course extends the material of Organic Chemistry I by presenting a simple heterocyclic and polyfunctional compounds. The laboratory work involves synthesis of aliphatic and benzenoid compounds. Syntheses involving sequences of reactions are carried out.

CHM 341   **Electrochemistry**   **2-2-5**
P CHM 242, CHM 292   (3 credits)

The theme of this course is the thermodynamics of non-electrolytes and the application of the principles to electrolytes. Properties such as conductance, mobilities, transference numbers, ionic strength are studied. Thermodynamic properties of electrolytes such as free energy, activities, and equilibrium constant are studied through the electromotive force of cells and electrolytic reactions. Applications of both conductivity and electromotive force in other areas are also covered. Laboratory work illustrates the principles studied in the classroom.

CHM 362   **Quantum Chemistry and Spectroscopy**   **2-2-5**
P 202-101, MAT 251, PHY 231   (3 credits)

This course presents basic quantum chemistry and touches briefly on several spectroscopic methods. Topics include an outline of quantum mechanics, the Schrödinger equation, interpretation of the wave function, the quantum mechanics of simple systems, spherical potential (the hydrogen atom and hydrogen-like atoms), atomic spectroscopy, molecular symmetry, electronic spectra of molecules, photoluminescence, rotational and vibrational spectroscopy, photoelectron spectroscopy, and ESCA techniques, NMR, NQR and ESR techniques, Mössbauer spectroscopy, optical rotatory dispersion and circular dichroism, and analytical applications.

CHM 372   **Inorganic Chemistry**   **2-2-5**
P 202-201   (3 credits)

The purpose of this course is to familiarize students with basic inorganic chemistry by study of the following topics: atomic structure and the periodic table, covalent substances (covalent bonding, coordinate covalence, resonance, the structures of simple molecules, Hund-Mulliken theory, electronegativity, weak interactions), ionic substances (structure, ionic radii, lattice energy, solubility), the hydrogen bond, acids and bases, metals, coordination compounds (bonding, ligand field theory, geometrical configurations of complexes).

CHM 399   **Technology of Weapons**   **3-0-3**
P 203-927   (2 credits)

This course is shared by the Physics and Chemistry Departments. It is intended to enable students taking the course in Military and Strategic Studies to evaluate the effects of modern technology on strategy and tactics.

After an historical review the following subjects are discussed: utilisation of chemicals in time of war, the modern arsenal of chemical weapons, utilisation of chemical weapons, the toxicity of chemical compounds towards man and plants, the biology and the chemistry of the action of gases and toxins on living organisms, the future of chemical weapons, the chemical industry of a country and its capacity to produce chemical weapons, strategic materials, (elements and chemical compounds essential for war, and the vulnerability of a country with relation to these strategic materials).

For a description of the remainder of the course see physics course PHY 399.

CHM 421   **Organic Chemistry III**   **2-2-5**
P CHM 322   (3 credits)

The object of this course is the study of natural products and synthetic polymers, emphasizing spectroscopic methods of structure determination including infrared, ultra-violet/visible, nuclear magnetic resonance, and mass spectroscopy. The laboratory involves synthesis of complex chemical substances, separation of natural and synthetic mixtures, and structure determination.

CHM 491   **Experimental Chemistry and Project**   **0-6-6**
CHM 492   (4 credits)
P CHM 242

These courses are intended to give the student some experience of independent investigation. A project including a bibliography, experimental work, a dissertation, and a formal oral presentation are required. Some compulsory experimental work related to the project will be assigned.

Tutorials

The department of chemistry offers tutorials to students who have either failed an examination or shown insufficient progress during an academic session. Students being tutored obtain supplementary explanations and do additional exercises in order to attain an acceptable level of proficiency.

Seminars

Within the framework of the seminars organized by the Science and Engineering division, the department of chemistry invites specialists from the College and elsewhere to speak on chemical topics. These seminars, often of military interest, are an essential complement to the student's regular courses and contribute substantially to his university education.

Research

Most research in the department of chemistry is in four areas: ion-containing polymers, thermodynamics of bi- and tri-metallic alloys, study of the environment, and synthesis and characterization of organic and organometallic semiconductors. Researchers in the latter field are active participants in le Groupe de recherche sur les semiconducteurs et les diélectriques, a research group composed of physicists and chemists from CMR and l'Université de Sherbrooke. Students in the Fourth Year of the general B.Sc. programme may select a term research project in one of the above fields. The work is done under the supervision of a member of the department.

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Head of the Department	Michel Jean, B.A., B.Sc., M.A., Ph.D., N.D.C.
Associate Professors	Didier Chong, B.Sc., Ph.D.
	Jocelyn Desbiens, B.Sc., M.Sc., Ph.D., M.Sc.(Info.)
Assistant Professors	Major Gilles Champigny, C.D., B.Sc., M.Eng.
	Charilaos Fakiris, B.Sc., M.Sc.
	Denis Valois, B.Sc., M.Sc.
Lecturers	Michel de Champlain, B.Sc., M.Sc.
	Captain Bruno Dubreuil, B.Ing.
	Captain René Sturgeon, B.Ing., M.Sc.
Part-time Lecturer	Brian Patrick, B.Comp.Sc., M.Sc.

420-900   **Introduction to Computer Science**   **2-1-3**
(2 units)

For First Year students in Administration and Arts, this course is designed to give a basic formation in computer science. Upon completion of this course, the students will know the main characteristics of computer hardware and its applications in different domains. The main topics are: historical perspective, the computer and its hardware components, peripherical devices; notions of file, software, data; programming languages, compilation, execution; operating systems, commands; word processing, electronic mail, spreadsheets, databases, data communications.

420-920   **Introduction to Computer Programming**   **2-1-3**
(2 units)

For First Year students who select Sciences or Engineering, this course is an introduction to problem solving with the algorithmic method and to procedural programming. Topics will include algorithms and pseudo-code; modules and top-down problem solving; basic programming, input/output, assignment and arithmetic operations; flow of control statements, selections and iterations; simple data types, integer, real, boolean and character; subprograms, functions, procedures, parameter passing; structured data types, scalar types, arrays, sets and records.

201-408   **Computer Programming and Numerical Methods**   **3-0-3**
P 201-103, 201-105, 420-920   (2 units)

In this course, the student will learn some general numerical methods used for problem solving in Science and Engineering. He will implement these computational methods on a computer, using a procedural language. Here are some of the topics covered: solving systems of linear equations, solving non-linear equations, finding roots of polynomials, approximating functions by interpolation and curve-fitting, evaluating integrals numerically, optimizing with the simplex method.

ING 210   **Engineering Graphics I**   **1-2-6**
(3 credits)

This course is aimed at developing the student's ability to communicate with the help of drawings and to visualize in three dimensions. The student will learn the lettering techniques, geometric constructions, orthographic and pictorial views, sections and conventions, dimensions and tolerances, and graphical mathematics. The student will control the drawing instruments, master the sketching technics and will use a Computer Assisted Design (CAD) software.

ING 220   **Engineering Graphics II**   **1-2-6**
P ING 210   (3 credits)

This second course in Engineering Graphics provides the engineering students with advanced technical aspects. Furthermore, a project will introduce them to the design process. They will learn to use joints, fastener and standard parts, and to produce assembly drawings. They will be introduced to descriptive geometry and will also learn to use the six steps of the design process and the advanced functions of CAD during a term project. A technical report and an oral presentation will introduce them to communication techniques.

ING 230   **Strength of Materials**   **3-1-5**
P 201-103, 201-105, 203-101   (3 credits)

This course provides an introduction to the basic concepts of the strength of materials. The student will learn the basic relations between the external forces applied on a deformable body and the various stresses induced inside; he will then deduce the corresponding deformations for various materials, and finally he will determine the necessary shape for every element of a given structure. It includes a review of statics, mechanical properties of materials, stress and strain in axially loaded members; axial force, shear and bending moment diagrams; elastic torsion of circular members; bending and shearing stresses in beams; compound stresses; analysis of plane stress; principal stresses; Mohr's circle for plane stress; combined loading. Laboratory demonstrations include tension, torsion and bending tests.

ING 375   **Simulation and Control**   **3-1-5**
(3 credits)

The aim of this course is to introduce the students to the fundamental concepts of system modeling and to make them understand the basic principles underlying control theory. After a brief historical overview of control system evolution, the course will concentrate on the mathematical modeling of systems, on the differential equations describing physical systems and on their linearization. Then the Laplace transform and the transfer function of a system will be covered. Finally, the characteristics of control systems, their stability, transcent response control and sensibility to perturbations will be discussed.

INF 341   **Algorithms**   **3-0-6**
P INF 442   (3 credits)

After this course the student will be able to design efficient algorithms and to analyse them. Among the topics discussed are the asymptotic notations, the a priori classification and analysis of algorithms. The main technics studied are divide and conquer, greedy algorithms, dynamic programming, probabilistic algorithms.

INF 352   Structured Programming   3-0-6
P 420-920   (3 credits)

This course will allow the student to master in depth a procedural language and to design and implement programs of some size, using approved software engineering techniques. Among the concepts studied are the syntactic description of a language, the block structure and recursion; units and packages; structured data types, arrays, files, records, sets; pointers and dynamic data types; elementary notions from software engineering; specification and design; implementation, modularization, transparent programming style, choice of meaningful names; validation, tests, debugging, formal verification.

INF 360   Real-time systems applications   2-2-5
                                                                    (3 credits)

The objective of this course is to present theoretical concepts of real-time systems and to initiate the student to the use of real-time programming languages. The theoretical concepts that will be covered are: task management, synchronization, input/output, interrupt management, clock management, memory management, and scheduling policies. Exemples of real- time programs will be studied in detail and applied to typical problems.

INF 361   Computer Organization   2-0-4
P INF 352   (2 credits)

The objective of this course is to present microprocessor structure and organization concepts. It introduces the student to the design of assembly language routines and their interface with an high level language. The main topics are: machine language versus assembly language; instructions set and addressing modes; interface techniques with high level languages, routines, differences between functions and procedures, parameters passing by value and by address; macros; input/output access. Small programs will be developped involving the use of: an assembler, a compiler, a linker and a source-level debugger.

INF 362   Real-Time systems and interfaces   3-0-6
P INF 361   (3 credits)

The objective of this course is to present real-time operating system concepts. It introduces the student to the design of device drivers with the support of a real-time operating system. Included is the study of sections of a real-time executive kernel, list and queue management, task management, device management, processor management, inter-task synchronization and communication, interrupt management, clock management, and memory management. The following concepts of input/output software will be studied: interrupt handlers, device drivers and device independant input/output.

INF 363   Sructured System Analysis   3-0-6
                                                                    (3 credits)

The objective of this course is to present an overview of the management information systems in a business environment as well as to provide the student with the appropriate techniques and tools enabling him to analyse, to study and to design an information system in order to meet the needs of an organization in the best way. The topics studied will include: information system functions and components, problem definition and problem solving principles,

a system development life cycle, preliminary analysis, feasibility study, fact-gathering techniques, modular design, top-down design, information system design, implementation, modification and documentation.

INF 371   **Data Communications**   **3-0-6**
P INF 362   (3 credits)

This course will introduce the student to the techniques and methods involved in the analysis and design of computer networks with emphasis placed on the open system interconnection model. It will prepare the student for tasks involving the selection, trouble-shooting and management of digital communication systems. The following topics will be studied: data transmission methods and mediums, channel capacity, modems, multiplexors, concentrators, coding systems, error detection and recovery, network structures, capacity analysis, flow control, routing control, transmission protocols, public access networks, local area networks.

INF 421   **Introduction to Software Engineering**   **3-0-6**
P INF 442   (3 credits)

The objective of this course is to expose the student to the principles and concepts which apply to the development of any large software, from its specification to its maintenance. This course will deal with software development, the needs, goals, methods, products and processes; software project management, programming in the small versus programming in the large, project scheduling, programmer productivity; requirements definition, analysis and validation techniques; software specification methods; software design, object-oriented and function-oriented methods; software implementation, verification and validation; quality assurance and control; configuration management; software maintenance and evolution; software portability and reuse; software tools; software metrics and complexity.

INF 423   **Software Project Management**   **3-0-6**
                                                                             (3 credits)

After completing this course, students should know how to develop a software project management plan, how to assess risk, how to track schedule, budget, quality, productivity, how to use and evaluate software tools. In addition, students should understand the relationships among software quality assurance, software configuration management, and project documentation. They should also gain an understanding of the key issues in intellectual property issues, contracts and licenses, and process assessments. They should also learn the standards governing the acquisition, development and maintenance of software systems.

INF 432   **Foundations of Computer Science**   **3-0-6**
                                                                             (3 credits)

The objective of this course is to give a precise mathematical understanding of what is meant by the terms algorithms, computable functions and unsolvable problems. After an introduction to the diagonal argument in set theory, different models of computability will be presented: Turing machine, recursive functions and lambda calculus. The course will also deal with the notions of axiomatisation and completeness in propositional and predicate logic.

INF 441   **Compiler Construction**   3-0-6
P INF 442, MAT 463   (3 credits)

The objective of this course is to familiarize the student with basic concepts of a compiler, its structure, and its implementation. Among the topics studied are: theoretical models of programming languages, regular expressions, formal languages and syntax diagrams; functionnal semantic, ambiguity; programming languages concepts, declarable objects, parameter passing, static and dynamic environments; compilation technics, lexical, syntactical and semantical analysis; code generation and optimization.

INF 442   **Data Structures**   3-0-6
P INF 352   (3 credits)

After taking this course the student should: distinguish between an abstract data type and concrete data structures that, together with the necessary procedures, will represent and implement the abstract data type; know the properties of the most common data structures; and be able to implement them using pointers or to utilize them when they are given implicitly. The main topics are: concepts of data structure, abstract data type, the most common data structures: sets and sequences, arrays (including sparse arrays), stacks, queues, trees, graphs; their implementation as arrays, strings, linked lists of different kinds; the algorithms that manipulate them, sorting, searching, hashing, string matching.

INF 443   **Database Management Systems**   3-0-6
P INF 442   (3 credits)

The objective of this course is to expose the student to the major approaches to database systems and to database management systems concepts. The topics studied will include: database system architecture, the external, conceptual and internal levels of the architecture, data definition languages and data manipulation languages, the database administrator; data modeling, conceptional and representational data models, normalization, data security and integrity; the organization, storage and manipulation of hierarchical, network and relational models; relational algebra; relational calculus, distributed systems.

INF 451   **Office Automation**   3-0-6
P INF 442   (3 credits)

The principal objective of this course is to introduce the student to the world of office automation: designing and implementing office information systems, concepts, tools and technics. The course will cover: office automation components, word processing, form design, electronic mail, data and document retrieval, decision support system, integration with database management system; augmented Petri Net formalism; communication networks, local area networks, integration problems; interface design, man-machine communication, multi-level user interface; database and network security, cryptography; analysis of existing commercial information systems; future perspective in office automation, artificial intelligence, knowledge-based expert systems.

INF 461   **Operating Systems**   3-0-6
P INF 442, INF 362   (3 credits)

This course presents the principles of operation of the major modules of an operating system in a multiprogramming context. A comparative study of different operating systems will be

made. The course will deal also with the multiprogramming principles, the communications between tasks, the problems of synchronization and mutual exclusion; the management of memory, of input/output, of files and of jobs; the protection and the security.

INF 462   **Computer Architecture**   **3-0-6**
P PHY 427, INF 362   (3 credits)

The objective of this course is to present an overview of the structure of contemporary computer systems and to give the student an understanding of the factors determining performance and applicability to specific applications. The main topics are: compromises in the design of the central processing unit; reduced instruction set and complex instruction set computers; bus structures, clock speeds, bandwidth; memory organization and management; virtual memory; classification and structure of multi-processor systems; massively parallel systems; case studies.

INF 471   **Computer Graphics**   **3-0-6**
P INF 442   (3 credits)

This course is an introduction to the concepts and methods of computer graphics. The presentation of the concepts underlines the relations between computer graphics, the physiology of human vision, shape recognition, image processing, robotic vision and scientific graphics and their applications. The topics studied will include: description of the hardware devices of computer graphics, displays, input units, interactive tools; introduction to a typical library of graphic primitives associated with a workstation; modelling of curves, surfaces and solids in three dimensional space; introduction to the visualization algorithms; geometrical transformations, perspective, projections and hidden surface removal; data structures and segmentation of images; introduction to shading; the basics of color theory and the methods of geometrical optics.

INF 493   **Computer Science Project**   **0-6-6**
                                                                                   (4 credits)

A computer related project, typically an effort of analysis and creativeness in a particular area of computer science related to the orientation in which the student is enrolled. Three periods are reserved on the schedule at the first and second session for this project. A report and an oral presentation must be given at the end of the year.

