Collège militaire royal de Saint-Jean

Calendar 1993-95

Canadian Military College

Saint-Jean-sur-Richelieu

Québec, Canada

COLLEGE MILITAIRE ROYAL DE SAINT-JEAN

ACADEMIC YEAR 1993-1994

First Term

August 30	Classes start
September 6	Labour Day Holiday
October 2	Fall Prize Giving Ceremonies
October 11	Thanksgiving Holiday
October 12 - 22	Mid-term exams
November 11	Remembrance Day Holiday
December 7	Classes end
December 8	Exams start
December 18	Exams end
December 22 - 23	Supplemental exams
December 23 - January 3	Christmas Leave

Second Term

January 4	Students return
January 5	Classes start
February 14 - 25	Mid-term exams
February 26 - March 6	Reading Week
April 1 - 4	Easter Holiday
April 22	Classes end
April 25	Exams start
May 5	Exams end
May 10 - 11	Supplemental exams for 4th year
May 13 - 14	End of Year Ceremonies
May 16 - 17	Supplemental exams for remaining years

ACADEMIC YEAR 1994-1995

calendar of activities during the 1994-95 academic year will be similar to the one for 1993-94.

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GENERAL INFORMATION

The Canadian Military Colleges

There are three Military Colleges (CMC's) in Canada:

- the Collège militaire royal de Saint-Jean (CMR) in Saint-Jean-sur-Richelieu, Québec;
- the Royal Military College of Canada (RMC) in Kingston, Ontario; and
- the Royal Roads Military College (RRMC) in Victoria, British Columbia.

Role and Objectives

The role and objectives of the Canadian Military Colleges are to prepare candidates for effective service as commissioned officers in the Canadian Forces by

a. providing a university-level education in appropriate disciplines designed on a broad base to meet the needs of the Forces,

b. developing leadership qualities,

c. developing the ability to communicate in both official languages and an understanding of the principles of biculturalism,

d. developing a high standard of personal fitness,

e. stimulating an awareness of the ethics of the military profession.

Furthermore, the CMC's provide an opportunity for officers in the Canadian Forces to improve their academic background by following undergraduate and postgraduate courses in appropriate fields.

Chancellor

The Minister of National Defence is the Chancellor of each Canadian Military College. The appointed Commandant of each College acts as Vice-Chancellor.

The Minister is assisted by the Canadian Military Colleges Advisory Board whose function is to advise the Minister and submit proposals on all aspects concerning the CMC's. Furthermore, the Board, at the request of the Minister or of its president, can undertake various studies or projets related to the Colleges.

The Advisory Board is made up of representatives from the provinces and of representatives from former officer-cadets. The listing of the present members of the Advisory Board is given on page 111.

Le Collège militaire royal de Saint-Jean (CMR)

History and Location

CMR is located on the west bank of the Richelieu River on the southern edge of the town of Saint-Jean in Québec's Richelieu Valley. The original buildings, still in use at CMR, were built between 1836 and 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

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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.** CMR obtained its own University charter in June 1985.

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 Mid-May to Mid-August, from 09:30 to 16:30 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 from 1666 to 1672 and 1748 to 1760; two dealing with the English Fort Saint-Jean from 1760 to 1775 and 1776 to 1839; one depicting the Canadian Fort from 1839 to 1952; and the last one dealing with the Collège militaire royal de Saint-Jean, from 1952 to the present.

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Organizational Structure

The Collège militaire royal de Saint-Jean is not a *civilian* university; nor is it an *ordinary* military establishment. It is both a real university and a real military establishment. On one hand, it has a Principal, Deans, Heads of department, technicians and students; it also has classrooms, conference rooms, laboratories, a gymnasium and sports facilities. On the other hand, being a military establishment, it has its own military structure headed by a Brigadier-General as commandant with numerous officers, officer-cadets and NCO's under him as well as many civilian employees.

To meet its objectives, the college structure is composed of a Military Wing, an Academic Wing and an Administrative Wing.

Military Wing

The Military Wing, under the direction of the Director of Cadets, is responsible for all programs other than academics, such as the conduct and discipline of cadets, their well being, their military, physical and sports training, as well as their orientation and career. To help him out in his duties, the Director of Cadets is supported by three staff officers, a director of athletics and sports and seven officers commanding the squadrons in which the cadets are organized, as well as advising the Director of Cadets.

Many NCO's also play an important part in the military training of cadets and in the athletics and sports programme. The success of the parades, which always attract much interest, results from the detailed attention that the Regimental Sergeant-Major and his aides bring to their work. (See page 113)

Academic Wing

The Principal, aided by four Deans, heads the Academic Wing. It is comprised of two faculties, the Faculty of Science and Engineering and the Faculty of Administrative Sciences and Humanities; each faculty is comprised of several departments and is responsible for university courses. Furthermore there is an important division that is responsible for collegiate studies; it is also headed by a Dean who is further responsible for other academic supports such as the library, the computer center and the pedagogical service unit. Finally there is a Dean who is responsible for research and post graduate studies. (see page 112)

College Senate

The Senate is composed of the Chancellor, the Minister of National Defence, the Vice-Chancellor, 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 university degrees, diplomas and certificates to members of the Canadian Forces, as well as honourary degrees.

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 faculties as members. The function of the Council is to look after all academic matters, to foster and encourage research activities in order to sustain academic excellence (Research with a Defence focus is encouraged), and to make recommendations to the Commandant for promoting the interests of the College.

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 Faculty members,

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the Assistant Registrar, the Pedagogical Counsellor, the Academic Administration Officer, the Communications Officer, the Librarians and the officers of the Military Wing.
The function of the Faculty Board is to supervise the academic performance of the officer-cadets and to make recommendations to the Commandant through the Faculty Council on examination results, honours standing, failure, cadet appointments, and on ways to promote the interests of the College.

Library

The College library is an essential part of the educational program of CMR. The collection, consisting of over 150,000 volumes and 800 current periodicals, has been chosen to support the teaching and research programs and the general information 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 the teaching staff in providing students with individual and group instruction in library use to ensure that students develop competence in information-gathering.

The computer is used to improve the efficiency of many library services: the library's catalogue is computerized and can be consulted from any one of the many computer terminals located throughout the campus; other large bibliographic data bases can be searched 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 1200 hours and 1300 to 1630 hours.

Computer Service Center (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 operates the College's centralized and shared computing resources. These include a few mini-computers on which are stored the Student Records System and the Library Catalogue, ten Banyan Vines servers providing the office automation tools and teaching application software for some 400 micro-computers spread throughout the campus, a complex communication network providing access to all computing resources from any workstation, a completely integrated electronic mail system as well as links to the Datapac and RISQ networks.

Support and maintenance of the College's administrative applications is provided by the Application Development and Programming Section. Oracle and Ares database applications are supported as well as the Pascal, Fortran, C, C++ and Ada programming languages. Several program libraries are available for simulation (SLAM, Symscript), numerical analysis (NAG, CPLEX), statistics (SPSS, SAS) and graphical applications.

Computing Services operates a network of 45 HP/Apollo workstations. These graphical workstations support the Autotrol CAD/CAM software, and the ART, Lisp and Prolog environment for developing Artificial Intelligence and other scientific applications. This network, distributed into four laboratories, is equipped with laser printers in each laboratory, with colour plotters, and with a high resolution colour projector for use in support of the CAD courses. These powerful workstations provide a sophisticated environment and state of the art tools for the science and engineering students and researchers.

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Two micro-computer laboratories, equipped with IBM compatible computers on a local area network are available to students twenty four hours a day, seven days a week. Office automation software, such as WordPerfect, Lotus 1-2-3, DBase IV, Paradox, Quattro, Harvard Graphics, are available on the file servers of these laboratories as well as numerous educational software packages. These two laboratories double as classrooms for certain courses involving computers. To this end, each is equipped with an additional instructor station which is tied in to a large screen colour projector.

Assistance to the users and equipment maintenance and repair is provided by the Client Services Section.

A Graphic Arts and Electronic Publishing Section provides document and brochure preparation, graphic arts production, drawing and illustrations as well as a consultation service in publishing and graphics. This section also supports the Pedagogical Service. 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 comprise 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 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 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, 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.

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Administrative Wing

As its name implies, the Administrative Wing provides the administrative support to the College. The Director of Administration is responsible for this Wing (see page 114) specifically for the following services:

- Personnel administration (military and civilian)
- Logistics;
- Chaplains;
- Medical and dental services;
- Mail;
- Supply;
- Accounting;
- Food services;
- Public relations;
- Maintenance;
- Engineering and construction; and
- Security.

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Programme of Study

The Canadian Military College (CMC) programme is designed to educate selected candidates to the baccalaureate level in either Computer Science, Space 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. For further details, please refer to the "Study Programmes" section of the calendar.

Course Duration

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

Second Language Training

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

Second language proficiency is a degree requirement for officer cadets.

Proficiency Evaluation

Upon entry, Preparatory students are given linguistic proficiency tests to determine their second language proficiency in each of four skills: listening comprehension, oral expression, reading comprehension, and written expression.

These proficiency tests 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.

Exemption Level

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 "exemption" bilingualism level. The exemption level is defined as scores of at least 4 in listening and speaking, and 3 in reading and writing (eg. 4 4 3 3). After Preparatory Year, students who attain the exemption level are no longer required to take second language training. First Year students who do not achieve the exemption level by the end of the academic year will take an intensive summer course (ten weeks - 225 hours approximately).

Proficiency Level

The Second Language Centre must administer second language tests after each training period so as to have an annual update of each officer cadet's second language profile and the progress made.