DEPARTMENT OF LITERARY STUDIES

Head of the Department	Adnan Moussally, L.L., M.A., D.L.
Professors	Gilbert Drolet, B.A., M.A., Ph.D.
	Agop Hacikyan, N.D.C., B.A., M.A., Ph.D.
	René Labonté, B.Ped., B.A., M.A., Ph.D.
	Florent Tremblay, B.A., B.Ed., M.A., Ph.D.
Associate Professors	Michel Ladouceur, B.Ped., L.L., M.Ed.
	Guy Provost, B.A., M.A., D.L.
	Mohammad Tajuddin, B.A., M.A., Ph.D.
Assistant Professor	Lorne Shirinian, B.A., M.A., Ph.D.
Part-time Lecturers	Martine Ouellet, B.A., M.Sc.
	Raymond Poulin, B.A., M.A.
	Sigrid Simonsen, B.A., M.A.
	Benoît St-Germain, B.A., M.A.

603-101   **English Literature**   3-0-3
(2 units)

The course aims to review the fundamentals of composition and to introduce the methods of academic research as well as to study selected literary works of Anglo-Saxon, Middle English, and Shakespearean literature.

603-201   **English Literature**   3-0-3
(2 units)

The object of this course is to study English literature of the 17th and 18th centuries. Students are required to write a term paper as well as several short essays.

603-301   **English Literature**   3-0-3
(2 units)

This course focuses on English Romantic and Victorian literature of the 19th century. Students are required to write a term paper as well as several short essays.

603-401   **English Literature**   3-0-3
(2 units)

This course aims to study English literature of the 20th century in a variety of genres. Students are required to write a term paper and short essays.

ENG 211   **Utopian Literature**   2-0-4
(2 credits)

The object of this course is to study five of the six following works of Utopian literature : Bellamy, *Looking Backward*; Huxley, *Brave New World*; Orwell, *1984*; Golding, *Lord of the Flies*; Vonnegut, *Player Piano*; and Kesey, *One Flew Over the Cuckoo's Nest*.

ENG 212   English Literature   3-0-6
(3 credits)

This course focuses on the study of major works of the 20th century literature of all genres from various countries. Students are required to write a term paper and several short essays.

ENG 251   Communication and Writing Skills   3-0-6
(3 credits)

The course aims to develop oral communication and writing skills adapted to the needs of the students, to cover the grammatical aspects, pausing to study the language of business, and to offer certain models as a guide for the students, while requiring that the students prepare several practical exercises both written and oral.

ENG 301   Canadian Literature in English I :   3-0-6
The novel   (3 credits)

The goal of this course is to study the Canadian novel in English from the earliest times to the present day. It focuses upon the principal themes in a selection of major Canadian novelists.

ENG 302   Canadian Literature in English II :   3-0-6
The short story   (3 credits)

The aim of this course is to examine the story as a genre in its particular Canadian context, to trace the chronological development of this form in Canada, and to cover its thematic and comparative aspects.

ENG 310   Military Readings   3-0-6
(3 credits)

This course serves to introduce several of the world's best-known authors who have dealt with war in their works. Among others, works of the great traditions of France, Great Britain, Russia and Germany are studied, including selections from Camus, Malraux, Shaw, Waugh, Tolstoï, Rilke and Remarque.

ENG 401   Canadian Literature in English III :   3-0-6
Poetry   (3 credits)

The goal of this course is to study the themes and techniques which characterize the principal Canadian poets whose work has appeared in English from the earliest times to the present day. Regional poets may be invited.

ENG 402   Canadian Literature in English IV :   3-0-6
Drama, film, and television   (3 credits)

This course attempts to develop an awareness of, an interest in, and an appreciation of Canadian drama in English, to acquaint students with the various dramatic modes and to develop an interest in, and appreciation of, theatre in general.

601-102	**Poésie**	3-0-3
		(2 unités)

Ce cours vise à initier l'étudiant au langage poétique comme moyen de communication et à l'amener à une maîtrise minimale des techniques de ce discours par la lecture, l'analyse de différents types de poèmes et la création.

601-902	**Éléments de linguistique**	3-0-3
		(2 unités)

Décrire les mécanismes fondamentaux de la langue. Identifier et "catégoriser" les faits de la langue en fonction du français international, du franco-québécois et des particularités régionales. Donner à l'étudiant la possibilité de se situer face aux différents niveaux de langue. Faciliter le maniement de la langue comme moyen de communication. Le franco-canadien sert d'approche à chaque domaine de la linguistique : sémantique, phonétique, morphologie et syntaxe. Le souci de dégager les implications linguistiques est constant. Une importance particulière est accordée à la morpho-syntaxe pour sa dimension structurale ainsi qu'aux niveaux de langue. L'importance accordée au phénomène franco-canadien implique qu'on se préoccupe du français international et de l'anglo-canadien.

601-911	**Français écrit**	3-0-3
	/	(2 unités)

Ce cours a pour but d'aider l'étudiant à améliorer sa langue écrite. Il lui apprend à utiliser les mots dans leur sens propre, construire des phrases correctes, former des paragraphes logiques et rédiger un texte cohérent. Ce cours est destiné aux étudiants qui y ont été dirigés après un test.

601-302	**Roman**	3-0-3
		(2 unités)

Par la lecture et l'analyse de romans, amener l'étudiant à découvrir des aspects particuliers d'époques et de sociétés diverses, à suivre l'évolution des idées de progrès et de liberté, à développer une compréhension des techniques du roman et une capacité d'en dégager l'idéologie sous-jacente, à approfondir son aptitude à la lecture tout en améliorant sa langue écrite.

601-402	**Essai**	3-0-3
		(2 unités)

Apprendre ce qu'est l'essai et se familiariser avec certains types de discours utilisés par ce genre littéraire : informatif, argumentatif et critique. Amener l'étudiant à lire quelques essais et à produire des textes exprimant surtout des idées : compte rendu, dissertation, articles de journal ou de revue.

FRA 206	**Littérature québécoise**	2-0-4
		(2 crédits)

Ce cours est offert aux étudiants inscrits au programme de sciences et ingénierie. Il se propose de faire connaître un choix d'oeuvres qui témoignent de l'histoire du Canada français et de sa volonté d'affirmer son identité, de saisir la cohérence et la signification de chacun des

romans analysés, et d'en dégager l'idéologie sous-jacente par la confrontation des données romanesques et poétiques avec les réalités historiques et sociales.

FRA 208	**Littérature québécoise**	**3-0-6**
		(3 crédits)

Ce cours est offert aux étudiants inscrits aux programmes d'administration et d'humanités. Il se propose de faire connaître à l'étudiant un choix d'oeuvres qui témoignent de l'histoire du Canada français et de sa volonté d'affirmer son identité, de saisir la cohérence et la signification de chacun des romans et des poèmes analysés, et d'en dégager l'idéologie sous-jacente par la confrontation des données romanesques et poétiques avec les réalités historiques et sociales.

FRA 251	**Communication et techniques de rédaction**	**3-0-6**
		(3 crédits)

Ce cours vise à améliorer la communication orale et écrite des étudiants en s'adaptant à leurs besoins, à revoir l'aspect grammatical du langage, à s'attarder à l'étude de la langue des affaires, à proposer des modèles pour guider les étudiants et à exiger d'eux plusieurs travaux pratiques, écrits et oraux.

FRA 301-302-401-402	**Littérature et société**	**3-0-6**
	I, II, III et IV	(3 crédits)

Ces cours sont offerts aux étudiants inscrits en études littéraires. Ils se proposent de cerner le phénomène de l'écriture dans ses rapports avec l'évolution de l'idéologie et de la société québécoise. Les oeuvres étudiées (romans, essais, contes, théâtre, nouvelles et poèmes) sont groupées à l'intérieur des quatres périodes suivantes : (FRA 301) de la Nouvelle-France à 1914; (FRA 302) de 1914 à 1945; (FRA 401) de 1945 à 1960 et (FRA 402) de 1960 à nos jours.

FRA 310	**Guerre et littérature**	**3-0-6**
		(3 crédits)

Ce cours veut introduire plusieurs grands auteurs du monde qui ont traité de la guerre dans leurs oeuvres. L'étude porte sur des ouvrages des grandes traditions françaises, britanniques, russes et allemandes entre autres Camus, Malraux, Shaw, Waugh, Tolstoï, Rilke et Remarke.

LIT 340	**L'expérience militaire selon**	**3-0-6**
	les écrivains canadiens	(3 crédits)

Ce cours se propose d'analyser, dans la littérature d'imagination, les oeuvres qui enregistrent et reflètent les principaux événements militaires vécus par les Canadiens. Il examine l'essence de la guerre, ses effets sur la société canadienne et met en évidence l'évolution des attitudes des deux solitudes.

DEPARTMENT OF MATHEMATICS

Head of the Department	François Dubeau, B.Sc., B.Sc.A., M.Sc.A., Ph.D.
Professors	Robert Gervais, B.A., B.Sc., M.Sc., Ph.D., M.Sc.(Info.), N.D.C., (Part-time)
	Pierre Gravel, B.Mat., M.Mat., Ph.D.
	Gheorghe Isac, L.Sc., Ph.D.
	Michel Jean, B.A., B.Sc., M.A., Ph.D., N.D.C., (Part-time)
	Marcel Labbé, B.A., M.A., Ph.D.
	Philip J. Laufer, B.Sc., M.Sc., Ph.D.
Associate Professors	Jocelyn Desbiens, B.Sc., M.Sc., Ph.D., (Part-time)
	Jacques Gélinas, B.A., B.Sc., M.Sc., Ph.D.
	Daniel Hennequin, B.Sc., M.Sc., Ph.D.
	Pierre Laviolette, B.A., B.Sc., M.Sc., Ph.D., (Part-time)
	Sylvie Mainville, B.Sc., M.Sc., Ph.D.
	Patrice Marcotte, B.Sc., M.Sc., Ph.D.
	Gérard Normand, L.Sc., B.Sc., M.Sc.
	Jean Savoie, B.Sc., M.Sc., Ph.D.
Assistant Professors	Sahnoune Dahel, M.Sc., D.E.S., Ph.D.
	Alain Pautasso, L.Sc., M.Sc., Ph.D., M.Sc.(Info.)
	Gilles Savard, B.Sc., M.Sc.A., Ph.D.
Lecturers	Captain Jacques Albert, C.D., B.Eng.
	Captain Jean Genest, B.Sc.(Info.), M.Sc.(Info.)

201-101 **Introduction to Applied Mathematics** 2-1-2
(1.66 units)

For officer cadets of the Preparatory Year in the Science options.

The purpose of this course is to prepare students for scientific studies. As important tools in mathematics and physics, algebra and trigonometry will be reviewed and completed. The study of techniques of proof should help students to improve their ability to understand and to write correct mathematical solutions and introduces them to abstract mathematical reasoning.

Review of algebra: solving linear, quadratic, polynomial and rational equations and inequalities. Equations and inequalities involving absolute value. Exponential and logarithmic functions. Review of trigonometry: basic notions, trigonometric identities, inverse trigonometric functions. Methods of proof: proposition, truth values, direct proof, contrapositive method, proof by contradiction, quantificators, counter-examples, mathematical induction.

201-102 **Introduction to Applied Mathematics** 2-1-2
(1.66 units)

For officer cadets of the Preparatory Year in Social Sciences.

The objectives of this course are to complete the basic algebraic notions that students should have in arts programs and to use these notions to create mathematical models of phenomena in the real world.

Linear functions: the line, its slope and graph; linear models. Quadratic functions: the parabola, vertex, focus, standard form; quadratic models. Logarithmic and exponential functions:

exponents and logarithms, change of bases, graphs, exponential models. Trigonometric and circular functions: graphs, inverse circular functions, identities, trigonometric models.

201-103   **Differential and Integral Calculus I**

For officer cadets of the Preparatory Year in the Science options. This course is given over two semesters and its objective is to introduce the student to the fundamental concepts of differential and integral calculus: limits, derivatives and antiderivatives.

First semester   **2-1-3**
(2 units)

Slope of a tangent line. Limits: definition and theorems. Continuity. The derivative: definition, rules and interpretation. Chain rule. Derivatives of implicit and trigonometric functions. Applications: linear approximation and kinematics.

Second semester   **2-1-3**
(2 units)

Related rates, graphs and optimization. Mean value theorem. Definition of the integral by Riemann sums. Fundamental theorem of calculus. Inverse, exponential and logarithmic functions.

201-113   **Differential and Integral Calculus I**

This course is intended for students in the Preparatory Year of Social Sciences and is given over two semesters.

The objective of this course is to introduce the student to the fundamentals of calculus (limits, derivatives and antiderivatives) in view of their application in simple phenomena characteristic of the social sciences.

First semester   **2-1-2**
(1.66 units)

Slope and equation of a tangent line. Limits: intuitive introduction, properties. Continuity. The notion of the derivative. Derivation of rational, composite and implicit functions. Application in economics: marginal quantities.

Second semester   **2-1-2**
(1.66 units)

Graphing. Optimization problems with applications to inventory management. Definite integral as limit of Riemann sums. Integration and areas. Exponential and logarithmic functions.

201-105   **Introduction to Linear Algebra**

For officer cadets of the Preparatory Year in the Science options: this course is given over two semesters.

The objective of this course is to study the mathematical tools required to solve systems of linear equations.

<u>**First semester**</u>   **2-1-3**
                                                                    (2 units)

        Solution of systems of linear equations by Gauss-Jordan elimination.   Matrix algebra. Determinant and inverse of a matrix.   Cramer's rule.   Vectors in 2 and 3 dimensions.   Vector arithmetic. Scalar product and projections.

<u>**Second semester**</u>   **2-1-3**
                                                                    (2 units)

        Cross product.   Lines and planes in 3-space. R^n.   Vector spaces: subspaces, linear independence, basis and dimension.   Complex numbers.   Complex roots of polynomials. De Moivre's theorem. Applications of complex numbers to linear algebra.

201-115   **Introduction to Linear Algebra**

        For officer cadets of the Preparatory Year in Social Sciences, this course is given over two semesters.

        The objective of this course is to study the mathematical tools required to solve systems of linear equations and to introduce the student to linear programming in order to solve practical problems.

<u>**First semester**</u>   **2-1-2**
                                                                  (1.66 units)

        Solution of systems of linear equations by Gauss-Jordan elimination.   Matrix algebra. Determinant and inverse of a matrix.   Cramer's rule.   Vectors in 2 and 3 dimensions.   Vector arithmetic. Scalar product and projections.

<u>**Second semester**</u>   **2-1-2**
                                                                  (1.66 units)

        Cross product.   Lines and planes in 3-space.   Applications of matrices.   Linear programming: geometric approach, basic concepts, the simplex method, applications. Introduction to complex numbers.

201-203   **Differential and Integral Calculus II (Sciences)**   **2-1-3**
P 201-103   (2 units)

        For first-year students taking the Science, Engineering and Computer Science options.

        The objective of this course is to familiarize the student with the fundamental concepts and the methods related to the differential and integral calculus and prepare the student to use them as tools for subsequent courses of a quantitative nature.

        Definite integral.   Evaluation of definite integrals by the fundamental theorem of calculus. Substitutions in a definite integral.   Logarithmic and exponential functions, hyperbolic and inverse trigonometric functions: graphs, derivatives and integrals.   Methods of integration.   Improper integrals. Applications: area, volume and arc length.

201-303	Differential and Integral Calculus II (Sciences)	3-2-3
P 201-203		(2.66 units)

For first-year students taking the Science, Engineering and Computer Science options.

The objective of this course is to familiarize the student with the fundamental concepts and the methods related to differential equations, sequences and series and prepare the student to use them as tools for subsequent courses of a quantitative nature.

Indeterminate forms. Introduction to separable and/or linear first-order ordinary differential equations. Introduction to linear second-order ordinary differential equations with constant coefficients: method of undetermined coefficients, method of variation of parameters. Sequences and convergence. Convergent and divergent series: tests. Taylor and Maclaurin expansions. Power series, interval of convergence. Differentiation and integration of power series. Polar coordinates. Parametric equations.

201-213	Differential and Integral Calculus II (Administration)	3-2-3
P 201-113		(2.66 units)

For students taking the Administration and Arts option.

The objective of this course is to provide some of the tools needed for the study of administration problems. This course in differential and integral calculus prepares officer cadets to work on practical problems in the world of business and economics using the power of calculus as a basic tool.

Partial derivatives and Lagrange multipliers. Supply and demand. Marginal cost, cost elasticity and marginal income. Implicit differentiation. Graphs of functions in economics. Demand and price elasticity. Profit. Applications of the definite integral in economics. Consumer and producer surplus. Different types of interest and the number e. Laws of growth and decay. Integration by parts and partial fractions. Partial derivatives in economics.

MAT 212	Linear Algebra	3-1-5
P 201-105		(3 credits)

The purpose of this course is to enable the student to use effectively the fundamental tools of Linear Algebra while enhancing his ability to reason abstractly.

Review of the Gauss-Jordan method and the inverse of a matrix. Vector spaces and subspaces. Linear independence, basis and dimension. Rank of a matrix, algorithms for finding bases. Scalar product. Orthogonal bases. Coordinates and change of basis. Linear transformations: properties, kernel, image of a linear transformation and matrix representation. Similar matrices. Eigenvalues and eigenvectors. Diagonalization and applications.

MAT 221	Differential and Integral Calculus IV	3-0-6
P 201-303		(3 credits)

A student succeeding in this course will be able to use the main properties of the differential calculus of two and three variables. Among other things, he will know how to compute partial derivatives and will know their geometrical significance and uses, particularly for the search of extrema.

Functions of several variables: limits and continuity, partial derivatives, implicit differentiation, chain rule and applications, directional derivatives, gradient, tangent planes, total differential and applications. Partial derivatives of higher order, Taylor's theorem with remainder, maxima and minima, Lagrange multipliers, exact differentials and exact differential equations.

MAT 222   **Differential and Integral Calculus V**   3-0-6
P MAT 221   (3 credits)

This course is the natural complement to MAT 221. A student succeeding in this course will be able to use the main properties of the integral calculus of two and three variables. In particular, he will know how to compute double and triple integrals in the most common coordinate systems of R^2 and R^3. He will also know the relations that exist between them.

Double integral: definition, properties, evaluation, volumes, surface, mass, evaluation using polar coordinates. Triple integral: definition, evaluation, volumes, masses, evaluation using cylindrical or spherical coordinates. Surface integrals. Green's theorem. The divergence theorem. Stokes' theorem.

MAT 223   **Differential and Integral Calculus VI**   3-0-6
P MAT 221   (3 credits)

This course is a primer on direct and inverse transformations as tools for the solution of mathematical problems, mainly in the fields of integration and of the solution of differential equations.

Complete sets of functions. Applications: periodic functions and their Fourier series. Integral transforms: Fourier transforms and their complex representation, Laplace transforms. Applications to ordinary differential equations. Parametric representations of regions in R^n. Vector fields, differential operators and their integral theorems. Path independence in a line integral.

MAT 236   **Mathematical Models of Combat**   3-0-6
P ADM 242   (3 credits)

The objective of this course is to familiarize students with various mathematical techniques used to model military forces and operations. Students are required to develop certain mathematical models of combat, and to resolve them by using numerical analysis techniques and software currently available at CMR.

The emphasis is placed on the advantages and limitations of the various mathematical models including: deterministic models (Lanchester and Epstein formulations), stochastic models (Taylor, search/detection problems), simulation models, system simulation models (weapons systems, subsystem analysis, equipment reliability), and computer war games.

MAT 251   **Probability and Statistics**   3-0-6
P MAT 221   (3 credits)

This course consists of an introduction to the theory of probability. Basic notions will be developed and applications of the theory will be presented. The course will prepare the student for the study of statistical theory.

Random experiments. Sample space. Probability. Random variable. Methods of enumeration. Conditional probability. Independent events. Random variables of the discrete and continuous types. Density and distribution functions. Mathematical expectation. Classical distributions: binomial, geometric, Poisson, exponential, uniform and normal. Moment-generating functions. Multivariate distributions. Functions of random variables: $\bar{X}$, V. Central limit theorem.

MAT 312	**Numerical Methods in Linear Algebra**	**3-0-6**
MAT 411	**Modern Algebra I**	**3-0-6**
P MAT 212		(3 credits)

The objective of this course is to familiarize the student with the fundamental concepts of numerical methods in linear algebra and prepare the student to use these numerical methods to solve problems.

MAT 312 and MAT 411 have the same description and are given by the same professor. Assignments and examinations may not be identical for students in different degree programs. Emphasis in MAT 312 will be on investigating and understanding computational algorithms, whereas students in MAT 411 will concentrate on using algorithms and programs to perform computations arising from applications.

Direct methods for solving linear systems; review of the Gauss elimination method, LU factorization, Cholesky's method, QR factorization and Householder's method. Norm of a matrix, error estimation and conditioning of a matrix. Iterative improvement of solutions. Iterative methods for solving linear systems: Jacobi, Gauss-Seidel and relaxation. Eigenvalues and eigenvectors. Power, Jacobi and QR methods. The least squares problem: normal equations, modified Gram-Schmidt method and singular value decomposition. Projections in a vector space. Applications.

MAT 321	**Differential Equations I**	**3-1-5**
P MAT 221		(3 credits)

The purpose of this course is to introduce continuous models and the mathematical methods used in their study.

Ordinary differential equations. Definitions, problems and fundamental concepts. Examples. Elementary ordinary differential equations. Solutions by direct methods. Linear equations. Nonlinear equations with separable variables. Homogeneous equations. Bernoulli and Riccati equations. Equations with total differentials. Integrating factor. Clairaut and Lagrange equations. Models. Existence, uniqueness and continuity theorems. Differential systems (Linear systems). Higher order linear differential equations. (General theory and equations with constant coefficients). Linear differential equations with variable coefficients. Solution in series. Ordinary differential equations of Mathematical Physics.

MAT 322	**Mathematical Methods of Physics I**	**3-1-5**
P MAT 222		(3 credits)

The objective of this course is to provide some of the mathematical tools needed for the study of dynamical systems and continuous field theories which will be met in Physics and Engineering.

Linear differential equations with variable coefficients. Method of Frobenius. Bessel's equation. Orthogonal polynomials. Construction and properties of classical orthogonal polynomials. Differential equations of orthogonal polynomials. Sturm comparison theory. Oscillation and separation theorems. Two-point boundary value problems. Green's function. Self-adjoint problems. Sturm-Liouville problems. Eigenvalues and eigenfunctions. Eigenfunction expansions. Sturm-Liouville singular systems. Solution of partial differential equations by separation of variables. Solution of Laplace's equation in cartesian, spherical and cylindrical coordinates.

MAT 326	**Differential Equations I**	**3-0-6**
P MAT 221		(3 credits)

MAT 321 and MAT 326 have the same description and are given by the same professor. The former meets four times a week and covers somewhat more advanced theoretical material. The latter meets only three times a week. Assignments and examinations will differ in content and difficulty for students in different degree programs.

MAT 327	**Differential Equations II**	**3-0-6**
P MAT 326		(3 credits)

MAT 322 and MAT 327 have the same description and are given by the same professor. The former meets four times a week and covers somewhat more advanced theoretical material. The latter meets only three times a week. Assignments and examinations will differ in content and difficulty for students in different degree programs.

MAT 328	**Analysis I**	**3-0-6**
P MAT 221		(3 credits)

The objective of this course is to enable the student to use correctly the fundamental concepts of real and convex analysis in optimization and applied mathematics.

Axiomatic definition of the real field. Structure theorems. Topology on the real axis. Convergence, Cauchy sequences and completion. Compactness of closed bounded intervals. Definition and properties of $\bar{R}$. An elementary construction (near to the Numerical Analysis) of the real field. Topology on R^n. Metric space. Topology and convergence. Continuity. Compactness. Simple and uniform continuity. Functions from a metric space into $\bar{R}$. Superior and inferior envelop of a family of functions. Inferior and superior limit. Semicontinuity. Elements of convex analysis.

MAT 329	**Mathematics of Signal Analysis**	**3-0-6**
P MAT 221		(3 credits)

The objective of this course is to introduce the student to the basic concepts of the digital processing of discrete signals. The related features of processing discrete signals (numerical methods) and continuous signals (mathematical methods) are presented with a preference given to the design of numerical algorithms. Applying these algorithms to definite problems will help to develop a deeper and intuitive understanding of the theory, its applications and its limitations.

Discrete signals and systems. Linear and translation invariant systems. Fourier transform of a discrete signal. Discrete Fourier transform (DFT, FFT). Z-transform of a discrete signal.

Analysis and synthesis of digital filters. Design of finite and infinite impulse response digital filters. Applications.

MAT 330	**Methods of Optimization**	**3-0-6**
P MAT 328 or MAT 221		(3 credits)

The purpose of this course is to enable the student to use the theoretical fundamental concepts and the principal numerical methods of the nonlinear optimization.

Introduction to the theory of nonlinear optimization. Elements of convex analysis. Optimality conditions. Quadratic programming. Minimax problems. Numerical optimization methods. Minimization of functions without constraints: gradient methods, Newton-type methods, conjugate direction method, Davidon-Fletcher-Powell method. Methods for solving problems with constraints: gradient projection method, penalization methods. Minimax calculation. Numerical methods for quadratic programming. Elements of variational calculus. Optimal control problems.

MAT 335	**Elements of Game Theory**	**3-0-6**
		(3 credits)

The objective of this course is to present the principal mathematical methods used in the study of conflictual or strategical situations.

Conflicts of interest and games. Strategies. Zero-sum two-person games. Games with and without saddle points. Mixed strategies. Minimax theorem. Solution of games by graphical methods. Linear programming and successive approximations. Nonzero sum n-person games. Coalitions. Negotiation sets and status quo points. Potential intimidation.

MAT 351	**Mathematical Statistics I**	**3-0-6**
P MAT 251		(3 credits)

This is a first course in statistics. The student is exposed to basic statistical tools. At the end of the course the student should be able to apply statistical procedures to real data.

Probability review: random variable, transformation of random variables, joint distributions. Simulation techniques. Introduction to a statistical package (SPSSX). Sampling distributions. Central limit theorem. Point estimation: maximum likelihood estimator, moment estimator. Confidence intervals. Statistical testing hypothesis: tests of means, variances and proportions, chi-square tests, nonparametric tests. Introduction to linear regression.

MAT 412	**Codes**	**3-0-6**
MAT 413		**3-0-6**
P MAT 212		(3 credits)

The objective of this course is to enable the student to understand and create abstract algebraic proofs in order to facilitate the use of certain algebraic structures. These structures will then be applied to solve problems in coding theory.

MAT 412 and MAT 413 have the same description and are given by the same professor, though they are intended for students enrolled in different programs. Assignments and

examinations will be adapted to the specific content of the program, and applications used in the two courses will not be the same.

Algebraic structures: semi-groups, groups, rings, polynomial rings, fields, finite fields. Codes: encoding techniques, detection and correction of errors, linear codes, Hamming codes, polynomial codes, Base-Chaudhuri- Hocquenghem codes.

MAT 415	Applied Modern Algebra	3-0-6
P MAT 212		(3 credits)

The objective of this course is to bring the student to the point where he will readily look for the symmetries of physical systems and use these symmetries to simplify the study of such systems.

Group theory: definition, permutation groups, continuous groups, subgroups, conjugacy classes, quotient groups, reducibles and irreducible representations, character of a representation, reduction of reducible representations, branching rules. Applications selected from classifications of physical and chemical systems according to their symmetries.

MAT 421	Graphs and Networks	3-0-6
P MAT 471		(3 credits)

This course is an introduction to graph and network theory where we will stress the algorithmic aspects, modelling of real-life problems as well as the relationship with linear programming theory.

Graphs and networks. Eulerian graphs. Trees and directed trees. König-Egervary theorem. Links with linear programming: max-flow min-cut- theorem. Shortest spanning trees: Prim and Kruskal algorithm. Shortest path algorithms: Ford and Dijkstra algorithm. Maximum flow. Minimum cost flow: simplex algorithm, out-of-kilter algorithm. Edge coloring. Bipartite and nonbipartite matching: Edmonds' algorithm. PERT and CPM. Convex-cost flow problems.

MAT 422	Mathematical Methods of Physics II	4-0-6
P MAT 322		(3 credits)

The objective of this course is to enable the student to use correctly complex analysis and the Laplace and Fourier transformations.
Review of complex numbers. Geometrical representation. Sets in the complex plane. Elementary complex functions of complex variable. Multivalued functions and their Riemann surfaces. Limits and continuity. Analytic functions, the Cauchy-Riemann conditions. Complex integration. The Cauchy theorem. The Cauchy integral formulas. Infinite series. The Taylor and Laurent series. Zeros and singularities. Residues. Applications to the evaluation of integrals. The Laplace and Fourier transformations. Applications.

MAT 423	Mathematical Statistics II	3-0-6
P MAT 351		(3 credits)

This course is a continuation of MAT 351. A detailed study of the general linear model is discussed. This approach is to unify regression, variance and covariance models. Following this

course, a student should be able to apply these techniques to practical situations. A statistical package is used to carry out these analyses.

Review: probability and statistics, matrices and quadratic forms. The multivariate normal distribution. Cochran theorem. Simple regression: least square method, parameters inference and prediction. The general linear model: estimation of the model parameters, model's assumptions. Simultaneous estimation. Some pitfalls in regression. Residual analysis. Stepwise regression. Analysis of variance: single factor, two-factor and multifactor analysis of variance. Other designs: nested designs, randomized balanced block design. Covariance analysis.

MAT 451	**System Safety, Reliability and Maintainability**	**3-1-5**
P MAT 251		(3 credits)

To familiarize the student with requirements and methods to ensure dependable operation of space systems and to prevent critical failures through effective design.

Basic concepts, probability distributions and reliability theory. Element of standardization and/or modularization and redundancy. Depreciation, replacement and maintenance policies. Life cycle design.

MAT 461	**Numerical Analysis**	**3-0-6**
P MAT 212, MAT 222, INF 201-408		(3 credits)

In this course, the student will apply the principles of mathematical analysis to the study of numerical algorithms and of their convergence.

Floating-point arithmetic and round-off errors. Convergence of iterative methods for nonlinear equations. Existence, unicity, error and algorithms of polynomial interpolation. Numerical differentiation and integration. Direct and iterative solution of linear systems. Runge-Kutta methods for ordinary differential equations.

MAT 463	**Automata and Formal Languages**	**3-0-6**
P MAT 212, INF 442		(3 credits)

The objective of this course is to present theoretical models of computations and their applications. It introduces the student to Chomsky's formal languages and to automata.

Regular languages: regular expressions, deterministic and non-deterministic finite automata, Kleene's theorem, automata minimization, applications, implementations. Context-free languages: pumping lemma, context-free grammars and their properties, syntaxic analysis, implementations.

MAT 471	**Operations Research**	**3-0-6**
P MAT 212, INF 201-408		(3 credits)

This is an introductory course of Operations Research where the student will learn how to model mathematically optimization problems and how to solve them using appropriate algorithms.

Linear programming. Duality. Sensitivity analysis. Dynamic and integer programming. Branch-and-bound. Column generation. 2-person zero-sum games. Applications to transportation problems, production planning, reliability.

MAT 475   **System Simulation**   **3-0-6**
P MAT 251 or ADM 242   (3 credits)

This course introduces the student to simulation methods, model construction, implementations on a computer, and interpretation of simulation results.

Topics to be addressed are the stages of a simulation, random numbers and random number generators, the generation of discrete distributions, the generation of continuous distributions, systems and their models and applications. The formal study will use a simulation language for both network and discrete event approaches.

Seminars

The Department of Mathematics offers Fourth Year students a series of lectures as part of the Science Division seminar program. Held once a week, the lectures are given by qualified professors and researchers, each of whom will discuss his field of specialization as well as its present state and needs.

The various speakers are chosen from among professors at Collège militaire royal de Saint-Jean who are particularly active in research, and also from those of universities and scientific research institutions. This series of seminars is an essential complement to the regular courses. The program also includes visits to industries and laboratories, which are often of military interest as well.

Research

Research conducted by the Department of Mathematics includes studies in both pure and applied mathematics in the areas of nonlinear analysis, fixed point theory, optimization, finite elements, combinatorial analysis, graph theory, probability and statistics, partial differential equations, operations research and artificial intelligence.

Tutorials

For students of the Preparatory Year encountering difficulties, the Department of Mathematics offers two tutorial periods each week during the first term and one tutorial period per week during the second term.

DEPARTMENT OF MILITARY LEADERSHIP
AND MANAGEMENT

Head of the Department	Léandre Maillet, N.D.C., B.A.,.M.A.Ps., D.Ps.
Associate Professors	Marian Olynyk, B.A., M.A., Ph.D.
	Michel Pageau, C.D., B.A., M.Ps.
Lecturers	Major J. Fournier, C.D., B.A., L.OR.
	Captain S. Eyres, C.D., B.A., M.Sc.
	Captain R. Fillion, C.D., B.Ps. M.Ed.
Part-time Lecturers	Captain L. Aubé, C.D., B.Ped., B.Ed., M.Ed.
	Susan Bartholomew, B.A., M.B.A.
	Gilbert Grou, B.Sc., M.Sc.
	Peter Toy, B.A., M.A., D.Ac.

MLM 350-101   **Introduction to Psychology I**   **3-0-3**
(2 units)

This course presents the student with a general overview of psychology, exploring in turn, such various related themes as cognition, affect, sensation, perception, learning, motivation, and personality. The aim of this study of human behaviour is to help students better understand themselves as individuals.

MLM 350-201   **Introduction to Psychology II**   **3-0-3**
(2 units)

This course follows Introduction to Psychology I. However, the latter is not a prerequisite because its subject matter is different, and is not sequential. The main topics covered are the neurobiological basis of psychology, states of consciousness, thought and language, stress, abnormal behaviour and therapies employed in psychology.

MLM 221   **Social Psychology**   **3-0-6**
P 350-101   (3 credits)

The objective of this course is to develop an awareness of social influences on interpersonal relationships and on the individual as a member of a particular group. Topics covered include interpersonal attraction, prejudice and discrimination, communication, norms, roles, power and status, and behaviour in groups.

MLM 232   **Psychology of Aggressive Behaviour**   **3-0-6**
P MLM 221   (3 credits)

This course provides the student with a better understanding of the phenomena of aggression and violence in society and the factors operating within the individual that promote it. Topics covered include: the causes of aggressive behaviour and its manifestations as an instinct, as socially learned behaviour, delinquency, domestic and collective violence, war, terrorism and methods employed in the control and reduction of aggression.