The minimum language profile degree requirement (which is under review) has been established at 2 2 2 2. 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 exemption level.

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

Exemption - 4 4 3 3 - Scores of at least 4 in listening and speaking and 3 in reading and writing.

Functional - 3 3 3 3 -Scores of 3 in listening, speaking, reading, and writing.

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Minimal - 2 2 2 2 - Scores of 2 in listening, speaking, reading and writing.

Second Language Teaching

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.

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. In Second, Third and Fourth Years, however, second language courses are non-credit courses. Students who have not attained the exemption level by Fourth Year, will be given second language tests to determine bilingual profiles before graduation.

Practical Application

To increase exposure to the second language and to underline the bilingual character of CMR, all activities except academic courses are conducted in both official languages. 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 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 practise and become experienced in the techniques of leadership and personnel 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.

Military Leadership studies

Courses in Military Leadership and Management are integrated into 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.

The Rank of Officer Cadet

Students will be enrolled 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 instructions which students will be expected to interpret intelligently and observe by means of self-discipline.

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Upon graduation, officer cadets will immediately be promoted to the commissioned rank of second lieutenant.

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.

Initial Training

Entry of First Year candidates into the three CMC's and also of Preparatory year candidates into CMR 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. Candidates will attend BOTC in Chilliwack, B.C.

Furthermore, upon arrival at the Military College, officer cadets will undergo a ten-day orientation course designed to familiarize them with the daily routine at the College.

Summer Training

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 classification. During the summer term normal pay and allowances will be received. This term is of approximately nine-week duration but varies according to military classification. Annual leave is normally granted upon completion of this training and 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 representative teams, and recreation activities.

Physical Education Classes

Physical education classes are compulsory and are conducted in one 90 minute period each 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 are taught how to play by qualified instructors. Equipment and facilities which often are not available at civilian universities are used at CMR. Intramural sports are also part of the physical conditioning aspect of student life at a CMC.

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Intercollegiate Sports and Representative Teams

Many popular Canadian sports are played at the intercollegiate level. These include team sports such as football, soccer, broomball, hockey, water polo, volleyball and basketball, and individual sports such as tae kwon do, biathlon, triathlon, alpine skiing 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. 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
0645 - 0800 hours	Breakfast
0800 - 1605 hours	Classes
1130 - 1215 hours	Lunch (First Sitting)
1230 - 1315 hours	Lunch (Second Sitting)
1630 - 1830 hours	Sports (Mon-Tue-Thu-Fri) Cultural activities and sports clubs (Wed)
1830 - 1945 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 semester. 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.

Leave privileges

A cadet's privilege for leave during the weekend or in the evening is related to his seniority; Preparatory year Cadets have restricted leave privileges while those in fourth year enjoy much more freedom. These restrictions do not apply to the UTPNCM.

Cadets also enjoy leave at Christmas time to a maximum of two weeks. There is a study week in March and statutory holidays are observed.

Cultural 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.

A large number of clubs provide outlets for students' special interests, such as: social dance, flying, astronomy and photography. Among other organizations are the Music Club and the Entertainment Committee (for dances and other activities).The production of a monthly newspaper and of the college year book provide 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.

Sports Clubs

Sports clubs are organized for those officer cadets interested in parachuting or scuba diving, mountaineering, and aeronautics. Opportunities are also provided for students to skate, play tennis, and sail. The reading rooms and libraries provide further 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' mess which provides facilities for relaxation as well as for introducing the cadets 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.

Ex-Cadet Clubs

All those who have attended a Canadian Military College are eligible to become members of either the CMR Ex-Cadet Club or the RMC Club of Canada. As a member of these Clubs, one can retain a valuable connection with the colleges. In addition, no matter where duties and responsibilities take fellow classmates later on, their paths will cross many times, thereby enabling them to renew the friendships they have made at the College.

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Plans Available

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 enrolled 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 throughout 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 are awarded a degree from a Canadian Military College and a commission as an officer, beginning a career in the Canadian Forces.

Obligatory Service

An officer cadet who started subsidized academic training under the ROTP in a Preparatory or First Year baccalaureate programme at a CMC may apply for release before the beginning the next academic year without service or financial obligation on his part. Such release requests are normally considered at only 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 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 unforeseen 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 sponsorship at a

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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 places 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. Those who elect to remain a Reserve entry officer cadet are 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. $762 each term for tuition, clothing, books, instruments, drawing materials and incidental expenses;

b. approximately $1060 per term to defray the cost of meals and accommodation;

c. an annual Recreation Club Fee of $90, including $24 for the Recreation Association.

NOTE - All fees quoted are revised periodically and current costs should be obtained from the nearest Recruiting Centre. Furthermore, accomodation fees will depend on the number of occupants per room.

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 are selected to attend a Canadian Military College (CMC) or a civilian university in Canada , in accordance with the policy and procedures set forth in CFAO 9-13

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.

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

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plan will not be used to train officers for a second baccalaureate or higher degree.

Candidates are selected 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).

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.
Candidates are selected in accordance with the rules and procedures set forth in CFAO 9-13, Postgraduate Training programmes - Regular force and Primary Reserve.

CMR presently offers postgraduate study programmes leading to an M.Sc. in Operational Research and in Software Engineering. These programmes and the postgraduate studies rules and regulations are published in a separate brochure which can be obtained from the CMR Registar's office.

Additional Information

Complete information on the above mentioned training plans can be obtained from the Director of Recruiting and Selection, National Defence Headquarters, Ottawa, Ontario, KlA OK2 or from any Canadian Forces Recruiting units listed in the yellow pages under "Recruiting". The Registrar of a Canadian Military College can provide more detailed information on the Academic Programmes of that college 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 VOS 1B0
Tel. 604-380-4514

Financial Support

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

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

At CMR, the Academic Administration Officer is responsible for coordinating financial support and should be contacted for further information.

Canada Scholarships

The federal government's Canada Scholarships Program awards over 2,500 scholarships annually to students entering undergraduate studies in selected Natural Sciences, Engineering and related disciplines. The scholarship can be worth up to $8,000 received as $2,000 annually over four years. Furthermore, outstanding Canada Scholars in their third and fourth years of study in certain disciplines may also be recommended by their faculty to receive an additional award sponsored by the corporate sector. For more information, contact the guidance counsellor, university awards office of the institution attended at present, or:

The Canada Scholarships Program
Awards Division
Association of Universities and Colleges of Canada
151 Slater Street
Ottawa, Ontario
K1P 5N1
Tel.: (613) 563-1236

ADMISSION PLANS

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 awarding the scholarships, the principle of scholastic excellence will be observed. 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.

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

ADMISSION PLANS

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 singular 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 residents. 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.

ADMISSION REQUIREMENTS

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. meet the medical standards for enrolment as prescribed;

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

e. possess the necessary academic qualifications.

Note concerning marital status. It should be noted the ROTP/RETP programmes require a student to devote all his time to his work, 24 hours a day. Nevertheless, married candidates and those with dependants may apply, but they should be advised with great care as to the life and training at CMR.

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 a career as a member of the Canadian Forces will be cause for rejection. Candidates 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 the nearest Canadian Forces Recruiting Centre.

Admission Procedure

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

Application Date

Application should be made as early as possible in the final year of high school or CEGEP I (or equivalent), preferably before March 1st of the year in which admission is desired. The 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 the application.

If applying for admission to a Canadian Military College, it is recommended to submit an application to other universities or colleges in addition so as not to be denied the opportunity of continuing to university or college in the event that the application to a Canadian Military College is not accepted . However, evidence of admission to a Canadian university or college is not required for consideration for a place at a CMC.

Choice of a Military Career

Candidate for the ROTP or RETP will need to consider carefully the classification area in which they intend to pursue their career. In the Canadian Forces, the classification areas are divided broadly into "Functional Groups" which are then subdivided into "Military Classifications". The Career Counsellor at the CFRC will be able to provide detailed information about these classification areas. The following points should be kept in mind:

ADMISSION REQUIREMENTS

a. First, second, and third choices of Functional Group must be made with the application. The usual ones are Sea, Land or Air Operations, Engineering, or Support.

b. Certain military officer classifications may require a specific degree course pattern. For example, all Engineering military classifications require completion of a Science or Engineering degree. For most Operational military classifications, any degree pattern may be followed. The Career Counsellor will be able to provide more information regarding the various alternatives.

c. Applicants for the Air Operations functional group will be expected to take some extra time to undergo additional selection procedures to determine suitability for this group

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

There are officers at each of the three CMC's whose responsibility it is to counsel cadets on their military career. These officers, representing the afore-mentioned functional groups, are available at all times to answer questions concerning the military and to counsel cadets on their career in the Canadian Forces.

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. Canadian applicants not residing in the city in which the CRFC is located will normally be reimbursed for normal travelling expenses from their place of residence to the CFRC and return, and for their living expenses while at the CFRC.

Candidates will be advised shortly after their interview as to the status of their application. They will be considered for admission to the Military College of their first choice, provided there is a vacancy at that college and that they meet the appropriate minimum admission requirements. Otherwise, they 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 basis of merit; 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. The candidate's choice of military career will also be taken into account

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, 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.

Academic Requirements

Admission in Preparatory Year - Required Subjects

In general, a candidate who has completed Secondary V in Quebec or the equivalent High School programme elsewhere may be accepted in preparatory year. This academic year is pre-university level and is the equivalent to the first year of the collegiate studies (CEGEP I). (Please see page 29 for further explanation)

C M R

ADMISSION REQUIREMENTS

A candidate may enter the Science and Engineering stream or the Arts Stream.