MLM 312   **Applied Military Psychology**   **3-0-6**
P MLM 221   (3 credits)

This course examines the application of psychology to typical military situations such as socialization, training, and combat. The importance of human factors such as cohesion, morale, motivation, leadership, stress, fear, and courage on the outcome of combat are discussed. As well, it discusses the impact of such human conditioning as propaganda and brain-washing on military operations.

MLM 315   **Psycho-Sociology of Conflicts**   **3-0-6**
P MLM 232 and MLM 221   (3 credits)

This course examines the phenomenon of conflicts from a multidisciplinary perspective. The intent is to demonstrate to the student the psychological and sociological processes which explain the origin, the development and the consequences of armed conflicts. For example, one issue addressed is the contemporary wars as seen from a social perspective. The course provides a forum for the reflection on defence policy and the role played by the military profession. In order to get a complete view of the war phenomenon, authropological material on the conduct of war indifferent societies is used.

MLM 322   **Organizational Psychology**   **3-0-6**
P MLM 221   (3 credits)

This course introduces the students to the human aspect of organizations and to their influence on effective organizational performance. More specifically, the course focuses on individual needs, motivation, group behavior, interpersonal processes, leadership and organizational culture. An attempt is made to demonstrate how the organization's effectiveness can be enhanced with the knowledge of the interaction of the individual and the organization.

MLM 331   **Leadership Role in the Process**   **3-0-6**
P MLM 221   **of a Subordinate Development**   (3 credits)

This course aims to increase the student's awareness of the human and psychological aspects influencing the management of personnel, the working environment and interpersonal relationships, in order to prepare the future leader to take these human and psychological aspects into account in his relationship with his subordinates. The leadership role is examined with regards to its impact on selection, integration into the work force, personnel training and subordinate career development.

MLM 341   **Leadership and Management from a**   **3-0-6**
P MLM 221   **Behavioural Science Perspective**   (3 credits)

This course introduces the student to the management functions of planning, organization, direction and control. It distinguishes between leadership and management and discusses such topics as decision making, counselling, stress management.

MLM 342   **Psychology of Small Groups**   3-0-6
P MLM 221   (3 credits)

The course provides the student with the opportunity to understand the importance of small groups as agents of social change. The course also examines how small groups, while trying to meet and satisfy members' needs, tend to perpetuate social norms and values. The major themes studied include: group formation, development, structure, cohesion, leadership, problem resolution... This course is based on the premise that students need to acquire these skills to better manage groups for which they will be responsible.

MLM 412   **Job Adjustment and Personality**   3-0-6
P MLM 341 or MLM 322   (3 credits)

This course familiarizes the student with the three main approaches to personality: psychoanalysis, behaviourism, and humanistic psychology which, each, propose an explanatory model of human behaviour according its field of interest and investigation. The results of these theories are applied to the military context.

MLM 422   **Behaviour in a Military Setting**   3-0-6
P MLM 341 or MLM 322   (3 credits)

This course facilitates the student's professional and individual adjustment to the role of officer by integrating the body of knowledge acquired in psychology and applying it to the duties and responsibilities of the officer as a leader of men, specifically: know the mission to be accomplished, be sensitive to the well-being of subordinates, maintain group morale, and act efficiently. To this end, the course addresses a series of themes which converge into two important issues: interpersonal relationships and performance.

DEPARTMENT OF PHYSICS

Head of the Department	Alain Rambo, C.D., B.Sc., M.Sc., Ph.D.
Professors	Cheuk Yin Cheung, B.Sc., M.Sc., Ph.D.
	Maurice Cormier, C.D.N., B.A., B.Sc., M.Sc., D.Sc.
	Gisèle Cory, L.Sc., D. 3e cycle, D.Sc.
	Roger Favreau, B.Sc., M.Sc., Ph.D.
	André Filion, B.Sc., M.Sc., Ph.D.
	Bernard Mongeau, B.Sc.A., M.Sc.A., D.Sc.A., Ing.
	Martin M. Perlman, B.Sc., M.Sc., Ph.D., F.A.P.S., F.I.P.L.
	Sesha Subramanian, B.Sc., M.A., Ph.D.
Adjunct Professor	Laurent-G Caron, B.Sc.A., M.Sc.A., Ph.D.
Associate Professors	Alessandro S. Biffi, B.A., B.Sc., M.Sc.
	Martin Boloten, B.Sc., M.Sc.
	Fernand Ledoyen, B.A., B.Sc., D.Sc.
Assistant Professors	William E. Gravelle, B.A., M.A., Ph.D.
	Major Claude Laporte, C.D., B.Sc., M.Sc., M.Sc.A.
	Jacques Lewandowski, Ing., M.Sc.A., Ph.D.

203-101 **Mechanics** **2-2-3**
P 201-101, 201-103 (2.33 units)

The purpose of this course is to teach the fundamental laws of classical mechanics by applying them, with the aid of sufficient mathematics, to the study of motions encountered in everyday life.

Vectors. Kinematics. Dynamics. Centripetal force. Conservative and non-conservative forces. Work and energy. Conservation of energy. Conservation of momentum. Laboratory exercises.

203-201 **Electricity** **2-2-3**
P 201-101, 201-103, 203-101 (2.33 units)

This course is an introduction to the fundamental laws of electricity.

Electric charge and matter. Electric field. Gauss' Law. Electric potential. Capacitors. Dielectrics. Current and resistance. Direct current circuits. Laboratory exercises.

203-301 **Waves and Optics** **2-2-3**
P 203-909 (2.33 units)

The objective of this course is to introduce the student to the various types of waves found in nature, and explain the physical aspects involved. The student will be led to understand and then predict the behaviour of sound waves (e.g. in musical instruments) and the propagation of visible electromagnetic waves in optical instruments.

Description of progressive waves. Physics of sound. Addition of waves. Electromagnetic waves. Geometrical Optics, interferences. Laboratories will be used to familiarize the student with instruments used in optics (mirrors, lenses).

203-902   **Experimental Physics (Magnetism and Circuits)**   2-3-4
P 203-201   (3 units)

This course continues the study of electricity and magnetism with additional emphasis on laboratory work.

Magnetic force. Magnetic field and examples. Biot-Savart Law. Electromagnetic induction. Inductance. Alternating current circuits. Theorems of Thevenin and Norton for direct current. Laboratory experiments.

203-909   **Mechanics and Waves**   2-1-2
P 203-101, 201-101, 201-103   (1.66 units)

The objective of this course, which is a continuation of course 203-101, is to provide the student with a better understanding of the principles of mechanics with applications to rotational dynamics and oscillations.

Kinematics and dynamics of circular motion. Rigid body rotation about a fixed axis. Torque and angular momentum. Rolling. Static equilibrium of a rigid body. Oscillations. Laboratory work.

203-927   **Physical Sciences**   3-0-3
P 203-990, 202-101 or 202-901   (2 units)

The purpose of this course is to further the understanding of the fundamental nature of science for students in the Administration and Humanities options. This is done by studying some useful applications of Physics and of Chemistry.

203-990   **Principles of Physics**   3-0-3
       (2 units)

The objective of this course is to introduce the student of the Administrative Sciences and Arts option to the scientific way of thinking, emphasizing the concepts of the scientific method, of knowledge base on observation and measurement of natural phenomena and of the mathematical formulation used to express the ensuing deductions; the student will become familiar with these concepts through applying them to the solution of simple problems and using them to understand practical applications taken from everyday life.

Elements of Mechanics: Measurement, Forces, Kinematics, Dynamics, Work, Energy, Power, Complex Motions. Elements of Electricity: Electric forces, Direct Current, Magnetism, Alternating Current.

PHY 211   **Mechanics**   2-1-3
P 203-909, 201-303   (2 credits)

The aims of the course are to enable the student to understand the laws of mechanics and to use them correctly for solving simple problems, and to illustrate the concept of physical theory by means of an elementary study of special relativity.

Variable forces. Conservation laws and their consequences. Central forces. Kepler's laws. Satellites. Special relativity.

PHY 222   **Electromagnetism**   3-0-6
P 203-902, MAT 221   (3 credits)

The aim of this course is to study the fundamental laws of electromagnetism leading to Maxwell's equations.

The laws of Gauss, Ampere and Faraday in integral form. Displacement current. Maxwell's equations in integral and differential form. Electric fields in matter. Magnetic fields in matter.

PHY 231   **Oscillations, Waves and Electric Circuits**   3-0-6
P 203-301, 201-303   (3 credits)

The objective of this course is to enable the student to acquire a thorough quantitative knowledge of wave and vibration phenomena and to apply this knowledge to the study of the propagation of waves and the behaviour of electric circuits. The student will acquire a facility in the use of complex numbers in problem-solving which will be applicable to other branches of Physics.

Free, damped, and forced harmonic motion using complex numbers. Superposition of periodic motions. The wave equation and travelling waves. Phase and group velocity. Application to series and parallel A.C. electric circuits. D.C. and A.C. loop current and node voltage circuit analysis. Theorems of Thevenin and Norton.

PHY 262   **Introduction to Quantum Physics**   2-1-3
P PHY 231, MAT 221   (2 credits)

The objective of this course is to introduce the student to the notions of Quantum Mechanics with applications to atomic physics, solid state physics, and nuclear energy, etc. It links classical physics, as studied in Preparatory and in First Year, with atomic and nuclear physics, electronics, etc. to be studied in Third and Fourth Year.

Black body radiation, Photoelectric effect, Compton effect, Bohr atom, De Broglie Waves, Uncertainty principle, Schrodinger equation, Particle in a box, Transitions, Spin, Pauli principle, Periodic table, Introduction to solid state and nuclear physics.

PHY 291   **Experimental Physics**   0-2-2
P 203-902   (1 credit)
PHY 292   0-2-2
P PHY 291   (1 credit)

The objective of this course is to enable the student to learn experimental methods, instrumentation, and techniques. The experiments are related to the subject matter of courses PHY 222, PHY 231, and PHY 262.

Damped electrical oscillations, forced mechanical oscillations, A.C. circuits, Thevenin's and Norton's theorems, X-rays, microwaves, lasers, electromagnetic induction and hysteresis.

PHY 311   Classical Mechanics I   3-1-5
P PHY 211, MAT 222   (3 credits)

The aim of this course is to present the laws of classical mechanics in a more general way.

Central force motion, orbits, orbit stability, transfer orbits. Dynamics of a system of particles. Motion in a non-inertial frame. Dynamics of rigid bodies.

PHY 316   Mechanics of Fluids   3-0-6
P PHY 311   (3 credits)

The objective of this course is to introduce the students to the concepts of fluid mechanics and their application to pertinent problems in technology.

Kinematics of continuous media. Dynamics of continuous media: motion equations and conservation laws. Dimensional analysis and dynamic similitude. Euler's equation. Navier-Stokes equation. Boundary layer theory. Applications: fluid flow, aerodynamics and hydrodynamics, surface tension, microgravity.

PHY 322   Electromagnetic Waves and Applications   3-1-5
P PHY 222, PHY 291, MAT 222   (3 credits)

This course has as its objective the understanding of information transmission via electromagnetic waves and its application to practical problems.

Curvilinear coordinates. Maxwell equations (integral and differential form). Dielectric and conductive media. Boundary conditions. Reflection and transmission at interfaces. Poynting vector. Transmission lines. Waveguides. The Smith Chart. Antennas. Propagation of electromagnetic waves in the atmosphere.

PHY 323   Electronics and Instrumentation   3-3-6
P PHY 291   (4 credits)

The aim of this course is to enable the student to understand and use electronic circuits using linear active elements.

Review of elementary circuit principles. Thevenin's and Norton's theorems. Input impedance, output impedance. Frequency response. Noise and noise reduction techniques. Sensors: principles of operation, sensitivity, output signal properties. Signal conditioners. Amplifiers, current-voltage converters. Data acquisition systems. Analog-to-digital and digital-to-analog converters. Control systems. Methods of signal processing. Smoothing.

PHY 324   Introduction to Robotics   3-1-5
                                                                                      (3 credits)

The purpose of this course is to give a general introduction to robotics. The student will acquire a general knowledge of the basic concepts related to mechanical engineering, electric motors, sensors, vision, and control systems using micro-computers. He will study the diverse applications of robotics.

The course contains a number of themes necessitating specified prerequisites covering the theoretical and practical aspects of the following list of subjects: History of Robotics - Motion, mobility and articulations - Electric motors and hydraulic mechanisms - Mechanical, electronic, and visual sensors - Methods of control interfacing - Available types of robots and software - For Recognition - Applications in industry and in the Armed forces. Laboratory sessions will enable the student to experiment with motors and sensors as well as to control a robot arm, various automats and an integrated robot system. In addition, students will be able to analyze the capabilities of various software packages in real applications or in simulation.

PHY 331   **Physical Optics**   **3-1-5**
P PHY 322, MAT 329   (3 credits)

The objective of this course is to further the understanding of electromagnetic waves in the visible spectrum. The student will know their specific behaviour in matter and how to determine the propagation of light in the case of complex systems.

Complex notation of electromagnetic waves - Polarization - Behaviour of light in matter: absorption, reflection, transmission, scattering. Interference and non-destructive testing. Diffraction and structure of images in instruments.

PHY 334   **Signal Processing**   **3-1-5**
P MAT 329   (3 credits)

The objective of this course is the understanding of spectral analysis of signals and the application of this analysis to analog and digital signal processing.

Review of mathematical concepts: continuous and discrete signals, Fourier transform, linear time invariant systems, convolution, impulse response, transfer function. Analog signal processing: ideal filters and approximations (Butterworth, Chehyschev ...), practical realization (bi-quad sections). Digital signal processing, sampling, discrete Fourier transform, Fast Fourier Transform, discrete convolution, IIR and FIR digital filters, windows, filter realization, dedicated digital signal processing electronics, quantization effects. Applications.

PHY 341   **Statistical Physics**   **3-0-6**
P PHY 211, PHY 222, PHY 262, MAT 222, MAT 251   (3 credits)

The aim of this course is to get the student acquainted with the concepts and formalism of statistical physics. The student will learn how to use these concepts and formalism for analyzing and solving a wide variety of problems in physics.

Principles of statistical mechanics. Quasistatic thermodynamics: equilibrium, entropy, Kelvin temperature scale. Statistical ensembles and the Boltzmann distribution. Spin systems, ideal gas and specific heat of solids. Maxwell velocity distribution. Black bodies.

PHY 342   **Quantum Statistical Physics**   **3-0-6**
P PHY 341   (3 credits)

The objective of this course is to learn how to develop a rigorous mathematical formalism based on quantum statistics. The student will be able to apply statistical concepts to real problems of the physical world.

The course first offers a detailed analysis of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac statistics, followed by the study of the following subjects: electromagnetic radiation (black body), conduction electrons in metals, lattice vibrations and the Debye theory of solids, real gazes, low temperature phenomena, kinetic theory of transport processes.

PHY 345   **Space Sciences**   **2-1-3**
(2 credits)

The aim of this course is to familiarize the student with the fundamental concepts of astronomy and with the effects of space environment on human beings.

Astronomy: Earth-Moon system, solar system, stellar structure, galactic structure and evolution. Physical properties of the near-earth environment. Introduction to the challenges posed to man by the environment of space: Overview of the physiological, psychological and sociological problems encountered and how these have directed the evolution of current space programs.

PHY 350   **Space Systems**   **3-1-5**
(3 credits)

This course introduces the principles underlying the construction of spacecraft and the techniques pertaining to it.

Introduction to satellite construction, space vehicles and launch systems. Orbit determination, flight control, notion of link equation. Telemetry, power generation, ground support system. Overview of American and Soviet military systems, other military and non-military space systems.

PHY 361   **Atomic and Nuclear Physics**   **3-0-6**
P PHY 451   (3 credits)

The objective of this course is the application of quantum mechanics to atomic and nuclear physics.

The hydrogen atom. Perturbation theory. Atomic spectra. Lasers. Introduction to nuclear physics.

PHY 362   **Electro-Optics**   **3-1-5**
P PHY 322   (3 credits)

The objective of this course is to introduce the student to the subject of electro-optics. The student will be able to describe the characteristics of the principal light sources, of electro-optic components for light control, and of the various detectors available. The student will also learn the theory and applications of fibber optics.

Conventional light sources and their characteristics. Lasers: pumping, resonators, beam properties and propagation, review of different types of lasers. Modulation and deflection of light: mechanical, acousto-optic and electro-optic systems. Detection of light. Fibber optics. Technical study of the use of lasers and electro-optic devices in a military environment: Night vision, optical radar (LIDAR), target detection and pursuit systems. Countermeasures. High power lasers. Laboratory sessions will be included in this course.

PHY/CHM 399 Weapons Technology 3-0-6
P 203-927 (3 credits)

The object of this course is to enable students taking the course in Military and Strategic Studies to acquire the necessary technical knowledge required to evaluate the capacities and also the limits imposed upon tactical and strategic thought by the highly developed technology of modern armament.

Influence of physics on weapon development. Ballistics. Blasting effects. Missiles. Lasers. Military electronics. Nuclear armament: principle, destructive and radiation effects, bearing on strategy. (For complementary courses in Chemistry, see the Department of Chemistry under course CHM 399).

PHY 411 Spacecraft Dynamics and Control 3-1-5
P PHY 311 (3 credits)

This course introduces the techniques of satellite attitude dynamics, control and manoeuvre systems.

Spacecraft dynamics: reference frames, angular momentum, Euler's moment equations, center of gravity, libration. Satellite attitude control: gyroscope, torque, thrust, momentum management, gravity gradient, shape and stability. Large structures and rockets.

PHY 412 Classical Mechanics II 3-1-5
P PHY 311, MAT 422 (3 credits)

The objective of this course is to provide a deeper understanding of the motion of rigid bodies using the calculus of variations and the formalisms of Lagrange and Hamilton.

Orthogonal transformations. Tensors. Curvilinear coordinates. Lagrangian and Hamiltonian dynamics. Coupled oscillations. Normal coordinates. Calculus of variation.

PHY 422 Radiation 3-0-6
P PHY 322, MAT 422 (3 credits)

The objective of this course is to present the interaction of electromagnetic waves with anisotropic media, including plasma.

Plane waves. Waves in anisotropic media. Interaction of electromagnetic waves with charged particles. Klystron. Plasma.

PHY 426 Logic Circuit Design 2-2-5
(3 credits)

The objective of this course is to familiarize the student with digital electronics. It introduces the student to Boolean algebra and to the design of logic circuits.

Number systems: conversion between number bases, negative numbers. Codes: binary codes, binary-coded decimal. Boolean Algebra, simplification of Boolean functions. Combinational logic circuits: elementary gates, multiplexers, demultiplexers, encoders, decoders. Sequential logic

circuits: Flip-Flops, synchronous and ripple counters, shift registers. Arithmetic circuits: comparators, adders, subtracters, ALU, multipliers. Logic circuit families. The student will have to design and build circuits in the laboratory.

PHY 427   **Microprocessor System Design**   **2-2-5**
P PHY 426   (3 credits)

The objective of the course is to present microprocessor structure and organization in order to design and build hardware interfaces. It introduces the student to assembly language and to the main interfacing techniques.

Microprocessor structure and operation. Instruction set. Addressing modes. Operation of data, address, and control buses. Interface techniques: Memory, parallel, serial, direct memory access, analog to digital, digital to analog. In the laboratory, the student will build interfaces and write programs to control them.

PHY 451   **Quantum Mechanics**   **3-1-5**
P PHY 311, PHY 322, PHY 341, MAT 329, MAT 422   (3 credits)

Introduction to the fundamental ideas of quantum mechanics.

Mathematical tools of quantum mechanics. Postulates of quantum mechanics. The harmonic oscillator. Angular momentum. Spin.

PHY 455   **Space Operations**   **3-1-5**
                                                                      (3 credits)

This course will enable the student to know and understand the different manoeuvres and operations in space and the motives behind them.

Satellite launching, rendez-vous, docking. Orbital traffic control around space platforms. Servicing of space platforms using robotics and automation. Launch windows. Tracking and observation of actual artificial satellites, orbital predictions and updates, launch angles. Logistics of space operations, safety, fire issues, electrostatic charging, radiation protection, satellite catalogue maintenance.

PHY 460   **Remote Sensing and Image Processing**   **3-1-5**
P MAT 329   (3 credits)

The aim of this course is to present and explain the physical and mathematical techniques used in image acquisition and processing.

Review of sensor systems: active and passive radars, optical, microwave, infrared, x-ray, gamma ray sensors, laser based sensors and others. Processing of satellite image data: preprocessing, image enhancement, object identification, classification of image picture elements, calculation of spectral indices, image-to-image change detection.

PHY 473   **Solid State Physics**   3-0-6
P PHY 322, PHY 341, PHY 451   (3 credits)

The student will learn to understand the concepts and theories underlying solid state physics. He will be able to describe and understand the principal thermal and electronic properties of metals, semiconductors and insulators.

Crystalline structures, X-ray diffraction, reciprocal lattice, Brillouin zones, Energy bonds, metals semiconductors, insulators, superconductors.

PHY 481   **Logic Circuit Design**   2-4-6
                                                              (4 credits)

The objective of this course is to familiarize the student with digital electronics. It introduces the student to Boolean algebra and to the design of logic circuits.

Number systems: conversion between number bases, negative numbers. Codes: binary codes, binary-coded decimal. Boolean Algebra, simplification of Boolean functions. Combinational logic circuits: elementary gates, multiplexers, demultiplexers, encoders, decoders. Sequential logic circuits: Flip-Flops, synchronous and ripple counters, shift registers. Arithmetic circuits: comparators, adders, subtracters, ALU, multipliers. Logic circuit families. The student will have to design and build circuits in the laboratory; this work culminates in the conception and execution of a project.

PHY 482   **Microprocessor System Design and Application**   2-4-6
P PHY 481   (4 credits)

The objective of the course is to present microprocessor structure and organization in order to design and build hardware interfaces. It introduces the student to assembly language and to the main interfacing techniques.

Microprocessor structure and operation. Instruction set. Addressing modes. Operation of data, address and control buses. Interface techniques: Memory, parallel, serial, direct memory access, analog to digital, digital to analog. In the laboratory, the student will build interfaces and write programs to control them; this work culminates in the conception and execution of a project.

PHY 491   **Experimental Physics and Project**   0-6-6
                                                              (4 credits)
PHY 492   0-6-6
P PHY 491   (4 credits)

The objective of the course is to develop the capacity to analyze and solve problems autonomously in a context of high technology. The student will then acquire a solid scientific methodology in order to apply his knowledge to real cases. Furthermore he will learn to produce a synthesis of acquired knowledge in conducting a project which is of the same importance as that of PHY 493.

The course offers a choice of experiments in electromagnetism, optics, atomic and nuclear physics, solid state physics, electro-optics and laser physics. The student uses modern analysis techniques, such as computer data processing, real time data acquisition and word processing both for the experiments and for the project.

PHY 493	Physics Project	0-3-3
		(2 credits)
PHY 494		0-3-3
P PHY 493		(2 credits)

The objective of this course is to learn how to produce a synthesis of the knowledge in a specified field of physics. At the end of this course the student, when presented with a problem situation, will be able to analyze, comprehend, find the necessary information to propose acceptable solutions, and apply them.

In the context of the senior year of a baccalaureate program in physics the student will conduct an in-depth study of a subject related to his field (experimental, applied or mathematical physics). The student will make use of modern technology such as computer-aided literature search, computer data processing, real time data acquisition, high-technology analysis equipment in atomic and nuclear physics, solid state physics, electromagnetism, laser physics, etc. Computer support software such as for project management and word processing will be used.

PHY 495	Space Science Project	0-3-6
		(3 credits)
PHY 496		0-3-6
P PHY 495		(3 credits)

The aim of this course is to develop the aptitude to analyze and solve problems involving the advanced technology used in space operations.

The space-related project is an exercise in analysis and creativeness in a particular area related to space sciences or space systems. If possible, it will be done in collaboration with the armed forces or industry.

PHY 499	Space Science Seminars	0-1-0
		0-1-0
		(1 credit)

The purpose of this course is to present recent developments in the area of space sciences and operations.

A series of conferences will be presented by qualified researchers from academic, industrial and government laboratories. These presentations will cover space related subjects. Visits to industrial and research laboratories will also be included in this course.

SECOND LANGUAGE CENTRE

Special Assistant to the Principal	Marian Olynyk, B.A., M.A., Ph.D.
Head of Centre	Ronald Wilkinson, B.A., B.Ed.
Senior Teachers	Jeannine Théberge, B.A., B.Péd.
	Dorothy Zalcman Howard, B.A., D.I.A.
Language Teachers	Normand Arseneault, B.A., B.Péd.
	Rollande Beaudoin, L.L., L.Péd.
	Suzanne Bodner, B.A., M.Ed.
	Yvon Côté, B.A., L.L., B.Péd.
	David Gravel, B.A., L.L., B.Péd.
	Jennifer Hanna, B.A., M.A., M.A.
	Marian Holobow, B.A., M.A., B.Ed.
	Mary Louise Macdonald, B.A., B.A., B.Ed.
	Marie Paquette, B.A.
	Richard Pelletier, B.A., B.Péd., B.A., (special project - ELMO)
	Gregory Reid, B.A., M.A., G.D.C.S., Ph.D.
	André Robichaud, B.A.
	Judith Wolfe-Labbé, B.A., M.A.

ENGLISH AS A SECOND LANGUAGE

604-101	**Preparatory Year**	(CMR 001) 3-1-2
604-102		(CMR 011) 3-1-2
		(2 units)

The principal aim of this course is to present the basic language structures and to practise them in communicative activities. Short compositions and written exercises reinforce the acquisition of the material. Reading selections provide topics for discussions and oral presentations. The emphasis at this level is on understanding and speaking in everyday situations.

604-301		(CMR 002) 3-1-2
604-302		(CMR 012) 3-1-2
		(2 units)

The course provides a review of grammar, reinforced and verified through controlled conversations, drills and laboratory exercises. As the year progresses, the emphasis is shifted from grammar and drill to presentations and more open discussions using video, audio and slide presentations, role-playing, informal debates and discussions on specific topics. Students read assignments from E.S.L. texts and write short compositions.

604-928		(CMR 003) 3-1-2
604-902		(CMR 013) 3-1-2
		(2 units)

This course includes a review of tenses, a study of idiomatic expressions, the reading of first language short stories and novels. In addition, video and audio materials are used for

discussion and written assignments. Clear paragraph organization is stressed. As well, library research in the target language is done to encourage the student to use English media.

604-911	**(CMR 004) 3-1-2**
604-916	**(CMR 014) 3-1-2**
	(2 units)

Novels and short stories as well as newspapers, magazines, and radio and television programs will be used to further develop communication abilities. Students are required to complete reading and other assignments outside of class time and to be prepared to present or discuss the material in class.

604-914	**(CMR 005) 3-1-2**
604-309	**(CMR 015) 3-1-2**
	(2 units)

This course consists mainly of the study of novels, short stories, essays and exposés as well as student presentations based on individual or group research. Audio-visual resources will be used to supplement the written material.

604-103	**First Year**	**(CMR 101) 3-1-2**
604-104		**(CMR 111) 3-1-2**
		(2 units)

The grammar content of this course provides an intensive review and continued practice of the basic tenses. An introduction to more advanced tenses as well as language functions is given. Oral expression is developed through short presentations in class followed by questions. Short texts from newspapers, magazines and literature are discussed. Listening skills are improved by the use of audio tapes to reinforce material taught and to expose students to samples of native-like speech. Reading skills are enhanced by the use of second language texts assigned for homework. Writing skills are practised by placing emphasis on correct spelling, grammar and sentence construction.

604-901	**(CMR 102) 3-1-2**
604-907	**(CMR 112) 3-1-2**
	(2 units)

The purpose of this course is to develop fluency by means of laboratory work, role-playing activities, video-based activities, idioms, grammar and vocabulary exercises, reading of second language texts, short stories and newspapers, debates and discussions.

604-929	**(CMR 103) 3-1-2**
604-903	**(CMR 113) 3-1-2**
	(2 units)

The content of the course is selected in order to develop the reading skills (rate and vocabulary-building, reading for information and enjoyment); writing skills (accuracy in spelling, sentence/paragraph structure, dictation/note-taking, summarizing); speaking skills (ability to parti-

cipate in discussions/debates, to ask for information, to use conversational gambits and social formulae); and listening skills (ability to understand and interact with varieties and levels of spoken English.)

604-912   (CMR 104) 3-1-2
604-308   (CMR 114) 3-1-2
                                                                                                      (2 units)

A thematic approach to several topics in this course constitutes an important vehicle for student practice in reading, essay writing, debating and oral presentations. A study of literary texts forms a major part of the course. A study of films is another important area of course work and serves as an introduction to more advanced studies. A study of vocabulary and idioms develops the student's fluency.

604-909   (CMR 105) 3-1-2
604-919   (CMR 115) 3-1-2
                                                                                                      (2 units)

The course is based on an introduction to modern drama, the short story and the novel. Slide and video presentations on language, symbols and modern literature are used to complement the course material and to stimulate discussion. Students are required to complete reading and writing assignments which are also discussed in class. The course includes a review of selected issues in advanced grammar and stylistics.

ESL 201   **Second Year**   2-1-2
ESL 211   2-1-2

This course supplies a review of basic grammar: verb tenses, modals and idioms. Current affairs, TV programs, newspaper articles and short E.S.L. texts are the basic content of the course.

ESL 202   2-1-2
ESL 212   2-1-2

Speaking and listening skills are developed through classroom exercises and oral activities based on videos, readings, current affairs, audio tapes and other appropriate authentic materials. Written and reading tasks are assigned to consolidate class work.

ESL 203   2-1-2
ESL 213   2-1-2

Expansion of vocabulary and understanding of grammar is achieved through the reading of literary, technical and scientific texts, and through the preparation of out-of-class assignments. Comprehension of English is improved through a variety of tasks: conversational interaction, class discussions, laboratory drills, viewing of documentaries, note-taking. Speaking skills are developed through exercises to build vocabulary, to use idioms, to improve pronunciation and to correct grammar problems.

ESL 204   2-1-2
ESL 214   2-1-2

To promote class discussion, a variety of audio-visual material is presented. The students give oral reports on topics from current newspapers and magazines as well as from works of literature. Written work is also required to consolidate the new material.

ESL 302   **Third Year**   2-1-2
ESL 312   2-1-2

Grammar is approached through a review of the basic tenses, and emphasis is put upon written and oral practice in class and in the laboratory. General conversations on directed topics and in role-playing situations help to address problems in putting together structures. Readings in current magazines and newspapers are used, and video material is used for discussion. Written error correction is also done extensively.

ESL 303   2-1-2
ESL 313   2-1-2

This course provides materials and training which develop students' language skills in conversational interaction (knowledge of social formulae, idioms, language levels), and in reading and writing, on a diagnostic basis, focussing on form, style, accuracy in spelling, vocabulary choice and grammar. A variety of exercises based on topics of general and current interests is also used.

ESL 304   2-1-2
ESL 314   2-1-2

Translation exercises, idioms and grammar work are all used to encourage the acquisition of formal grammar. Formal speeches, role-playing games, and directed conversation topics are used to improve fluency. Topics from current magazines, radio, and T.V. are used to initiate discussions. Formal paragraph writing is also done.

ESL 402   **Fourth Year**   2-1-2
ESL 412   2-1-2

Complex grammar areas are reviewed and emphasis is placed on accurate performance at a high level in all four skills. Samples of authentic native language are used for study. Videos are exploited in vocabulary expansion exercises and audio tapes are used to sharpen listening exactness.

ESL 403   2-1-2
ESL 413   2-1-2

A study of problem grammar areas is used as a basis for the speaking section of this course. This is complemented by error analysis techniques in listening and writing. Authentic language materials are used to promote reading skills and to foster thematic discussions in class.

ESL 404	2-1-2
ESL 414	2-1-2

A study of topical concerns through the reading of newspaper and magazine articles, and essays, through the viewing of videos and films, and through listening to taped audio interviews promotes in-class discussions, debates, oral presentations, and written assignments.

Descriptions of French Second Language courses can be found in the French section under "LANGUES SECONDES".

DEPARTMENT OF SOCIAL SCIENCES

Head of Department	Marcel Bellavance, B.A., B.Hist., L.L., D.E.S., Ph.D.
Professors	Roger Brière, B.Sc., L.L., M.A., Ph.D.
	André Dirlik, B.A., M.A., Ph.D.
Associate Professors	Philippe Constantineau, B.Ph., M.Ph., Ph.D.
	François Gendron, B.A., M.A., LL.L., D.L.
	Pierre Paquette, B.Com., M.A., Ph.D.
Assistant Professors	Captain Jean Gagnon, C.D., B.A., M.A., M.B.A.
	Myroslaw Smereka, B.Sp., M.Sc.Eco.
Lecturer	Captain Alvin Doucet, C.D., B.A., M.A.
Part-time Lecturer	Marc Imbeault, B.A., M.A., D.E.A.

320-901   **Economic Geography of Canada**   **3-0-3**
(2 units)

The purpose of this course is to establish the foundations of the economic, social and political life of Canada, in preparation for courses offered in the following years of the curriculum. It deals with the development of natural resources, the problems associated with such development and the regional disparities resulting therefore.

330-915   **Modern and Contemporary History from 1789**   **3-0-3**
to the Present   (2 units)

The purpose of this course is to familiarize the students with the great historical events from the 18th to the 20th century. It focusses on the French Industrial and American Revolutions, the civil war in United States and finally on the varied crises of the contemporary age.

330-925   **Canadian History from the Beginning**   **3-0-3**
to the Present   (2 units)

The aim of this course is to give the students a broad understanding of Canadian history from the Conquest of New France to the present. The programme will meet two goals: to familiarize students with long term phenomena in examining the past, and to give them a sound understanding of chronology by studying the growth of economic, social and political structures.

340-225   **Political and Social Philosophy**   **3-0-3**
(2 units)

The purpose of this course is to introduce the students to the study and discussion of Western political and social theory which has, from Plato onward, focussed on such questions as: the nature and purpose of the state; the best practicable constitution; the dialectic implied by the notions of common good, self-interest and individual freedoms; the social problem; and the relationship between states.