Science and Engineering Programme	Arts Programme
Newfoundland and Labrador	
Math 3201	Math 3201
Phys 3204	or
Chemistry 3202	Math 3203
English or Français (mother tongue)	English or Français (mother tongue)
Nova Scotia	
Math 441	Math 441
Phys 441	English or Français (mother tongue)
Chemistry 441	
English or Français (mother tongue)	
Prince Edward Island	
Math 621	Math 621
Phys 621	English or Français (mother tongue)
Chemistry 611	
English or Français (mother tongue)	
New Brunswick	
Math IV (3041)	Math IV (3041)
or	or
Math 121 or 122	Math 121 or 122
Phys 112 or 5121	English or Français (mother tongue)
Chemistry 121	
English or Français (mother tongue)	
Québec	
Math 536	Math 536
Phys 534	English or Français (mother tongue)
Chemistry 534	
English or Français (mother tongue) Note 3	Note 4
Ontario	
Math 4A	Math 4A
Phys 4A	English or Français (mother tongue)
Chemistry 3A	
English or Français (mother tongue)	
Saskatchewan	
Alg/Trig 30	Math 30
Phys 20	English or Français (mother tongue)
Chemistry 30	
English or Français (mother tongue)	
Alberta/NWT	
Math 30	Math 30
Phys 20	English or Français (mother tongue)
Chemistry 30	
English or Français (mother tongue)	
B.C./Yukon	
Math 30	Math 12
Phys 11	English or Français (mother tongue)
Chemistry 12	
English or Français (mother tongue)	

Notes:

1. Candidates who were unable to take all the required courses but who have obtained very good marks may be considered.

2. All courses at CMR are offered both in English and in French.

ADMISSION REQUIREMENTS

3. It is better to have taken Math 536, but Math 532 and Math 528 are also accepted. In Physics and Chemistry, if a candidate has followed a program previous to Phys 534 and Chemistry 534, the following combined courses are accepted. Chemistry grade IV and Physics grade IV and, Chemistry grade V or Physics grade V. The basic rule was that a candidate must have taken with success a full year course in each subject matter, Physical Sciences 436 not being considered a full year course in either subject.

4. Math 536 is preferred, but Math 532, 522 and 528 are also accepted, but not Math 512 and 514.

Admission in First Year - Required Subjects

The academic requirements for admission into first year at CMR are as follows:

Science and Engineering
Programme

Québec CEGEP I programme,
or
A University preparatory year
including the following compulsory courses:

two Mathematics courses among:
- Math 201-103 or equivalent (Calculus I)
- Math 201-105 or equivalent (Linear Algebra)
- or
- Math 201-203 or equivalent (Calculus II)
- Note 1, 3

one Physics course:
- Phys 203-101 or equivalent (Mechanics)

one Chemistry course:
- Chm 202-101 or equivalent (General Chemistry)

Arts
Programme

Quebec CEGEP I programme,
or
a University preparatory year,
including two Mathematics courses:
- Math 201-103 or equivalent (Calculus I)
- Math 201-105 or equivalent (Linear Algebra)

Note 2,3

Notes

1. Candidates are strongly advised to also take Math 201-101 (Introduction to Applied Mathematics) if it is available at their school.

2. Math 201-103 is required, while candidates are strongly advised to take Math 201-105; if the latter has not been taken with success before arriving at CMR, candidates will have to take it in addition to the normal First year programme.

3. Candidates who were unable to take all the required courses but who have obtained very good marks may be considered.

Part-time Students

Students who meet the general admission criteria or who were admitted to another university may be admitted to 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 to CMR as mature students.

ADMISSION REQUIREMENTS

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 to CMR as special students upon review of their academic record.

ACADEMIC PROGRAMMES

Collegiate and University Studies

Le Collège militaire royal de Saint-Jean is both a collegiate level and a university level institution. It normally accepts students who have completed their high school and wish to become officers in the Canadian Forces while enjoying a solid education consisting of two years of collegiate studies and three of university studies.

Canadian Education Systems Equivalences

The structure of the programmes of study at CMR follows the structure of the Quebec education system. On the other hand, the programmes at CMR must also be compatible with other Canadian universities, including RMC and RRMC. It is important to realize that after one year of collegiate studies, the student has the equivalent of a senior matriculation (university entry), and after two complete years of collegiate studies, he has reached a level equivalent to the end of first year in a Canadian university outside Quebec. To eliminate all ambiguity, the equivalence between the different years at university level for the various education systems are given below.

Quebec Education System	CMR	Other Canadian Universities
CEGEP I	Preparatory	———
CEGEP II	First Year	First Year
Univ I	Second Year	Second Year
Univ II	Third Year	Third Year
Univ III	Fourth Year	Fourth Year

Distribution of Workload

Beside the name of each course in the course description, 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.

This is the basis for establishing the number of units at the collegiate level and the number of credits at the university level.

Collegiate Studies

The main objective of collegiate studies is to further the personal development of the student through the acquisition of a variety of knowledge, the development of an analytical approach of work and also of an intellectual maturity required to undertake university studies. During this period, the students learn to analyze, to question and to react in an imaginative and creative way.

CMR is particularly well equipped to help students during the collegiate studies; the experience and knowledge of the professors are especially noteworthy since they also teach at the university level and must do research. Furthermore they remain constantly available to the students, who also enjoy a large, modern and well qualified technical support.

CMR offers two programmes of study at the collegiate level: Science and Engineering, and Arts.

Students who have been successful in all courses of their particular programme are granted a collegiate studies certification. This is to underline their work, their success, and their promotion to university studies.

The list of courses making up each of these two programmes follows.

COLLEGIATE STUDIES

Science and Engineering

Preparatory		Units
201-101	Introduction to Applied Mathematics	1.66
201-103	Differential and Integral Calculus	4.00
201-105	Linear Algebra	4.00
202-201	General Chemistry	2.66
203-101	Mechanics	2.33
303-915	Contemporary History	2.00
303-920	Introduction to Economics I	2.00
603-108	English Literature	2.00
603-164	English Literature	2.00
_____	Second Language	4.00
_____	Physical Education	
Tutorial Classes		
_____	Mathematics, chemistry, physics	
603-107	Effective Writing	2.00
		26.66
First Year		
201-203	Differential and Integral Calculus II	2.00
201-303	Differential and Integral Calculus III	2.66
201-408	Computer Programming and Numerical Methods	2.00
202-201	Chemistry of Solutions	2.66
203-201	Electricity	2.33
203-301	Waves and Optics	2.33
203-902	Experimental Physics	3.00
203-909	Mechanics and Waves	1.66
340-225	Political and Social Philosophy	2.00
350-101	Introduction to Psychology	2.00
420-920	Introduction to Computer Programming	2.00
603-305	English Literature	2.00
603-404	English Literature	2.00
_____	Second Language	4.00
_____	Physical Education	
		32.66
	Total	59.33

Arts

Preparatory		Units
201-102	Introduction to Applied Mathematics	2.66
201-115	Linear Algebra	2.66
202-901	Development and the Environment	2.00
203-990	Principles of Physics	2.00
300-300	Introduction to Methodology	2.00
320-901	Economic Geography of Canada	2.00
330-915	Contemporary History	2.00
383-920	Introduction to Economics I	2.00
420-900	Introduction to Computer Science of the Social Sciences	2.00
603-108	English Literature	2.00
603-160	English Literature	2.00
_____	Second Language	4.00
_____	Physical Education	
Tutorial Classes		
_____	Mathematics	
603-107	Effective Writing	2.00
		27.33
First Year		
201-113	Differential and Integral Calculus I	2.66
201-213	Differential and Integral Calculus II	2.66
203-927	Physics Sciences	2.00
330-925	Canadian History	2.00
330-983	Decolonization and Problems of the Third World	2.00
340-225	Political and Social Philosophy	2.00
350-101	Introduction to Psychology	2.00
350-951	Human Development	2.00
383-921	Introduction to Economics II	2.00
410-102	Topics in Administration	2.00
603-305	English Literature	2.00
603-404	English Literature	2.00
_____	Second Language	4.00
_____	Physical Education	
		29.33
	Total	56.66

UNIVERSITY STUDIES

University Studies

The objective of CMR is to reach the highest possible level of excellence in all research activities and in all academic programmes whether in Engineering, Science, Administration, Social Sciences or Military and Strategic Studies.

Firstly CMR tries to provide the Engineering programmes at RMC with top quality candidates. Normally, students choosing these programs will complete their Preparatory, First and Second Year at CMR before transferring to RMC for the remainder of their studies. Secondly the Faculty of Science and Engineering and the Faculty of Administration and Humanities at CMR offer complete programmes that fully satisfy today requirements of the Canadian Forces.

General Admission Requirements

Normally, to be admitted to the university level studies, students must have successfully completed Preparatory and First Year (Collegiate Studies) in Science and Engineering for those intending to proceed in Science or Engineering, and in Arts for those proceeding to Administration, Social Sciences and Military and Strategic Studies. It is possible for a student who has completed Science and Engineering at the collegiate level to change to Administration, Social Sciences or Military and Strategic Studies on entering university; on the other hand, a student who has taken Arts at the collegiate level may not change to Science or Engineering on entering university since he would lack the prerequisites in Science.

Additional admission requirements may apply on entering Third Year particularly in Science programmes. These requirements are detailed in the course outlines of the various programmes.

Programmes available

The following programmes of study are available at CMR both in English and in French.

Engineering
CMR offers up to and including Second Year university in Engineering. Those students who undertake this programme will normally transfer to RMC to complete their studies.