383-920   Introduction to Economics I   3-0-3
(2 units)

The purpose of this course is to deal with the behaviour of the economy as a whole, particularly, with the overall functioning of capitalist type economies. It is concerned with the determination of the economy's total output, the price level, the level of employment, interest rates, the balance of payments, and exchange rates. The course has three main objectives: providing the students with a good understanding of the functioning of an economy, an awareness of the main issues currently debated both nationally and internationally, and enabling the students to evaluate and judge contemporary economic events, phenomena and policies. These objectives will be pursued using both a theoretical and a descriptive approach.

383-921   Introduction to Economics II   3-0-3
(2 units)

The purpose of this course is to introduce various basic concepts and analytical tools relevant to Microeconomics. Topics studied will be: the theory of Consumer Behaviour, the theory of the Firm, the product and factor markets, and the analysis of production costs. Perfect and imperfect competition will be studied; however, emphasis will be on the perfect competitive environment.

SCH 220   Canadian History   3-0-6
(3 credits)

The aim of this course is to give undergraduate students a broad understanding of Canadian history and its relationships with historiography.

SCH 221   Political Science   3-0-6
(3 credits)

The aim of this course is to present human nature in society and the epistemology of political science. Students learn fundamental values and notions met in politics. Moreover, they are initiated to the most significant theoretical and practical elements of this field of study known as political science. Finally, this course prepares them for other courses in international relations and political institutions.

SCH 222   Canadian Political Institutions   3-0-6
(3 credits)

The aim of this course is to explain the Canadian parliamentary system of government; more specifically the procedures and process by which demands and problems in Canadian society lead to, step by step, political decisions applied by the State. It initiates students to Canadian political processes and institutions through a comparison between the American presidential and Canadian parliamentary systems.

| SCH 252 | Introduction to Canadian Studies | 3-0-6 |
| | | (3 credits) |

The aim of this course is the study of all aspects of the daily experience of Canadians that one can really understand the make-up of the Canadian cultural identity. This is the sole object of the courses of history, sociology, literature, geography, economics and political science. This course will try to deal with areas not already covered by the aforementioned courses and will attempt to integrate and synthesize what has already been dealt with.

| SCH 254 | Canadian Society | 3-0-6 |
| | | (3 credits) |

The purpose of this course is to study the broad social and political changes which have affected Canada and Quebec since the Second World War.

| SCH 311 | Economic History in a Social Context | 3-0-6 |
| | | (3 credits) |

The aim of this course is to give the students a broad understanding of the Canadian economic history since the beginnings. We will picture the economic history withnin the social context, and adopt a multidisciplinary approach favoured by historians. Because of the broad period and geography, the course will remain general. The topics studied will take into account the major changes which derived from the economic and demographic growth of the country, and from its urbanization and industrialization.

| SCH 312 | Canadian Economic and Social History | 2-1-6 |
| | | (3 credits) |

The purpose of this course is to give students a broad understanding of the Canadian economic history since the beginnings. We will picture the economic history within the social context, and adopt a multidisciplinary approach favoured by historians. Because of the broad period and geography, the course will remain general. The topics studied will take into account the major changes which derived from the economic and demographic growth of the country, and from its urbanization and industrialization.

| SCH 313 | Macroeconomic Analysis | 3-0-6 |
| P 383-921 | | (3 credits) |

The objective of this course is to improve the students' understanding of the overall functioning of contemporary economies and societies. Part of the course will consist of an indepth survey of macroeconomic theory; the Keynesian approach will be emphasized. A second part of the course will examine important contemporary issues: the economic crisis within market economies, inflation, unemployment, and international economic problems.

| SCH 314 | Microeconomics Analysis | 3-0-6 |
| P 383-921 | | (3 credits) |

The purpose of this course is to analyse the functioning of markets, and the economic behaviour of consumers and producers. This course is designed especially for administrators,

and its content is slightly different from traditional microeconomic courses. As a secondary objective, this course aims at familiarizing students with the systematic analysis of problems.

SCH 317   **Defence Economics**   **3-0-6**
                                                                      (3 credits)

The purpose of this course is to apply economic concepts and methods to decision-making problems in the realm of national defence. In this light, the student will examine how economic considerations have influenced certain aspects of defence policy in the past.

SCH 319   **Main Currents in the 20th Century**   **3-0-6**
                                                                      (3 credits)

The purpose of this course is to propose a review of the main currents and schools of thought in the social sciences since 1900, i.e. those that still exert a recognized or identifiable influence on current theory-building, and also offers an assessment of the actual state of theory in the following fields of study nowadays associated with "social science" - philosophy, sociology, anthropology, ethnology, history and political economy.

SCH 412   **Managerial Economics**   **3-0-6**
P SCH 314   (3 credits)

The aim of this course is to familiarize the student with the application of economic principles and methodologies to the decision-making process of the firm. It emphasizes the use of the tools and techniques of economic analysis to analyze and solve managerial problems.

SCH 424   **Canada and Its North American Environment**   **3-0-6**
                                                                      (3 credits)

The purpose of this course is to invite the students to consider what constitutes the basis of a national identity. We draw attention particularly to the efforts of the Canadian government to maintain its political autonomy separate from that of the United States and to the expression of a national will in the country's economy and communications. The following topics are given special attention: the presence of foreign multinational companies and its economic and social consequences in the host country, the influence these companies exert on the national government; the Canadian bourgeoisie and its national consciousness: American imperialism and Canadian intellectuals; regional concerns and the sense of identity; Canadian labour unions and international unions.

SCH 452   **Forms of Expression and Interpretation**   **3-0-6**
                                                                      (3 credits)

The purpose of this course is to place emphasis on the arts such as architecture, painting, sculpture, music, cinema and theatre. This course will include meetings with Canadian artists as well as visits to various museums and other places allowing direct contacts with social values, standards and beliefs which have been the object of discussion during formal courses. The student will also study the folklore, legends and traditions of various ethnic groups.

SCH 460   **Directed Research in Social Sciences**   **0-6-12**
and Practical Assignments   **(6 credits)**

       The purpose of this course is to complete the schooling of the Fourth year Social Sciences students by having them undertake a research project on a topic pertinent to their discipline and by demonstrating clearly not only the methodological research proper to the social sciences but also the art of communicating their findings in a coherent and vibrant paper which meets the requirements for a first university degree.

DEPARTMENT OF STRATEGIC STUDIES

Head of department	John D. Young, B.A. (Hon.), M.Sc.soc.
Professor	Harold P. Klepak, C.D., B.A., M.A., Ph.D.
Visiting Professor	Jean-Christophe Romer, Ph.D. (soc.pol.), Ph.D. (hist.)
Associate Professors	Charles David, B.Sc., M.A., Ph.D.
	Paul Létourneau, B.sp.H., M.A., D.E.A., Ph.D.
Lecturer	Captain Michel Tremblay, C.D., B.A., M.A.
Part-time lecturers	Monik M. Beauregard, B.Sc., M.A.
	Pierre Goigoux, B.A., B.sp.H., M.A.
	Gilbert Grou, B.Sc., M.Sc.
	Major Louis Haeck, C.D., B.A., LL.L., D.D.N., C.E.T., LL.M., D.C.L.
	Houchang Hassan-Yari, B.A., M.A.
	C. Peter Turner, B.A., LL.L.

330-983	Decolonization and Problems of the Third World	3-0-6
		(2 units)

The purpose of this course is to make the students aware of the problems, the aspirations and the options for development of the Third World.

EMS 216	Classical Strategy	3-0-6
		(3 credits)

The aim of this course is to study the development of classical strategic thought from ancient times down to the arrival of the atomic bomb. The great thinkers involved in this development will be studied and will include Thucydides, Sun-Tzu, Jomini, Clausewitz, Marx, Mahan, Liddell-Hart and Douhet.

EMS 223	International Relations	3-0-6
		(3 credits)

The purpose of this course is to familiarize the students with the current schools of thought in this field. It focuses attention on international conflicts and their peaceful settlement.

EMS 232	Military History of Canada	3-0-6
		(3 credits)

The purpose of this course is to give a critical study of the major stages of Canada's military history. It stresses our role in the various wars in which we took part.

EMS 319	Diplomacy and Wars in the 20th Century	3-0-6
		(3 credits)

The purpose of this course is to study, in some depth, the two great wars of this century as well as certain key conflicts of the post-World War II period. Emphasis is placed on pre-war diplomatic aspects as well as the direct war-time experiences themselves.

EMS 324   Soviet Defence Policy   3-0-6
(3 credits)

The purpose of this course is to provide the students with a basic understanding of the USSR, its army, society, economy, political system and major aspects of its foreign policy. This course covers the period from 1917 to the present.

EMS 325   Security Issues in the Third World I   3-0-6
(3 credits)

The purpose of this course is to add depth to the student's knowledge of current problems in the Third World particularly in the realm of national security. Different case studies are chosen for elaboration each year.

EMS 326   Nuclear Strategy   3-0-6
P EMS 216   (3 credits)

The aim of this course is to study the principles of contemporary nuclear strategy and of the problems related to it. It includes an analysis of the theoretical concepts of deterrence, détente, escalation and crisis management. It also examines the major strategic doctrines: massive retaliation, graduated deterrence, and mutual assured destruction.

EMS 328   Introduction to Public International Law   3-0-6
(3 credits)

The aim of this course is to provide students with accurate basic concepts of Public International Law which should allow them to better understand the role and the consequences of military interventions. The course also provides a general knowledge of NATO Treatises and of Canada's involvement in NATO.

EMS 329   Space Policies and Legal Regimes   3-0-6
(3 credits)

The purpose of this course is to offer a twin focus on the politics of space. The international legal regimes governing the use of space for both civilian and military purposes are set out and subjected to examination in terms of their origins, evolution in time, current viability and future prospects. This form of scrutiny of international space law and policy leads in turn to consideration and analysis of the course's second line of inquiry: the comparative study of a number of national space policies, including the Canadian case, against the strategic backdrop of competing and cooperative images of space as an economic, political, and international-security frontier.

EMS 360   Concepts and Methods in International Relations   3-0-6
(3 credits)

The purpose of this course is to teach students the basic concepts as well as the main methods used in the analysis of international relations. Fundamental aspects of the contemporary international system will also be discussed.

EMS 415   Canadian Defence Policy   3-0-6
P SCH 222, EMS 232   (3 credits)

The aim of this course is to make the student understand the context of Canadian defence policy since 1945. There is a review of the problems resulting from the safeguarding of our national sovereignty, our participation in North American defence, the carrying out of our commitments towards NATO and our role in peacekeeping operations throughout the world.

EMS 417   Low-Intensity Conflict   3-0-6
P EMS 216 or EMS 327   (3 credits)

The purpose of this course is to lead the students to understand why the international community is facing an increasing level of unconventional conflict. This course aims at giving the student the necessary tools to understand the various facets of this trend both in the political and military domains.

EMS 419   Current Strategic Issues   3-0-6
                                                                             (3 credits)

The purpose of this course is to develop the conceptual and analytical abilities of the student in regard to current strategic and military problems either in relation to the evolution of East-West relations or to the North-South dialogue. The problems selected for analysis could change each year depending on the evolution of international problems.

EMS 425   The Law of War   3-0-6
                                                                             (3 credits)

The aim of this course is to address the subjects of the right to declare war through a brief study of the Kellogg-Briand Pact, the UN Charter, and the 1974 UN Resolution defining aggression. The course then addresses the 1907 Hague Convention and that part of the 1977 Protocol regulating combat methods, the legality of combatant acts and the legality of weapons employed. Finally the course studies humanitarian law, that is the four Geneva conventions of 1949 and those parts of the additional 1977 Protocol to these conventions dealing with the wounded and the sick as well as prisoners of war and the civilian population.

EMS 426   Comparative Defence Policy   3-0-6
P EMS 326, EMS 360   (3 credits)

The aim of this course is to provide a comparative analysis of the national defence policies of the United Kingdom, France, China, and Sweden from the point of view of each country's geopolitical situation. Analysis deals with organization, personnel, doctrinal and weapons concerns.

EMS 428   American Defence Policy   3-0-6
P EMS 326   (3 credits)

The purpose of this course is to lead the student to an understanding of the dynamics of the relation between the political factor and the military factor in America, to analyze the strategic doctrines since 1914 and the general organization of American defence as well as the distribution of American force in the world.

EMS 440   Arms Control and Disarmament   3-0-6
P EMS 324, EMS 326, EMS 428   (3 credits)

The aim of this course is to examine the issues that have motivated arms control and disarmament negotiations since the late-nineteenth century; and it will consider the role that such negotiations and, in certain cases, agreements are said to play as elements of national security policy.

EMS 444   Germany and European Security   3-0-6
P EMS 324, EMS 326, EMS 428   (3 credits)

The aim of this course is to examine the role and the importance of the German question in relation to the European security context. Consideration will be given to the geopolitical, military and strategic dimensions of this vital area of the world.

EMS 450   Security Issues in the Third World II   3-0-6
                                                                           (3 credits)

The purpose of this course is to add depth to the student's knowledge of current problems in the Third World particularly in the realm of national security. Different case studies are chosen for elaboration each year.

EMS 460   Research Paper in Military and Strategic Studies   0-3-6
                                                                           (6 credits)

This aim of this research paper is to ensure that Fourth Year students in the Honours Program in Military and Strategic Studies (EMS) write an essay requiring a sustained effort to synthesize in a particular area of strategic studies. This research should permit officer cadets to improve their knowledge as well as to apply rigorous research methods employed in the social sciences.

DRILL

Instructors

Chief Warrant Officer R.M. Charest, C.D.
Master Warrant Officer R. Laplante, M.M.M., C.D.
Sergeant E.R. Rocray, C.D.
Sergeant J.C. Michaud

Aim

The object of Drill is to teach the students to obey instructions instinctively and properly stimulate the power to command through mutual instruction, and develop leadership qualities through responsible handling of groups of officer cadets.

Contents

Drill includes Rifle, Sword and Foot Drill Elementary, Advanced, and Ceremonial, as prescribed by the Canadian Forces Drill Committee.

901-110	**Drill**	0-1-0
901-210		0-1-0

This course includes all movements in elementary drill.

901-311	**Drill**	0-1-0
901-411		0-1-0

Flight and Squadron Drill, including:

a. voice control;

b. words of command;

c. inspections; and

d. mutual instruction.

XML 200	**Drill**	0-1-0
XML 210		0-1-0

This course is a continuation of Drill 901-110, 901-210, 901-311 and 901-411, plus instructions in Wing Drill.

XML 300	**Drill**	0-1-0
XML 310		0-1-0
XML 400	**Drill**	0-1-0
XML 410		0-1-0

PHYSICAL EDUCATION AND ATHLETICS

Director of Athletics	Major J.H. Lansing, C.D., B.A., B.P.E.
Athletic Administrative Officer	Captain J.A.G. Blais, C.D., B.P.E.
Physical Education Officer	Lieutenant (Naval) J. Daoust, B.Sc.(P.E.)
Senior Instructor	Chief Petty Officer second class D. Théoret, M.M.M., C.D.
Administrative Coordinator	Warrant Officer J.E.P. Sénécal, M.M.M., C.D.
Instructors	Sergeant W. Edwards, C.D.
	Sergeant M. Dion, C.D.
	Sergeant R. Gallant, C.D.
	Sergeant M. Parent, C.D.
	Sergeant J.G. Proulx, C.D.
	Sergeant J.P. Sarrazin, C.D.
	Sergeant J.S.P.G. Stocchero, C.D.
	Petty Officer second class J.Y.S. Tremblay, C.D.

Physical Education and Athletic Facilities

CMR offers first class physical education and athletic facilities which include a 400 metre track, six soccer/football fields, three softball diamonds, eight tennis courts, plus a marina which has sailing craft, sailboards and canoes. Indoor facilities include a double gymnasium, arena, swimming pool, two sauna baths, four squash courts, and a well-equipped weight-training facility.

The Physical Education and Athletic Programme

The aim of the programme is:

a. to instill an understanding of the theory and philosophy of physical education;

b. to develop physical fitness, sport skills, and habits necessary for maintaining physical fitness; and

c. to develop leadership qualities and other attributes of an officer.

The aim of the programme is achieved through a balanced and progressive schedule of activities composed of the following:

a. physical education classes;

b. intramural sports programme;

c. intercollegiate athletics; and

d. recreation club activities.

These four components are complementary and are considered an integral and indispensable part of the whole programme.

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PHYSICAL EDUCATION PROGRAMME

The aim of the physical education programme is achieved by means of compulsory participation by all officer cadets in 90 minutes of physical education classes each week which are conducted during the normal academic day.

109-101	**Preparatory Year Physical Education Programme - First Term**	0-2-0

Meeting the requirements of the Canadian Forces Military Survival Swim Standard. The development of personal health habits and care in sport and fitness activities. The development of individual sport skills through participation in a variety of selected seasonal sports. Compulsory participation in vigorous physical fitness activities. Participation as minor officials in various leagues and tournaments.