Computer Science (B.Sc.)
- System Concentration
- Operational Research Concentration
- Management Concentration

Physics (B.Sc.)
- Physics
- Applied Physics

Space Science (B.Sc.)

General Science (B.Sc.)

Administration (B.Adm.)
- Honours
- Major in Administration, Minor in Psychology

Social Sciences (B.A.)
- General
- Major in Social Sciences, Minor in Psychology
- Major in Social Sciences, Minor in Administration

Military and Strategic Studies (B.A.)
- Honours
- General
- Major in Military and Strategic Studies, Minor in Psychology

ENGINEERING

Engineering

The detailed programme of Second Year Engineering at CMR follows below. Successful students in this programme may continue their studies at RMC in the following programmes:

- Fuels and Materials Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Management Engineering
- Physical Engineering
- Mechanical Engineering

Requirements for admission into Third Year of any of these programmes at RMC can be found in this calendar under "Inter-CMC Transfers".

This programme should also be taken by students intending to go into Honors Science at RMC or Honors Physics and Physics and Oceanography at RRMC. In some cases, students who wish to proceed in Science at CMR may also take this programme.

Second Year			Credits
ING	210	Engineering Graphics I	3
ING	220	Engineering Graphics II	3
ING	230	Strength of Material	3
MAT	212	Linear Algebra	3
MAT	221	Differential and Integral Calculus IV	3
MAT	222	Differential and Integral Calculus V	3
MAT	223	Differential and Integral Calculus VI (1)	3
MAT	251	Probability and Statistics	3
PHY	211	Dynamics	2
PHY	231	Waves and Particles	3
PHY	222	Electromagnetism	3
PHY	262	Introduction to Quantum Physics	2
PHY	291/292	Experimental Physics	2
CHM	241	Physical Chemistry I	3
CHM	242	Physical Chemistry II	3
PSY	221	Social Psychology	3
ENG	211	Utopian Literature	2
			47 cr.

Note: (1) Optional Course - MAT 223 is recommended for admission into Honours Mathematical Physics at RMC.

COMPUTER SCIENCE (B.Sc.)

Computer Science (B.Sc.)

Computer Science occupies an ever more important place in almost every sector of human activity. The aim of the programme is to meet the growing demand for experts in Computer science within the Canadian Forces:

a. Systems. This concentration is designed to enable the students to acquire an adequate knowledge of computer hardware and software so that they may work in a computerized environment. This concentration totalizes 94 credits.

b. Management. This concentration is designed to enable the student to acquire a thorough understanding of modern management methods and to put the computer to use in the service of management. The programme is centered on quantitative methods where the computer plays an essential role. This concentration totalizes 93 credits.

c. Operational Research. Operational Research (O.R.) is the study of scientific approaches to decision-making. This programme initiates students to scientific methods of decision-making and introduces them to the use of such methods in the areas of economics, management, industry, business, transportation, and in the solution of problems of logistics and tactics encountered in the different Canadian Forces officer classifications. This concentration totalizes 96 credits.

The lists of courses making up each of these three programmes are found hereafter.

Entry Requirements

Applicants must have taken MAT 212 and MAT 251 or the equivalent, and satisfy the specific requirements below. Candidates for the System Concentration must have obtained a 60 percent general average in Second Year. Candidates for the management and Operational Research Concentrations must have obtained a 55 percent general average in Second Year.

Second Year			Credits
INF	352	Structured Programming	3
INF	361	Computer Organization	2
INF	442	Data Structure	3
MAT	212	Linear Algebra	3
MAT	221	Differential and Integral Calculus IV	3
MAT	222	Differential and Integral Calculus V	3
MAT	251	Probability and Statistics	3
PHY	291	Experimental Physics	1
PHY	426	Logic Circuit Design	
PHY	427	Microprocessor System Design	
PSY	221	Social Psychology	3
ENG	211	Utopian Literature	2
			32 cr.

COMPUTER SCIENCE (B.Sc.)

Third Year

Core courses			Credits
INF	362	Real-time Systems and Interfaces	3
INF	461	Operating Systems	3
PSY	322	Organizational Psychology	3
SCH	220	Canadian History	3
			12 cr.

Concentration: Systems

INF	363	Structural System Analysis	3
INF	341	Algorithms	3
INF	443	Data Base Management	3
MAT	461	Numerical Analysis	3
PHY	323	Electronics and Instrumentation	4
MAT	329	Mathematics of Signal Analysis	3
			19 cr.

Concentration: Management

INF	363	Structured System Analysis	3
INF	443	Data Base Management	3
MAT	351	Mathematical Statistics I	3
ADM	231	Accounting I	3
ADM	314	Operations Management	3
ADM	332	Management Accounting I	3
			18 cr.

Concentration: Operations Research

INF	341	Algorithms	3
MAT	328	Analysis I	3
MAT	471	Operations Research	3
MAT	475	System Simulation	3
MAT	329	Mathematics of Signal Analysis	3
MAT	351	Mathematical Statistics I	3
MAT	421	Graphs and Network	3
			21 cr.

Fourth Year

Core Courses			Credits
INF	493	Project	4
PSY	422	Behaviour in a Military Setting	3
			7 cr

Concentration: Systems

INF	371	Data Communications	3
INF	441	Compiler Construction	3
INF	462	Computer Architecture	3
INF	471	Computer Graphics	3
MAT	463	Automata and Formal Languages	3
MAT	475	Systems Simulation	3
PHY	334	Satellite Communications	3
One Elective Course			3
INF	421	Introduction to Software Engineering	
INF	432	Foundations of Computer Science	
			24 cr.

Concentration: Management

INF	451	Office Automation	3
INF	471	Computer Science	3
MAT	461	Numerical Analysis	3
MAT	471	Operations Research	3
MAT	475	System Simulation	3
ADM	331	Finance	3
ADM	435	Logistics Management	3
ADM	470	Project Management	3
			24 cr.

Concentration: Operational Research

INF	432	Foundations of Computer Science	3
MAT	330	Methods of Optimization	3
MAT	413	Codes	3
MAT	461	Numerical Analysis	3
MAT	463	Automata and Formal Languages	3
Three Elective Courses			9

This choice of courses must be authorized by the programme Coordinator.

24 cr.

PHYSICS (B.Sc.)

Physics (B.Sc.)

Science is made up of concepts representing our observations of the world we live in, which we attempt to arrange in some order so as to improve our understanding of our surroundings. Physics is that branch of science which studies matter and energy in their different forms and how they interact. In following a Physics programme, students learn experimental techniques and how to interpret natural phenomena. With an emphasis on measurement and mathematical description, they develop skills in constructing models and solving problems. These skills will enable the students to cope with problems in whatever field of endeavour they may find themselves in the future.

a. Physics. This option provides versatility by combining, in a balanced way, studies of fundamental concepts, experimental methods, and technology. This prepares the student to master future developments in technology. Students will be able to specialize in Physics and proceed to Graduate Studies. This option totalizes 96 credits.

b. Applied Physics. This option offers a combination of technology and computer sciences. The student will acquire the skills needed to work in an advanced technological environment in highly diversified fields. This option totalizes 94 credits.

The lists of courses in each of these programmes will be found hereafter.

Entry Requirements

Candidates must have taken MAT 212 and MAT 251 (or the equivalent) and satisfy the specific requirements below. Candidates for B.Sc. Physics must normally have obtained in Second Year a minimum combined average of 60 percent in Mathematics and Physics. Candidates for B.Sc. Applied Physics must have obtained in Second Year a minimum combined average of 55 percent in Mathematics and Physics.

Second Year			Credits
PHY	211	Dynamics	2
PHY	222	Electromagnetism	3
PHY	231	Vibrations and Fluids Mechanics	3
PHY	262	Introduction to Quantum Physics	2
PHY	291/292	Experimental Physics	2
CHM	241	Physical Chemistry I	3
CHM	242	Physical Chemistry II	3
MAT	212	Linear Algebra	3
MAT	221	Differential and Integral Calculus IV	3
MAT	222	Differential and Integral Calculus V	3
MAT	251	Probability and Statistics	3
PSY	221	Social Psychology	3
ENG	211	Utopian Literature	2
Optional Courses			
ING	210	Engineering Graphics I	
ING	230	Strength of Material	
			35 cr.

PHYSICS (B.Sc.)

Third Year — Credits

Core courses

PHY	322	Electromagnetic Waves and Applications	3
MAT	322	Mathematical Methods of Physics I	3
MAT	329	Mathematics of Signal Analysis	3
PSY	322	Organizational Psychology	3
SCH	220	Canadian History	3

15 cr.

Option: Psysics

PHY	311	Classical Mechanics	3
PHY	316	Mechanics of Fluids	3
PHY	323	Electronics and Instrumentation	4
PHY	341	Statistical Physics	3
PHY	473	Solid State Physics	4

Optional Courses

PHY	345	Space Science	
PHY	350	Space Systems	
PHY	426	Logic Circuit Design	
PHY	427	Microprocessor System Design	
ADM	470	Project Management	
MAT	461	Numerical Analysis	

17 cr.

Option: Applied Physics

PHY	426	Logic Circuit Design	3
PHY	427	Microprocessor System Design	3
INF	360	Real-Time Systems Application	3

One Elective Course — 3

PHY	341	Statistical Physics
PHY	345	Spaee Science
MAT	461	Numerical Analysis

One Elective Course — 3

PHY	350	Space Systems
PHY	473	Solid State Physics
MAT	422	Mathematical Methods of Physics II
ADM	470	Project Management

15 cr.

Fourth Year — Credits

Core Courses

PHY	493/494	Physics Project	4
PSY	422	Behaviour in a Military Setting	3

7 cr.

Option: Physics

PHY	361	Atomic and Nuclear Physics	4
PHY	411	Spacecraft Dynamics and Control	3
PHY	451	Quantum Mechanics	3
MAT	422	Mathematical Methods of Physics II	3

Two Elective Courses — 6

PHY	334	Satellite Communications
PHY	426	Logic Circuit Design
PHY	460	Remote Sensing and Image Processing
MAT	471	Operations Research

One Elective Course — 3

PHY	362	Electro-Optics
PHY	422	Radiation

22 cr.

Option: Applied Physics

PHY	323	Electronics and Instrumentation	4
PHY	324	Introduction to Robotics	3
PHY	334	Satellite Communication	3
PHY	362	Electro-optics	3
PHY	460	Remote Sensing and Image Processing	3
ING	375	Simulation and Control	3

One Elective Course — 3

PHY	422	Radiation
MAT	422	Mathematical Methods of Physics II
ADM	470	Project Management

Optional Courses

PHY	341	Physical Statistics
MAT	471	Operations Research

22 cr.

SPACE SCIENCE (B.Sc.)

Space Science (B.Sc.)

The purpose of the programme of studies in Space Science is to enable the student to discover and comprehend the scientific, technical and human aspects related to the exploration and development of extra-terrestrial space.

The programme includes a thorough grounding in the natural sciences and mathematics, followed by a series of specialized courses concentrated in the final two years.

The fundamental courses develop the student's intellect by activities and studies requiring a vigorous scientific method. In the specialized courses, the student learns to apply this basic training to the development of operations in space. This programme totalizes 101 credits.

The content of this programme will be found hereafter.

Entry Requirements

Candidates must have completed MAT 212 and MAT 251 (or the equivalent) and have obtained a minimum combined average of 55 percent in Mathematics and Physics in Second Year.

Second Year			Credits
PHY	211	Dynamics	2
PHY	222	Electromagnetism	3
PHY	231	Vibrations and Fluids Mechanics	3
PHY	262	Introduction to Quantum Physics	2
PHY	291/292	Experimental Physics	2
CHM	241	Physical Chemistry I	3
CHM	242	Physical Chemistry II	3
MAT	212	Linear Algebra	3
MAT	221	Differential and Integral Calculus IV	3
MAT	222	Differential and Integral Calculus V	3
MAT	251	Probability and Statistics	3
PSY	221	Social Psychology	3
ENG	211	Utopian Literature	2
Optional Courses			
ING	210	Engineering Graphics I	
ING	230	Strength of Material	
			35 cr.

SPACE SCIENCE (B.Sc.)

Third Year			Credits
PHY	311	Classical Mechanics	3
PHY	316	Mechanics of Fluids	3
PHY	322	Electromagnetic Waves and Applications	3
PHY	345	Space Science	2
PHY	350	Space Systems	3
PHY	460	Remote Sensing and Image Processing	3
MAT	322	Mathematical Methods of Physics I	3
MAT	329	Mathematical of Signal Analysis	3
INF	360	Real-Time Systems Applications	3
PSY	322	Organizational Psychology	3
SCH	220	Canadian History	3

Optional Courses

PHY	341	Statistical Physics
PHY	426	Logic Circuit Design
PHY	427	Microprocessor System Design
PHY	473	Solid State Physics
ADM	470	Project Management

32 cr.

Fourth Year			Credits
PHY	324	Introduction to Robotics	3
PHY	334	Satellite Communications	3
PHY	362	Electro-Optics	3
PHY	411	Spacecraft Dynamics and Control	3
PHY	455	Space Operations	3
PHY	495/496	Space Science Project	4
PHY	499	Space Science Seminars	
MAT	451	System Safety, Reliability and Maintainability	3
ING	375	Simulation and Control	3
EMS	329	Space Policies and Legal Regimes	3
ADM	470	Project Management	3
PSY	422	Behaviour in a Military Setting	3

Optional Courses

PHY	422	Radiation
MAT	422	Mathematical Methods of Physics II

34 cr.

GENERAL SCIENCE (B.Sc.)

General Science (B.Sc.)

Chemistry Orientation. This programme will instill in the student the scientific knowledge necessary for an understanding of the chemical transformations and structures of matter. Courses emphasize the molecular view of matter and the modern tools of chemistry.

General. The student will acquire a modern scientific university training without necessarily becoming a specialist. Emphasis on personal interests in science is possible through an appropriate choice of courses in sciences, in humanities and in administrative sciences.

The courses listed hereafter are those of the Chemistry Orientation programme which totalizes 93 credits.

Entry Requirements

Candidates who choose the chemistry orientation must have taken CHM 241, CHM 242 and CHM 292 or the equivalent.

Second Year			Credits
MAT	221	Differential and Integral Calculus IV	3
MAT	222	Differential and Integral Calculus V	3
PHY	222	Electromagnetism	3
PHY	231	Vibrations and Fluid Mechanics	3
CHM	241	Physical Chemistry I	3
CHM	242	Physical Chemistry II	3
CHM	291/292	Experimental Chemistry	2
CHM	321	Organic Chemistry I	3
CHM	322	Organic Chemistry II	3
PSY	221	Social Psychology	3
ENG	211	Utopian Literature	2
Recommended Optional Course			
ING	210	Engineering Graphics I	
			31 cr.

Third Year			Credits
CHM	312	Analytical Chemistry	2
CHM	341	Electrochemistry	3
MAT	223	Differential and Integral Calculus VI	3
MAT	412	Codes	3
PHY	323	Electronics and Instrumentation	4
PSY	322	Organizational Psychology	3
SCH	220	Canadian History	3
Compulsory if not completed in Second Year			
MAT	212	Linear Algebra	3
MAT	251	Probability and Statistics	3
Two Elective Courses			6
Amongst Science and Engineering courses.			
			33 cr.

Fourth Year			Credits
CHM	362	Quantum Chemistry and Spectroscopy	3
CHM	372	Inorganic Chemistry	3
CHM	421	Organic Chemistry III	3
CHM	491/492	Experimental Chemistry and Project	8
INF	360	Real-Time Systems Applications	3
MAT	471	Operations Research	3
PHY	399	Weapons Technology	3
PSY	422	Behaviour in a Military Setting	3
			29 cr.

ADMINISTRATION (B.ADM.)

Administration (B. Adm.)

The main purpose of the programme leading to the degree of Bachelor of Administration (Honours or Minor in Psychology) is to provide the opportunity for the development of efficient leaders and managers capable of adapting to the various needs of Canada's Armed Forces.

This programme also intends:

a. to provide the student with a broad background in Business Administration;

b. to improve the understanding of human behaviour in organizations;

c. to provide the future officer with the required knowledge of public administration conducive to effective management in the Canadian Forces; and

d. to provide the future manager with the necessary knowledge to use quantitative methods in decision making.

Many approaches to learning are used: the case method, role playing, films, lectures, readings, report writing, business games, classroom discussions, tours of industry, and simulation exercises. Students are also called upon to apply experiential methods in organizations outside of the College.

The two programmes in Administration totalize 99 credits each. The list of courses for each of these programmes will be found hereafter.

ADMINISTRATION - HONOURS (B.ADM.)

Administration - Honours (B.Adm.)

Second Year			Credits
ADM	201	Management	3
ADM	231	Accounting I	3
ADM	232	Accounting II	3
ADM	242	Probability and Statistics	3
ADM	243	Applied Statistics	3
ADM	352	Marketing	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
PSY	221	Social Psychology	3
SCH	222	Canadian Political Institutions	3
SCH	313	Macroeconomics Analysis	3
SCH	314	Microeconomics Analysis	3
			36 cr.

Third Year			Credits
ADM	314	Operations Management I	3
ADM	323	Business Law	3
ADM	331	Finance	3
ADM	332	Management Accounting I	3
ADM	342	Operations Research I	3
ADM	343	Management Information Systems I	3
ADM	350	Management Information Systems II	3
ADM	413	Organizational Theory	3
ADM	470	Project Management	3
PSY	322	Organizational Psychology	3
			30 cr.

Fourth Year			Credits
ADM	412	Strategic Management	3
ADM	421	Human Resource Management	3
ADM	424	Public Administration	3
ADM	460	Project in Administration	3
PSY	422	Behaviour in a Military Setting	3
6 elective courses			18
ADM	411	Decision Making	
ADM	414	Operations Management II	
ADM	415	Finance II	
ADM	425	International Management	
ADM	431	Operational Auditing	
ADM	432	Management Accounting II	
ADM	433	Introduction to Tax	
ADM	435	Logistic Management	
ADM	441	Operation Research II	
ADM	463	Industrial Relations	
INF	363	Structured Systems Analysis	
INF	443	Data Base Management Systems	
MAT	475	System Simulation	
PSY	312	Applied Military Psychology	
PSY	451	Motivation and Job Satisfaction	
SCH	311	Economic History in a Social Context	
SCH	312	Canadian Economic History	
SCH	412	Managerial Economics	
			33 cr.

ADMINISTRATION - MINOR IN MILITARY PSYCHOLOGY (B.Adm.)

Administration - Minor in Military Psychology (B.Adm.)

Second Year			Credits
ADM	201	Management	3
ADM	231	Accounting I	3
ADM	232	Accounting II	3
ADM	242	Probability and Statistics	3
ADM	352	Marketing	3
SCH	222	Canadian Political Institution	3
SCH	313	Macroeconomics Analysis	3
SCH	314	Microeconomics Analysis	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
Minor			
PSY	221	Social Psychology	3
PSY	232	Psychology of Aggression	3
			36 cr.