109-201	**Preparatory Year Physical Education Programme - Second Term**	0-2-0

An introduction to modern physical fitness training techniques coupled with rigorous participation in a variety of physical fitness activities. A study of health hazards as related to physical fitness and personal well-being. Further development of individual skills and regular participation in selected seasonal sports activities. Participation as minor officials in various leagues and tournaments.

109-301	**First Year Physical Education Programme - First Term**	0-2-0

Further development of fitness and aquatic skills/knowledge. Comprehensive development of individual sport skills, plus an introduction to team strategies in selected seasonal sports. Regular participation in sports competitions as both player and minor official. Compulsory participation in demanding physical fitness activities.

109-401	**First Year Physical Education Programme - Second Term**	0-2-0

Development of knowledge and appreciation of modern physical fitness training techniques, including vigorous participation in wrestling. Development of individual skills with regular participation as a player and official.

EPH-200	**Second Year Physical Education Programme - First Term**	0-2-0

Continued emphasis on physical training activities. An introduction to the fundamentals of soccer, broomball, handball, football, and underwater hockey.

EPH-210	**Second Year Physical Education Programme - Second Term**	0-2-0

Students will select one of the following activities: badminton, basketball, hockey, snowshoeing or volleyball. Opportunity exists for the development of advanced individual skills and team strategies. University athletes are encouraged to select a sport other than their specialty.

EPH-300   **Third Year Physical Education**   0-2-0
                                  Programme - First Term

Third year students continue to participate in vigorous physical fitness programmes. Discussion of modern training techniques is continued. Students are exposed to two elective classes in the following sports: aquatics, badminton, broomball, canoeing, golf, indoor soccer, softball, and tennis.

EPH-310   **Third Year Physical Education**   0-2-0
                                  Programme - Second Term

During this term, officer cadets again select one of the following activities for in-depth study: aquatics, badminton, basketball, cross-country skiing, hockey, indoor soccer, racquetball, squash, or volleyball.

EPH-400   **Fourth Year Physical Education**   0-2-0
                                  Programme - First Term

The theoretical aspect of the course includes discussion of sports and physical education in the Canadian Forces, the duties of a unit sports officer and planning a personal physical fitness maintenance programme. Activities during this term will include aquatics, basketball, broomball, canoeing, cross-country skiing, golf, indoor soccer, squash, and tennis.

EPH-410   **Fourth Year Physical Education**   0-2-0
                                  Programme - Second Term

Officer cadets will look at designing physical fitness programmes and activity periods for groups of personnel up to platoon level. An update of theoretical fitness and conditioning information shall be conducted as mini-lectures throughout the term. Students will complete their in-depth study of a sport by selecting one of the following: aquatics, badminton, basketball, cross-country skiing, hockey, racquetball, squash, or volleyball.

INTRAMURAL ATHLETIC PROGRAMME

The intramural athletic programme contributes to the attainment of the objective as an extension of the physical education programme by:

a.   providing an opportunity for the development of individual sport skills and applying the principles which were presented in the physical education programme;

b.   providing further opportunity to develop physical fitness;

c.   providing a competitive environment in which the qualities of leadership, competitiveness, aggressiveness, self-discipline, self-sacrifice and esprit-de-corps are required to a greater degree than in the instructional environment of the physical education programme;

d.   providing the opportunity for the development of poise and the ability to make decisions through experiences of organizing, officiating and coaching in the various intramural programmes.

The intramural athletic programme is divided into two areas:

a.   intramural league play which is compulsory for all officer cadets not participating on university athletic teams; and

b.   wing championships and tournaments which include individual and team events. These activities are compulsory for the entire cadet wing.

Responsibility for the day to day operation of the intramural athletic programme rests with the officer cadets, under the supervision of Athletic Department personnel. Because of this operational approach, officer cadets are presented with the opportunity to develop leadership qualities through participation as activity convenors, officials, managers and coaches as well as players.

In conjunction with the intramural athletic programme, specialty clinics for officials and coaches of team sports are offered to those officer cadets who are interested and assigned duties in these areas. As is applicable, appropriate provincial certification is awarded to successful candidates of the clinics.

The core activities of the intramural programme include: basketball, broomball, cosom hockey, football, handball, hockey, soccer, volleyball, and water polo.

The wing championships take place in the following sports: badminton, cross-country running, track and field, regatta events, speed skating, squash, swimming, and wrestling.

THE INTERCOLLEGIATE ATHLETIC PROGRAMME

The intercollegiate athletic programme is designed for officer cadets of superior athletic skill and playing ability, and contributes to the achievement of the aim by:

a.   providing the opportunity for the individual to participate in highly skilled, competitive, organized athletics;

b.   providing the opportunity to achieve a high level of physical fitness;

c.   instilling, through the demands of training and competition, the desire to excel, developing self-discipline and encouraging self-sacrifice for a coordinated team effort; and

d.   creating through the efforts of the College teams, a College esprit-de-corps.

CMR is a member of the "Association régionale du sport étudiant du Richelieu" (ARSER) and through this association plays in leagues operated under the auspices of the FQSE (Fédération québécoise de sports étudiants).

The Remparts (name of the CMR's representative teams) currently compete in seven college sports: basketball, cross-country running, football, hockey, soccer (men's and women's), volleyball (men's and women's), and skiing.

The College also has teams in the following four disciplines which compete in independant leagues: badminton, broomball, water polo, and tae kwon do.

Successes of the Remparts include four undefeated football seasons which culminated in four provincial "Bol d'Or" championships (1976, 1977, 1983, and 1987), provincial cross-country championship in 1976, 1978, 1979, and with the addition of females to the College, the males and females won their respective categories in 1985, 1986, 1987, 1989, and 1990. In 1987, 1988, and 1990, the hockey team won the provincial championship.

Physical Education Assessment of Students

Each officer cadet is assessed in four areas covered by the Physical Education and Athletic Programme:

a. physical fitness as detailed by the Canadian Military Colleges Physical Performance Tests;

b. swimming requirements as outlined in Canadian Forces Administrative Orders;

c. sport skill evaluation insofar as participation in the Physical Education Programme is concerned; and

d. instructor assessment of desired officer-like qualities as related to the Physical Education and Athletic Programme.

The students who do not attain or maintain the required physical fitness or aquatics standard are obliged to participate in a compulsory remedial programme until they can meet the standard.

RECREATION PROGRAMME

CMR offers a comprehensive programme of recreational and leisure time pursuits which is conducted as part of the Athletic Programme under the general supervision of the CMR Recreation Association. Participation in the recreation programme is compulsory, and a period of time is specifically reserved each week for its operation. The programme is so diverse, however, that certain clubs find it necessary to operate outside of the formal club periods in order to meet their specific needs.

The recreation programme includes:

a.   military oriented activities such as: flying, parachuting, combat arms, and shooting clubs;

b.   sports oriented activities such as: alpine skiing, badminton, "high box", squash, and tennis clubs;

c.   art and hobby clubs such as: art, automobile, dance, music, and scuba diving.

DEFINITIONS

1. Degree

A degree is a title given by CMR and certified by a diploma. The College grants a student a degree for having successfully completed a programme.

2. Diploma

A diploma is a document certifying that a degree has been awarded.

3. Certificate

A certificate is a document other than a diploma certifying the successful completion of a programme involving at least thirty credits.

4. Certification of Studies

A certification of studies is a document other than a certificate or a diploma certifying that a student has attended or successfully completed study and/or research activities.

5. Programme

A programme is a sequence of study and/or research activities centred on the general and specific objectives of a training sanctioned by CMR.

6. Discipline

A discipline is one of the various branches of learning (vg physics, psychology...).

7. Field of learning

A field of learning is a coherent body of knowledge based on various disciplines and applied to a specific reality (vg administrative science, computer science).

8. Subject

A subject is a body of knowledge considered as a whole for study and/or research purposes. This body may correspond to a determined part of a discipline or of a field of learning, or it may be made up of the knowledge which is involved in the study of a problem or of a theme (vg nuclear physics, medieval philosophy).

9. Course

A course is a series of study and/or research activities which may constitute an element of one or several curricula; it is identified by a set of initials specific to a discipline or to a field of learning and by a number.

10. Compulsory Course

A course required of all students enroled in a particular curriculum.

11. Advanced course

Course normally within his university programme of study, but offered at a superior level, that a student can follow in advance. This course is valid for credits and is included in the student's average.

12. Elective course

Within his programme of study, a course that a student must select from an offered group. Such elective courses carry appropriate credit and marks obtained are included in the student's grade average.

13. Optional course

In his programme of study, a course that a student may select and follow. This course is valid for credits but is not included in the student average.

14. Extra course

A course that a student may take, though it is not in his programme of study. Such a course carries the appropriate credits but marks obtained are not included in the student's grade average.

15. Prerequisites

In the description of courses, "P" means "prerequisite".

The prerequisite (P) which appears in certain course descriptions identifies a course which normally must be passed before a student can register for the following course.

16. Failed-Credit Standing

Standing granted on the recommendation of the Faculty Board, and with the approval of Faculty Council and the Commandant, in a failed course for the purpose of allowing a student who fails one course to pass the year. The mark will be recorded with the annotation "Failed-Credit" (FC) and remains a failure for the purpose of determining whether or not work prerequisites to other courses has been completed.

17. Carry a Course

When it has been recommended by Faculty Council and approved by the Commandant, a student carries a course after failing this course in the previous term by taking the failed course again (or an authorized equivalent) in the first subsequent academic term in which the course is offered (schedule permitting) together with the normal academic workload of that term. The mark of the first attempt will be recorded on the transcript of marks for that term with the annotation against the failed course "Failed, but permitted to carry". That term will not be completed until the carried course is passed.

The particular conditions which a student must normally satisfy to be considered for a carry a course are determined by the Faculty Council.

Normally a student may not carry more than one course per term, nor can he carry a course in two consecutive terms. Without special permission of the CMC to which the student is transferring, a course may not be carried from one CMC to another.

18.1 Credit

a. A credit is a unit which allows Le Collège militaire royal de Saint-Jean to assign a numerical value to the workload (university level) required of a student so that he may reach the goals of a teaching or research activity.

b. A credit represents 45 hours or periods per 15 week term devoted by the student in a learning activity (courses, research, laboratories, seminars, individual work).

c. For example, a credit corresponds to the following weekly load during a 15 week term:

one period of classroom teaching and
two hours of individual work
or
one period of classroom teaching,
one period of practical work and
one hour of individual study; etc...

18.2 Unit

A unit allows Le Collège militaire royal de Saint-Jean to assign a numerical value to the workload (collegial level) required of a student so that he may reach the goals of a teaching or research activity. The calculation of a unit is done the same way as for the credit.

19. Bachelor's degree

A Bachelor's degree program involves at least 90 credits.

20. General Bachelor's degree programme

A General Bachelor's degree programme involves either three minors or certificates, or two minors or certificates and a heterogeneous block of 30 credits of activities in disciplines or fields of learning other than that of the minors or certificates, provided at least 12 credits are obtained in each case.

21. Honour's degree

A Bachelor's degree programme is an honour's degree programme if at least eighty per cent (80%) of the credits are concerned with the same discipline or the same field of learning.

22. Major

A major involves a minimum of 60 credits, of which at least 48 are obtained for specific courses within a single discipline or a single field of learning.

23. Minor

A minor involves a minimum of 30 credits, of which at least 24 are obtained for specific courses within a single discipline or a single field of learning.

24. Concentration

A concentration normally involves a minimum of 18 credits which may be obtained in any discipline or field of learning.

25. Certificate programme

A certificate programme involves a minimum of 30 credits.

REGULATIONS

26. Duration of the Programmes of Study

1. The duration of the programmes of study is normally four or five academic years. The years are designated as follows: Preparatory Year, First Year, Second Year, Third Year, and Fourth Year.

2. Entrance to the Preparatory Year requires completion of junior matriculation or its equivalent. Entrance to First Year requires completion of a programme equivalent to the Preparatory Year programme of study.

27. Degrees

Degrees are granted as follows:

a. the college Senate, on the recommendation of the Faculty Council, grants a degree of Bachelor of Arts, Science or Administration, as appropriate, to a student who has successfully completed his final year at Le Collège militaire royal de Saint-Jean;

b. a degree of Bachelor of Arts, Science or Engineering, as appropriate, shall be granted by the Royal Military College of Canada to a student who has successfully completed his final year at the Royal Military College of Canada;

c. a degree of Bachelor of Arts or Science, as appropriate, shall be granted by the Royal Roads Military College of Canada to a student who has successfully completed his final year at the Royal Roads Military College of Canada.

28. Diploma: mentions

The mention granted to the CMR university graduates is based on the cumulative average of the last two university years.

29. Collegiate Studies Certificate

The College grants a certificate of Collegiate Studies to the students who have successfully completed the Preparatory Year and the First Year.

30. Programmes of study

Preparatory Year

1.   All students registered in Preparatory Year are normally required to take the courses prescribed for the programme of study in which they are registered.

First Year

2.   All First Year students are normally required to take the courses prescribed for the programme of study in which they are registered.

Second Year

3.   All Second Year students are required to take the courses prescribed for the programme of study in which they are registered.

Third and Fourth Years

4.   Programmes for Third and Fourth Years are as follows:

   a.   Students who have successfully completed their Second Year in Administration, in Social Sciences, in Military and Strategic Studies or in Computer Science will normally complete their Third and Fourth Years in this option at Le Collège militaire royal de Saint-Jean.

   b.   The remainder of the students may elect to complete their Third and Fourth Years as follows:

      (1)   at CMR in Science or in another programme of study, under the conditions specified by CMR;

      (2)   at RMC in Arts, Science or Engineering, under the conditions specified by RMC;

      (3)   at RRMC in Military and Strategic Studies, Sciences or Oceanography, under the conditions specified by RRMC.

   c.   Details of the programme of study are laid in the current calendars of Le Collège militaire royal de Saint-Jean, Royal Military College of Canada, and Royal Roads Military College of Canada.

5.   Students, who wish to complete their course programme at the Faculty of Engineering of RMC, must meet the conditions listed under the section "Programmes of Study" and subsection "Conditions for Admission into the Third Year courses of study at RMC".

6.   Entry into Honours will normally be open only to those students who have obtained, at the end of the Second Year, a minimum combined average of sixty-six per cent (66%) in the Honours courses, an overall average of at least sixty per cent (60%), and have clearly passed the year at the first attempt without conditions. The departments and Dean concerned may refuse a cadet permission to enter the Honours programme.

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7.   A student in the Third and Fourth Years Honours programmes must maintain a minimum combined average of sixty-six per cent (66%) in the Honours courses, an average of sixty per cent (60%) in each Honours course and an overall average of at least sixty per cent (60%). Furthermore, he must pass each term at the first attempt without conditions.

8.   The Faculty Council may, for cause stated, move a student from an Honours to a General course of study at any time before the completion of his Fourth Year, even though he may have obtained the standard required by these regulations at the annual examinations.

9.   A student who has been advised not to take Arts or Engineering courses by his Canadian Military College on the completion of his Second Year, may be refused permission to register in these courses in his Third Year.

31. Drill and Physical Education

Courses in Drill and Physical Education must be taken by all students in all years.

32. Continuity of Studies

1.   Extra courses - A student may take an extra course in each term in Second, Third, or Fourth Year with special permission of the Faculty Council.

2.   Interruption of Studies - Under normal circumstances, a student may not postpone a year of study.

3.   Change in the programme of study:

a.   The Deans' Committee may, at any time during the first semester, for the Preparatory Year, authorize a change of option request from a student having learning difficulties.

b.   A student other than those concerned by the previous regulation may not change his programme of study without the permission of the Faculty Council.

c.   Withdrawal from a Course:

(1)   An elective course - An elective course which has been selected by a student at registration may be replaced by another course of the same category during the first month of the term in which the course is offered, if the Department Heads and the Dean(s) concerned agree;

(2)   Advance course - A student may only withdraw from an advance course forming an integral part of his programme of study and which he has chosen at registration, only during the first four (4) weeks following the beginning of the term during which the course is offered;

(3)   Extra course - A student may only withdraw from an extra course, which he has chosen at registration, during the first eight (8) weeks following the beginning of the term during which the course is offered. After the eight week period, any withdrawal, success or failure at a

final examination as well as success or failure on supplemental examination will be reported on the report card;

(4)   Optional course - A student may only withdraw from an optional course, which he has chosen at registration, during the first eight (8) weeks following the beginning of the term during which the course is offered. After the eight week period, any withdrawal, success or failure at a final examination as well as success or failure on supplemental examination will be reported on the report card.

4.   Normally, a student may not transfer from one programme of study to another, without having obtained the full prerequisite standing in the option he wishes to enter.

33. Attendance

Course attendance may be excused as follows:

a.   with the consent of the Head of the Department, a student who is in Third or Fourth Year may be excused from attending certain courses, provided that these exemptions are in the best interest of the student;

b.   in First, Second, Third and Fourth Years, a student who has reached the integral level of bilingualism is not required to take second language courses.

34. Academic Standing

1.   To be granted Pass Standing, a student must obtain:

a.   a minimum overall average of 50 per cent except for a student's first term at CMR;

b.   a minimum of 50 per cent in each course excluding a course passed with failed-credit.