Third Year			Credits
ADM	314	Operations Management I	3
ADM	323	Business Law	3
ADM	331	Finance I	3
ADM	332	Management Accounting I	3
ADM	343	Management Information Systems I	3
ADM	413	Organizational Theory	3
Minor			
PSY	312	Applied Military Psychology	3
PSY	322	Organizational Psychology	3
PSY	342	Psychology of Small Groups	3
PSY	351	Research Methods	3
			30 cr.

Fourth Year			Credits
ADM	412	Strategic Management	3
ADM	421	Human Resource Management	3
ADM	424	Public Administration	3
ADM	460	Project in Administration	3
ADM	470	Project Management	3
2 elective ADM courses (400 serial)			6
Minor			
PSY	315	Communication and Negotiation	3
PSY	331	Leadership	3
PSY	422	Behaviour in a Military Setting	3
PSY	451	Motivation and Job Satisfaction	3
			33 cr.

SOCIAL SCIENCES (B.A.)

Social Sciences (B.A.)

This multidisciplinary programme is being offered at CMR in conjunction with five other departments to give the officer cadet a basic and comprehensive education in the social sciences and falls within the academic requirements of most officer classifications in DND. The programme is comprised of courses in history, economics, political science, sociology, psychology and literature.

The Social Sciences Programme is designed to prepare students for a number of fields of specialization including Business or Public Administration should they wish to pursue graduate studies.

All the three programmes in Social Sciences totalize 96 credits each as shown in the course lists hereafter.

Second Year			Credits
SCH	221	Political Science	3
SCH	222	Canadian Political Institutions	3
SCH	252	Introduction to Canadian Studies	3
SCH	254	Introduction to Sociology	3
ADM	242	Probability and Statistics	3
PSY	221	Social Psychology	3
ENG	212	English Literature	3
FRA	251	Communication and Writing Skills	3
EMS	223	International Relations	3
EMS	232	Military History of Canada	3
			30 cr.

Third Year			Credits
SCH	311	Economic History in a Social Context	3
SCH	312	Canadian Economic and Social History	3
SCH	313	Macroeconomics Analysis	3
SCH	319	Main Currents in the 20th Century	3
PSY	322	Organizational Psychology	3
PSY	351	Research Methods	3
EMS	319	War and Diplomacy in the 20th Century	3
EMS	325	Security Problems in the Third World I	3
EMS	360	Concepts and Methods in International Relations	3
ADM	323	Business Law	3
ENG	300	Modern Canadian Literature I	3
ENG	310	War and Literature in the 20th Century	3
			36 cr.

Fourth Year			Credits
SCH	424	Canada and Its North American Environment	3
SCH	452	Canadian Society	3
SCH	460	Directed Research in Social Sciences I	3
SCH	460	Directed Research in Social Sciences II	3
EMS	415	Canadian Defence Policy	3
EMS	417	Low Intensity Conflicts	3
EMS	450	Security Problems in the Third World II	3
PSY	422	Behaviour in a Military Setting	3
ENG	400	Modern Canadian Literature I	3
ENG	410	Utopian Literature	3
			30 cr.

SOCIAL SCIENCES - MINOR IN MILITARY PSYCHOLOGY (B.A.)

Social Sciences - Minor in Military Psychology (B.A.)

Second Year

			Credits
SCH	221	Political Science	3
SCH	222	Canadian Political Institutions	3
SCH	254	Introduction to Sociology	3
SCH	311	Economic History in a Social Context	3
ADM	242	Probability and Statistics	3
EMS	232	Military History in Canada	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3

Minor

PSY	221	Social Psychology	3
PSY	232	Psychology of Aggression	3
			30 cr.

Third Year

			Credits
SCH	312	Canadian Economic and Social History	3
SCH	313	Macroeconomics Analysis	3
SCH	319	Main Currents in the 20th Century	3
EMS	223	International Relations	3
ENG	300	Modern Canadian Literature	3
ENG	310	War and Literature in the 20th Century	3

Minor

PSY	312	Applied Military Psychology	3
PSY	315	Communication and Negotiation	3
PSY	322	Organizational Psychology	3
PSY	331	Leadership	3
PSY	342	Psychology of Small Groups	3
PSY	351	Research Methods	3
			36 cr.

Fourth Year

			Credits
SCH	424	Canada and Its North American Environment	3
SCH	452	Canadian Society	3
SCH	460	Directed Research in Social Sciences I	3
SCH	460	Directed Research in Social Sciences I	3
EMS	415	Canadian Defence Policy	3
EMS	417	Low-Intensity Conflict	3
ADM	463	Industrial Relations	3
ENG	400	Modern Canadian Literature II	3

Minor

PSY	422	Behaviour in a Military Setting	3
PSY	451	Motivation and Job Satisfaction	3
			30 cr.

SOCIAL SCIENCES - MINOR IN ADMINISTRATION (B.A.)

Social Sciences - Minor in Administration (B.A.)

Second Year			Credits
SCH	221	Political Science	3
SCH	222	Canadian Political Institution	3
SCH	254	Introduction to Sociology	3
EMS	232	Military History in Canada	
ADM	242	Probability and Statistics	3
PSY	221	Social Psychology	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
Minor			
ADM	201	Management	3
ADM	231	Accounting I	3
Two elective courses			6
ADM	232	Accounting II	
ADM	243	Applied Statistics	
ADM	352	Marketing	
			36 cr.

Third Year			Credits
SCH	311	Economic History in a Social Context	3
SCH	312	Canadian Economic and Social History	3
SCH	313	Macroeconomics Analysis	3
SCH	314	Microeconomics Analysis	3
SCH	319	Main Currents of the 20th Century	3
PSY	322	Organizational Psychology	3
EMS	223	International Relations	3
Minor: Four Elective Courses			
ADM	323	Business Law	
ADM	331	Finance	
ADM	332	Management Accounting I	
ADM	343	Management Information Systems I	
ADM	350	Management Information Systems II	
ADM	352	Marketing	
ADM	413	Organizational Theory	
			33 cr.

Fourth Year			Credits
SCH	424	Canada in Its North American Environment	3
SCH	452	Canadian Society	3
SCH	460	Directed Research in Social Sciences I	3
SCH	460	Directed Research in Social Sciences II	3
EMS	415	Canadian Defence Policy	3
PSY	422	Behaviour in a Military Setting	3
Minor: Three Elective Courses			9
ADM	411	Decision Making	
ADM	412	Strategic Management	
ADM	413	Organizational Theory	
ADM	421	Human Resource Management	
ADM	424	Public Administration	
ADM	463	Industrial Relations	
ADM	470	Project Management	
			27 cr.

Military and Strategic Studies (B.A.)

The Military and Strategic Studies Programme at CMR offers a contemporary and progressive study of international relations, strategy, and history designed to give graduates both a comprehensive understanding of these disciplines and a solid foundation in the related fields of political science, military psychology, defence policy, economics, military technology, and literature. The programme has proven popular both among students at the three CMCs and across the spectrum of Canadian universities offering graduate-level programmes in international relations, international affairs, political science, and military history.

Graduates of the CMR Military and Strategic Studies Programme are regularly offered prestigious scholarships, and Military and Strategic Studies has a strong record of students proceeding directly to Master's level studies upon graduation. The Honours Degree has likewise proven of great interest to the Canadian Forces, and is on average the single most desirable of degree programmes for the operational and support classifications. Some 20% of the graduates of CMR Military and Strategic Studies to date either hold or are studying for graduate degrees.

The Military and Strategic Studies Programme at CMR offers Bachelor of Arts degrees in both General (93 credits) and Honours Military and Strategic Studies (96 credits) and a B.A. with a Major in Military and Strategic Studies and a Minor in Military Psychology (99 credits).

These programmes are offered in both French and English with emphasis upon producing bilingual students. Those students having attained the functional level of bilingualism are encouraged to take one or more of their courses in their second language, or to follow additional foreign language courses offered at CMR (such as Spanish, Russian, or German) which would be of use of their studies.

The course lists for each of these programmes follows hereafter.

MILITARY AND STRATEGIC STUDIES - HONOURS (B.A.)

Military and Strategic Studies Honours (B.A.)

Second Year			Credits
EMS	216	Classical Strategy	3
EMS	223	International Relations	3
EMS	232	Military History of Canada	3
SCH	221	Political Science	3
SCH	222	Canadian Political Institutions	3
ADM	242	Probability and Statistics	3
PSY	221	Social Psychology	3
PSY	232	Psychology of Aggression	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
MAT	236	Mathematical Models of Combat	3
			33 cr.

Third Year			Credits
EMS	319	War and Diplomacy in the 20th Century	3
EMS	324	Collapse of the Soviet Regime and Changes	3
EMS	325	Security Issues in the Third World I	3
EMS	326	Nuclear Strategy	3
EMS	328	International Public Law	3
EMS	360	Concepts and Methods in International Relations	3
PHY/ CHM	399	Technology of Weapons	3
SCH	317	Defence Economics	3
PSY	322	Organizational Psychology	3
FRA	310	War and Literature in the 20th Century	3
			30 cr.

Fourth Year			Credits
EMS	328	International Public Law	3
EMS	415	Canadian Defence Policy	3
EMS	417	Low-Intensity Conflicts	3
EMS	419	Current Strategic Issues	3
EMS	426	Comparative Defence Policy	3
EMS	428	American Defence Policy	3
EMS	440	Arms Control and Disarmament	3
EMS	444	European Security Issues	3
EMS	450	Security Issues in the Third World II	3
EMS	460	Research Paper in Military and Strategic Studies	3
PSY	422	Behaviour in a Military Setting	3
			33 cr.

MILITARY AND STRATEGIC STUDIES - MINOR IN MILITARY PSYCHOLOGY (B.A.)

Military and Strategic Studies - Minor in Military Psychology (B.A.)

Second Year

			Credits
EMS	216	Classical Strategy	3
EMS	223	International Relations	3
EMS	232	Military History of Canada	3
SCH	221	Political Science	3
SCH	222	Canadian Political Institutions	3
ADM	242	Probability and Statistics	3
PSY	221	Social Psychology	3
PSY	232	Psychology of Aggression	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
MAT	236	Mathematical Models of Combat	3
			33 cr.

Third Year

			Credits
EMS	326	Nuclear Strategy	3
Two Elective Courses			6
EMS	324	Collapse of the Soviet Regime and Changes	
EMS	325	Security Issues in the Third World I	
EMS	360	Concepts and Methods in International Relations	

Minor

PSY	312	Applied Miliary Psychology	3
PSY	315	Communication and Negotiation	3
PSY	322	Organizational Psychology	3
PSY	331	Leadership	3
PSY	342	Psychology of Small Groups	3
PSY	351	Research Methods	3
PSY	451	Motivation and Job Satisfaction	3
			30 cr.

Fourth Year

			Credits
EMS	415	Canadian Defence Policy	3
EMS	417	Low-Intensity Conflicts	3
EMS	419	Current Strategic Issues	3
EMS	428	American Defence Policy	3
EMS	440	Arms Control and Disarmament	3
EMS	444	European Security Issues	3
EMS	450	Security Issues in the Third World II	3
One Elective Course			3
EMS	328	International Public Law	
EMS	426	Comparative Defence Policy	
ADM	411	Decision Making	

Minor

PSY	351	Research Methods	3
PSY	422	Behaviour in a Military Setting	3
PSY	451	Motivation and Job Satisfaction	3
			33 cr.

MILITARY AND STRATEGIC STUDIES - GENERAL (B.A.)

Military and Strategic Studies - General (B.A.)

Second Year			Credits
EMS	216	Classical Strategy	3
EMS	223	International Relations	3
EMS	232	Military History of Canada	3
SCH	221	Political Science	3
SCH	222	Canadian Political Institutions	3
ADM	242	Probability and Statistics	3
PSY	221	Social Psychology	3
PSY	232	Psychology of Aggression	3
ENG	212	English Literature	3
ENG	251	Communication and Writing Skills	3
MAT	236	Mathematical Models of Combat	3
			33 cr.

Third Year			Credits
EMS	324	Collapse of the Soviet Regime and Changes	3
EMS	325	Security Issues in the Third World I	3
EMS	326	Nuclear Strategy	3
EMS	328	International Public Law	3
EMS	360	Concepts and Methods in International Relations	3
PSY	322	Organizational Psychology	3
Four Elective Courses			12
EMS	319	War and Diplomacy in the 20th Century	
EMS	329	Space Policies and Legal Regimes	
SCH	311	Economic History in a Social Context	
SCH	312	Canadian Economic and Social History	
SCH	313	Macroeconomics Analysis	
SCH	317	Defence Economics	
PSY	315	Communication and Negotiation	
FRA	310	War and Literature in the 20th Century	
ADM	332	Management Accounting I	
PSY/ CHM	399	Technology of Weapons	
			30 cr.

Fourth Year			Credits
EMS	415	Canadian Defence Policy	3
EMS	417	Low-Intensity Conflicts	3
EMS	419	Current Strategic Issues	3
EMS	428	American Defence Policy	3
EMS	440	Arms Control and Disarmament	3
EMS	444	European Security Issues	3
EMS	450	Security Issues in the Third World II	3
PSY	422	Behaviour in a Military Setting	3
Two Elective Courses			6
EMS	328	International Public Law	
EMS	426	Comparative Defence Policy	
ADM	411	Decision Making	
			30 cr.

PRIZES AND AWARDS

Prizes and awards

All awards in which studies, academic standing, or academic proficiency is a qualification normally required 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 for prizes and awards.

Officers of the UTPO plan are not eligible for prizes and awards offered to officer cadets of the ROTP/RETP/UTPNEM plans:

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 an English speaking student and to a French speaking student 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.

Departmental prizes

A departmental prize is awarded within each Faculty to the cadet of each of the different year levels who has achieved the highest standing in the courses offered by a given department provided that he has passed his year without conditions with "Second Class Honors" and has obtained 75 % in one of these departmental courses; the department concerned is responsible for selecting the cadet earning its prize.

Academic Achievement Award

This award is presented annually to the Fourth year student who has achieved the highest overall standing in his Third and Fourth Year programme of study providing he/she has maintained a combined average over Third and Fourth Year earning him/her First Class Honors.

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.

PRIZES AND AWARDS

AFCEA prize

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

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.

INTER-CMC TRANSFERS

Inter-CMC Transfers

Transfer between CMC's are normally made entering Third Year.

Transfer to CMR

Entry into a CMR study program is subject to approbation by the Dean and Heads of department involved who are always available for counselling as to prerequisite courses and application procedure.

Arts and Administration Programme

Students from any CMC having completed Second Year Arts are eligible for entry in any Administration or Humanity programme at CMR. Students from other programmes may also be eligible following an evaluation of their record.

It's suggested that students intending to enter the Administration programme after second year should take a course in accounting before hand.

Science programmes

To enter Third Year programme in Science at CMR, a student must have successfully completed one of the Second Year Engineering/Science programmes offered at any CMC.

The performance standards required to enter Third Year of a given Science programme at CMR can be found within the course outlines of the various programmes.

Furthermore students intending to enter Third Year at CMR in Computer Science, Physics or Space Science should have completed Mat 212 and Mat 251 courses or their equivalent. Those who intend taking General Science with concentration in Chemistry should have completed Chem 241, Chem 242 and Chem 292 courses or their equivalent.

Transfer to 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.

The following courses of study are normally available at RMC.

English, Honours and General
History, Honours and General
History and Political Sciences, Honours
Two Honours courses are offered: (a) emphasis on History, (b) emphasis on Political Science.

INTER-CMC TRANSFERS

Military and Strategic Studies: Honours and General interdisciplinary course in History and Political Science, with electives in Geography, Economics and Sociology.

Political and Economic Science, combined Politics and Economics. Two Honours courses are offered: (a) emphasis on Economics (b) emphasis on Politics.

Economics and Commerce, Honours
Commerce, General
Politics, General
Economics, General
Politics and Geography, General

Entry 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. General Science

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

c. Major and Minor Concentrations:

Major in Applied Mathematics
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.

d. 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 to RMC - Degree 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:

A 66 per cent combined average in Mathematics, Physics and Chemistry is required for:
Engineering Physics

A 55 per cent combined average in Mathematics Physics and Chemistry is required for all the other programmes that follow:

Fuels and Materials Engineering:
Civil Engineering:
Computer Engineering:
Electrical Engineering:
Engineering and Management:
Mechanical Engineering:

INTER-CMC TRANSFERS

Transfer to RRMC

Science Programme

The following Bachelor of Science degree programmes of study are available at RRMC to students upon successful completion of Second Year in Science or Engineering at RRMC, RMC or CMR, which normally includes a course in Statistics and Linear Algebra.

For the Combined Major and Major programmes, a weighted average of 55 per cent in second year subjects is recommended.

a. Bachelor of Science (Combined Major)

Six combined major programs are currently available as follows:
Physics and Oceanography
Physics and Earth Observational Science
Physics and Computer Science
Oceanography and Earth Observational Science
Computer Science and Earth Observational Science
Computer Science and Psychology

These programs require 36 units of credit during Third and Fourth year, of which 12 units are required in each of the two Major disciplines.

Honours programs are available in each of these degrees.

* It is currently being proposed that RRMC offer the following combination, starting in the fall of 1993: Computer Science and Oceanography.

b. Bachelor of Science (Major)

Currently the only single Major degree offered is Applied Psychology.

This program requires 30 units of credit during Third and Fourth year, of which 15 units are required in the Major discipline.

An Honours program is also available in this degree.

c. Bachelor of Science (Joint Concentration Programs)

Joint concentrations are offered in two Science fields chosen from:

Computer Science	Oceanography
Engineering Science	Physics
Mathematics	Earth
Observational Science	

These degrees require 30 units of credit during Third and Fourth year, of which nine units are required in each of the two concentrations.

Discipline Descriptions

The five major disciplines around which most of the above degree programs are built are described in further detail below:

a. Computer science

Computers are pervasive in our live. To the Canadian Forces, as with many civilian institutions, computers and computing are an essential part of every day operations in virtually all areas of activity.

The Computer Science program at RRMC is designed to train students in both aspects of computing. Understanding what computers can do, and how to get them to do it, is largely in the domain of software. Students will study Data Structures, Programming Languages, Operating Systems, Data Base Management and some of the fundamental concepts underlying modern computing. Understanding how computers work generally comes under the heading of hardware. In this area, study includes the design of the basic components of today's machines, including basic gates,

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multiplexers, decoders, etc., as well as integrated circuits and complex chips. Students will learn the physics (e.g., theory of electricity and electronics) necessary to understand and use the techniques of digital design.

Owing to this broad computing background graduates can expect good job opportunities. Both within and outside of the Canadian Forces, Computer Science is a preferred or desirable program for many of the ROTP military occupations (MOC). Graduates with good grades will also be prepared for acceptance in most graduate schools in Computer Science in Canada.