2.   An officer cadet must obtain a satisfactory standard in Physical Education, Drill and Second language, and a favourable report in officer-like qualities.

3.   Graduation of Academic Standings.

First Class Honours	Grade A - 75-100 per cent
Second Class Honours	Grade B - 66-74 per cent
Third Class Honours	Grade C - 60-65 per cent
Pass Standing	Grade D - 50-59 per cent
Failure	Grade E - less than 50 per cent

For second language, students at the university level will be given credits in the form of a letter grade only.

4.   Aegrotat Standing

Aegrotat standing may be granted by the Faculty Council to a student who has been unable to write one or more of the final examinations, but who has received satisfactory term marks in each course.

35. Final examinations

1.   Final examinations will be held at the end of each term.

2.   A student may write his examinations in either English or French, except for the examination in Second language.

3.   The Faculty Board constitutes the examining board for all final examinations. Standing in final examinations is granted by the Faculty Board, subject to confirmation by the Faculty Council.

4.   A student may be refused permission to write an examination:

    a.   in any course involving practical work in a laboratory, if his laboratory work has been unsatisfactory;

    b.   in any other course if he fails to meet the requirements with regard to assignments.

36. Supplemental examinations

1.   A student who fails in not more than three final examinations in a term may be allowed to write supplemental examinations in the courses concerned, provided that he has obtained an overall average of at least 50 per cent except for his first term at CMR in any year. Furthermore to be allowed to write a supplemental examination, a student must obtain at least 20 per cent in the failed subject.

2.   Supplemental examinations will be written at the end of each term.

3.   Following an end of term failure in a course, no second supplemental examination is allowed in that course for that term.

4.   To obtain pass standing in a supplemental examination, a student must obtain 50 per cent, not including the previous term mark or examination mark.

5.   Marks obtained in supplemental examinations shall not be used to raise a student's academic average in any term.

6.   Normally a student must obtain at least 30 per cent in a supplemental exam before being considered for a carry a course.

37. Revision of examinations

A student who has failed a final or supplemental examination may ask that it be revised in accordance with Faculty Council rules adopted to this effect.

38. Failure in a Term

An officer cadet fails his term:

    a.   if he fails to obtain a term overall average of 50 per cent except when it is his first term at CMR in any year;

    b.   if he fails in more than three courses in a term;

    c.   if he fails one or more of his supplemental examinations and is not granted failed-credit standing or is not allowed to carry a failed course;

    d.   if he fails the supplemental examination in a course he has been allowed to carry.

39. Repeating a Term

1.   A student:

    a.   may be permitted to repeat any term, but he may only repeat once in the four or five-year program; and

    b.   must be authorized to repeat a term by NDHQ on the recommendations of the Faculty Council and the Commandant.

2.   A student permitted to repeat a term must carry the equivalent workload of his full programme of study.

40. Withdrawal

1.   A student who fails in more than three courses in any term programme of study shall normally be required to withdraw.

2.   A student who fails a term for the first time may be required to withdraw from the College. A student who fails a term having previously failed a term, must withdraw.

3.   A student who, in the opinion of the staff, fails to develop the necessary officer-like qualities will, on approval of the Commandant, be required to withdraw.

41. Academic Misconduct

1.   PLAGIARISM:

Plagiarism is the presentation of submission of work as one's own which originates from some other, unacknowledged source. In term papers, laboratory assignments and examinations, the verbatim or almost verbatim presentation of someone else's work without attribution constitute plagiarism.
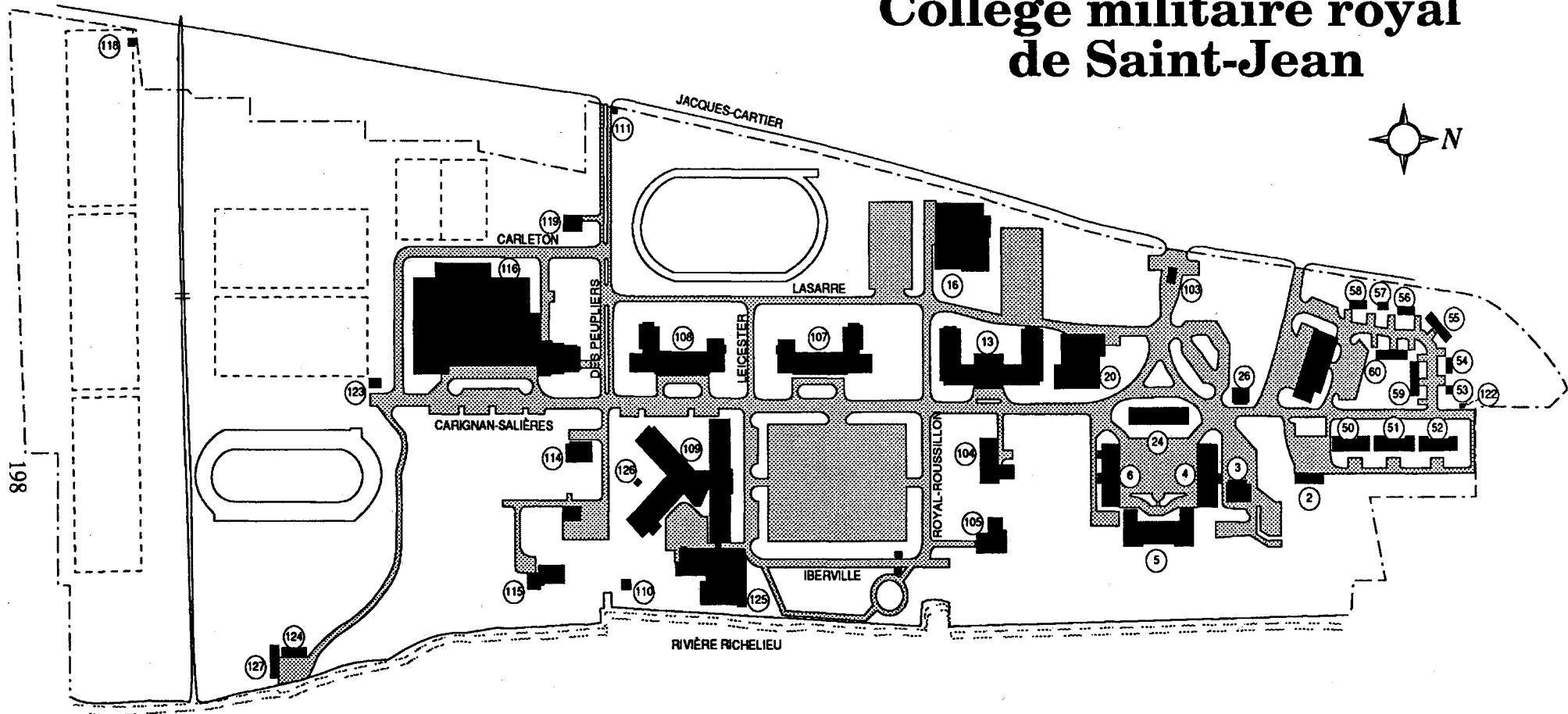
2.   CHEATING:

Cheating is the act or attempt to give, receive, share or utilize unauthorized information or assistance before or during a test or examination or personal assignment where marks are attributed. The presentation of a single work to more than one course without the permission of the instructors involved; the improper acquisition through theft, bribery, collusion or otherwise of an examination paper prior to the examination; the impersonation of a candidate at an examination; all constitute examples of cheating.

3.   PENALTIES:

Penalties are imposed upon students found guilty of cheating or plagiarism. Academic sanctions for such misconduct may range from the award of a zero grade for the work involved, to a recommendation for expulsion from the College.
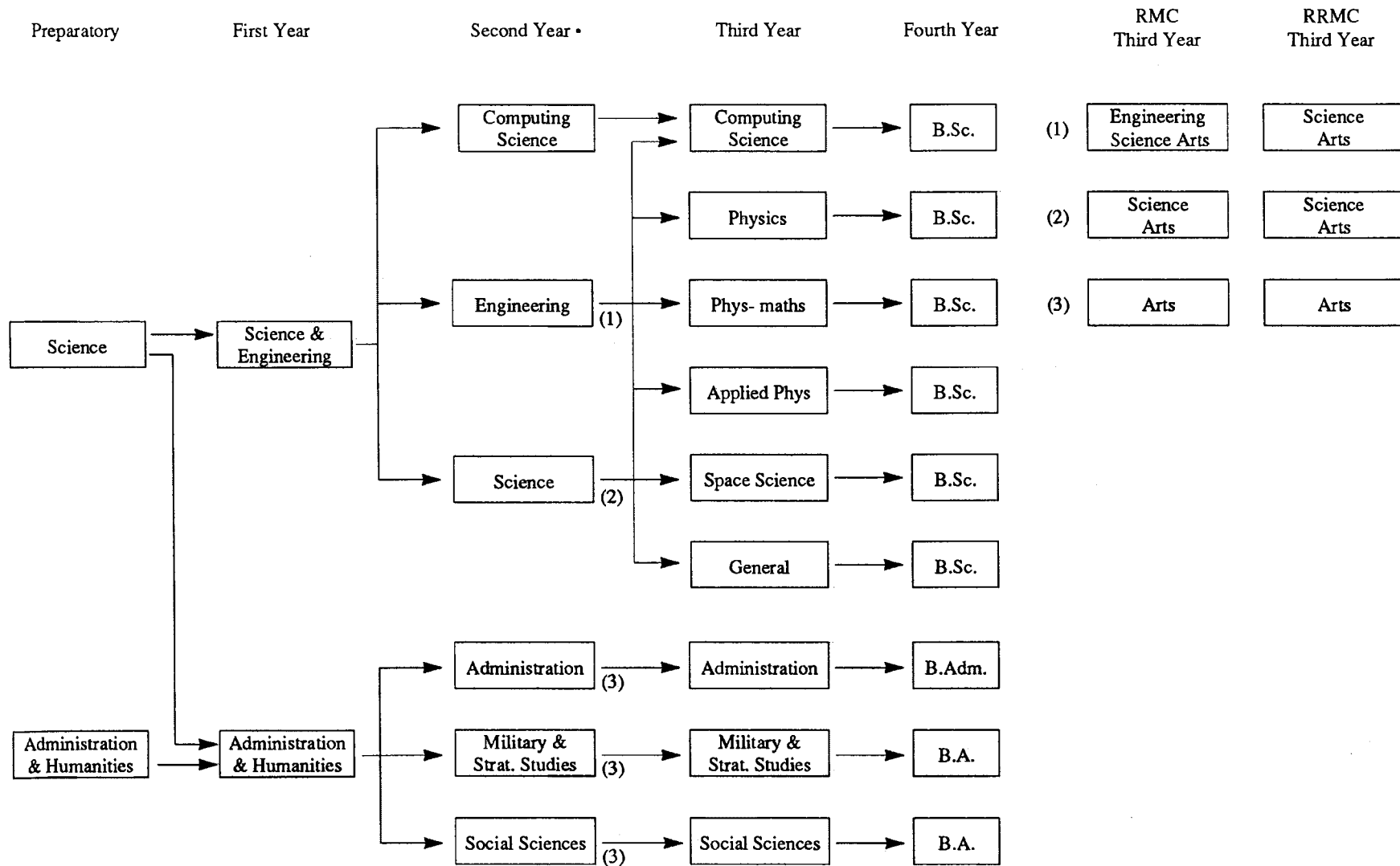
Collège militaire royal de Saint-Jean

JACQUES-CARTIER

CARLETON

LASARRE

CARIGNAN-SALIÈRES

DES PEUPLIERS

LEICESTER

ROYAL-ROUSSILLON

IBERVILLE

RIVIÈRE RICHELIEU

N

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2. C.E. STORAGE	50. P.M.Q. 4, 5, 6, 7
3. WO & SERGEANTS MESS	51. " 8, 9, 10, 11
4. MONTCALM BLOCK	52. " 12, 13, 14, 15
5. OFFOCERS' MESS	53. " 16
6. LA GALISSONNIÈRE BLOCK	54. " 18, 20
13. MAISONNEUVE BLOCK	55. " 22, 24, 26, 28
16. DRILL HALL	56. " 30, 32
20. DINING HALL	57. " 33
24. MASSEY PAVILLON	58. " 34, 35
26. MUSEUM	59. " 17, 19, 21, 23
	60. " 25, 27, 29, 31

102. SERVICE BUILDING	115. P.M.Q. 1
103. GATE HOUSE	116. VANIER HALL
104. R.C. CHAPEL	118. METER PIT
105. PROT. CHAPEL	119. P.M.Q. 3
107. CHAMPLAIN BLOCK	122. NORTH FLUO. BLDG.
108. CARTIER BLOCK	123. SOUTH FLOU. BLDG.
109. DE LERY PAVILLON	124. MARINA
110. STORM LIFT STATION	125. LAHAIE PAVILLON
111. SAN. LIFT STATION	126. CHEM.WAREHOUSE
114. P.M.Q. 2	127. MARINA WAREHOUSE

Programmes of study at Collège militaire royal de Saint-Jean

Preparatory	First Year	Second Year •	Third Year	Fourth Year	RMC Third Year	RRMC Third Year

Second Year → Third Year → Fourth Year branches:

- Computing Science → Computing Science → B.Sc.
- Physics → B.Sc.
- Engineering (1) → Phys- maths → B.Sc.
- Applied Phys → B.Sc.
- Science (2) → Space Science → B.Sc.
- General → B.Sc.

Preparatory: Science → First Year: Science & Engineering → [Computing Science, Engineering, Science]

- Administration (3) → Administration → B.Adm.
- Military & Strat. Studies (3) → Military & Strat. Studies → B.A.
- Social Sciences (3) → Social Sciences → B.A.

Preparatory: Administration & Humanities → First Year: Administration & Humanities → [Administration, Military & Strat. Studies, Social Sciences]

RMC Third Year / RRMC Third Year:

	RMC Third Year	RRMC Third Year
(1)	Engineering Science Arts	Science Arts
(2)	Science Arts	Science Arts
(3)	Arts	Arts

• After Second Year at CMR, students may continue their studies at another CMC providing they meet entrance requirements into Third Year of the College they wish to attend, as described in the calendar.

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MOC (Military Occupation Classification)	ENGINEERING										SCIENCE								ARTS										MISC.	
	Aerospace	Civil*	Computer*	Electrical*	Fuels and Materials*	Management*	Mechanical*	Nuclear	Physics*	Systems	Applied*	Chemistry	Computer*	General*	Geology	Math and Physics*	Physics*	Physics and Oceanography*	Canadian Studies*	Economics*	English*	French	General	Geography	History*	Mathematics*	Military & Strategic Studies*	Political Science*	Administration*	Commerce*
21 Armour	3	2	2	2	2	2	1	3	2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	2	2	2	1	2	2	2
22 Artillery	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23 Infantry	3	3	3	2	3	3	2	3	3	2	1	3	3	2	3	2	2	2	2	3	2	3	3	2	2	2	1	2	2	3
31 Air Navigator	1	3	2	2	3	2	2	2	1	1	2	3	1	2	2	1	1	1	3	2	3	3	2	3	3	1	2	2	3	3
32 Pilot	2	3	2	2	3	2	2	3	2	2	2	3	2	2	3	2	2	3	3	2	3	3	3	3	3	2	2	2	3	3
33 Air Traffic Controller	2	3	1	2	3	2	2	3	2	1	2	3	1	2	3	2	2	3	3	3	1	1	3	3	2	2	2	3	2	3
64 Air Weapons Controller	2	3	1	2	3	2	4	3	2	2	2	3	1	2	3	2	2	3	3	2	3	3	3	3	3	2	2	2	3	3
71 Maritime Surface and Subsurface	3	3	2	2	3	2	2	3	2	2	2	3	2	3	3	2	2	2	3	3	3	3	3	3	3	3	2	3	3	3
44 Maritime Engineer	3	3	3	1	3	3	1	3	2	2	3	4	3	4	4	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4
41 Aerospace Engineer	2	4	1	1	3	3	2	5	2	3	4	5	3	5	5	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5
42 Communications and Electronic Engineer	2	3	1	1	3	2	3	2	1	1	2	4	1	3	4	1	2	3	5	5	5	5	5	5	5	3	4	5	5	4
43 Land Ordnance Engineer	4	4	3	1	3	2	1	3	2	2	3	4	3	4	4	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5
45 Military Engineer	5	1	4	2	3	3	2	3	3	3	3	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5
69 Logistics	5	5	3	5	4	3	5	5	5	4	5	3	2	3	5	3	4	5	2	1	3	4	3	3	3	3	2	3	1	1
81 Security	3	3	2	2	3	3	3	3	2	2	2	3	2	3	3	2	2	3	3	3	2	2	3	3	2	3	2	2	2	3
68 Personnel Administration	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	2	3	3	3	3	3	3	2	2	1	1

LEGEND

Code

1 — Preferred
2 — Desirable
3 — Acceptable
4 — Unacceptable (1)
5 — Unacceptable
* — Offered at CMC's

Figure 3 Classifications and Course Patterns for ROTP

(1) Code 4 indicates that the degree program by itself is unacceptable. However, if a candidate has previous work experience and/or training related to the specifications of the classification, the degree program may be acceptable.