Students have the opportunity to take a Computer Science degree as a joint Major with Earth Observational Science, Oceanography, Physics or Psychology; these programs are described elsewhere in this section. Science degrees are available with concentration in Computer Science and one of these subjects, as well as with Mathematics or Engineering Science.

b. Oceanography

The purpose of this program is to produce general officers who are capable of working in land, sea or air environments who have a sound knowledge of the circulation and structure of the ocean surface and interior. Emphasis is placed on the effect of the ocean on the Earth's geophysical systems in general and on the strategic and tactical capabilities of armed forces in particular.

The purpose of specialization in oceanography is to learn how to apply scientific laws and to use the techniques of exact sciences to solve problems. Students study the characteristics of the environments in which military forces operate: the structure of the earth and the ocean bed, air-sea interaction (including the water column, ice and atmosphere), underwater acoustics and remote sensing from space. Chemical and biological oceanography are studied, but there is more emphasis on physical oceanography because it is more closely related to military problems.

Oceanography is offered in combination with either Physics, or Earth Observational Science . Exceptional students may be awarded an Honours degree by completing two extra courses and an oceanography project. Combined Majors and Science degrees with joint concentrations are also offered. Course details are given in the RRMC calendar. Honours or Combined Majors programs are suitable preparation for graduate work in many fields.

Entry requires successful completion of the Second Year Science or Engineering program at any CMC. For admission to the Honours program, completion of the Third Year in the Combined Majors program with a weighted average of at least 66 percent in Mathematics, Science and Engineering is required. Third year enrolment may be limited in numbers. Preference will be given to students with higher academic performance.

c. Physics

Physics is a fundamental science that deals with matter, forces and energy. All existing and future technologies are based on principles discovered by research in Physics. A strong Physics content in a B.Sc. degree is essential for any career in an Engineering and Science profession. It is also important for informed decision-making by managers in any technical work environments. Furthermore, the thought processes developed by an education in Physics can frequently be applied outside the scientific community.

The Physics program contains the fundamental core courses required for graduation in Physics at any university. Other courses offered at RRMC have been created as Applied Physics courses, also similar to those found at civilian universities but more specifically designed for the military work environment, (e.g., Acoustics and Electromagnetic Wave Propagation).
For most Engineering and Science course patterns, Physics is either a preferred or desirable degree pattern for many military occupations (MOC). A good background in Physics is essential for many courses that officers have to pass during their careers. Indeed

future developments of weapon systems will be the result of present day research in Physics.

Passing the Physics courses with a C or higher will give graduates access to many Science and Engineering graduate programs at civilian universities.

d. Psychology

When Psychology is understood to be the study of human behaviour and mental processes it becomes evident that it has an immense role within organizations as numerous and diversified as in the Canadian Armed Forces. An extensive range of organizational problems lend themselves to analyses and solutions through research and applications from psychology. The courses and associated topics in the Royal Roads Psychology B.Sc. are designed to provide a strong background in the areas of human neuro-physiology and biology, research methods in science, and computer science applications in engineering and psychology. The degree can lead to post-graduate studies in many areas in civilian life or within the Canadian Forces.

e. Earth Observational Science

The Earth Observational Science program at Royal Roads was designed in response to a need expressed by the component of DND concerned with space-based remote sensing, early warning, and communications systems. Earth Observational Science is the study of the earth and oceans, and of the region of space near earth, by the use of satellites and satellite technology. This field has implications and uses in the study of our oceans, forests, agriculture, natural resources, the Arctic, environmental(pollution) problems, meteorology, communications, surveillance and search and rescue. The program is offered as a combined major in conjunction with one of the following: Physics, Oceanography and Computer Science.

Royal Roads is one of the few institutions in Canada that offers a curriculum in these areas. Graduates of the Royal Roads program will have developed thereby a set of skills which will be very useful in the technology marketplace, both during military employment and when eventually embarking on a civilian career.

Arts Programmes

The following Bachelor of Arts Degree Programs of Study are available at RRMC to students on completion of Second Year at RRMC, RMC or CMR.

a. Bachelor of Arts in Military and Strategic Studies (B.A.)

The program 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. Although based primarily upon history and political science, the program is interdisciplinary, and will offer electives in Computing Science, Economics, Literature and Philosophy. Three areas of concentration are available with the following joint concentrations being permitted:

History and International Politics
Politics and Economics
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 Universities. Accordingly, students who have satisfactorily completed the Second Year of any program of study at any CMU are eligible for admission to the new General program. For admission to the Honours program a student must have completed Second Year with a minimum of Second Class Honours. The program is sufficiently flexible to enable students who, during their initial two years, may not have taken courses that are considered essential to "core subjects" to do so in the Third and Fourth Years.

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

The Applied Military Psychology program is designated to meet the need of the Canadian Forces for leaders trained in the behavioural 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 of 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 program 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 program relevant to their future careers while simultaneously meeting the requirement for graduate studies in psychology at other institutions.

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

COURSE DESCRIPTION

DEPARTMENT OF ADMINISTRATIVE SCIENCES

Head of Department
Jocelyn Gagné, C.D., B.Com., M.B.A.

Professor
Armand St-Pierre, B.Sc., B.Com., B.Sc.compt., C.M.A., C.G.A., M.B.A., Ph.D. (school attendance)

Associate Professors
Mokhtar Amami, B.Sc., Lic.Sc.Eco., Ph.D., Ing.
Paul Boisclair, B.A., B.Com., M.B.A.
Guy Lizotte, Dip. en informatique (M.I.T.), B.Com., 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 Jean Genest, B.Sc.(Info), M.Comp.Sc.

Part-time Lecturers
Fabien Chauny, B.Sc., M.Sc., D.Sc.A.
Paul Corriveau, C.D., B.A., M.B.A.
Albert Gadbois, B.Sc.Comm., M.B.A., D.Sc.Ges.
Paul Goineau, B.A. Sc. Econ., M.B.A.
Denis Lavigne, B.Sc., M.Sc.
Michel Ménard, B.Sc., M.Sc.
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, concepts 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)

In this course students will learn the process of accounting, including registering transactions in the journal, classifying financial information in the general ledger, closing the books at the end of an accounting period and preparing the financial statements.

Students will also be exposed to special problems of accounting, such as inventory profits and the cost of goods sold, the different depreciation methods, leasing liabilities and other topics. worksheet.

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ADM 232 Accounting II 3-0-6
P ADM 231 (3 credits)
This course is aimed at providing the student with a deeper understanding of the financial information conveyed by accounting data.

The course will address some advanced topics of corporation accounting such as capital stock transactions, consolidation of financial statements, statements of change in the financial position and analysis of financial statements.

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 to probability and statistics and their object. Descriptive statistics. Probabilities and their laws. Conditional probabilities and Bayes' 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, sampling, Chi-square test, hypothesis testing: one and two populations. Analysis of variance. Simple and multiple linear regression. Series analysis and forecasting.

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, MRP, MRP II, quality control and just-in-time.

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 including family law and estate 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, consumer protection law and wills and successions. The Charters of Rights.

The section on military law will deal with jurisdiction, arrest, military tribunals, procedure.

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.

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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 will be put on the use of accounting data, rather than their preparation, basic principles will be taught in enough depth to ensure full comprehension of quantitative reports regularly submitted by the controller to managers.

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, modern and traditional approaches, organizational barriers to development and use of data bases, notions of 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: topologies 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 seven (7) different themes including the environment, the marketplace, the products and services, the price, the distribution, the promotion/image management and the practice of marketing.

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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, PSY 322 (3 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. The following subjects will be covered: 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 PSY 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.

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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, 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 (3 credits)
ADM 352, PSY 322
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 advanced topics in management accounting.

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

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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.

COURSE OBJECTIVES

a. 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.

b. 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.

c. 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

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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 required of 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 specific interest and expertise in a specific field of the administrative sciences.

CHEMISTRY

DEPARTMENT OF CHEMISTRY

Head of the Department
Gilles Caron, B.A., M.A., Ph.D., P.Chem.

Professors
Joseph Zauhar, B.Sc., M.Sc., D.Sc., P.Chem.
James L. Thompson, B.A., M.A., Ph.D., 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
Gabriel Lord, B.A., B.Sc., M.Sc., Ph.D.
Pierre Smith, B.Sc., Ph.D.

Part-time Lecturers
Danielle Dautet, M. Chem., D.E.A., D.Sc. 3rd Cycle, Ph.D.
François Gauvin, B.Sc, M.Sc., Ph.D., P.Chem.

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 (2.66 units)
or two one-year high school courses.
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 covers 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.

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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 other half by the Physics 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 aim of this course is to prepare the student for a variety of programs in engineering and the physical sciences.

The following subjects will be covered: the kinetic theory of gases and deduction of the empirical gas laws, the behaviour of real gases and critical phenomena in liquids, the liquifaction of gases, the law of conservation of energy, energy transfers, specific heat, calculation of the heat associated with chemical reactions.

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

This course has the same objectives as CHM 241. The subjects covered will be the following: entropy and calculation of energy yields, refrigerators and heat pumps, free energy, electrochemical cells, the thermodynamics of cells, calculation of the electromotive force of cells, lead batteries, alkaline cells, phase diagrams, metals and alloys, eutectics and freezing point lowering in binary mixtures.

CHM 291 Experimental Chemistry 0-2-1
P 202-201 (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 vaporization, heat of reaction, and determination of a transition point.

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

Basic ideas of analytical chemistry are reviewed as they are applied to problems such as contamination of water, environmental pollution, bearing metals in engine oil, the composition of metal alloys, and other practical problems. In the laboratory modern instrumental methods such as gas chromatography, high pressure liquid chromatography, coulometric and potentiometric titration, and atomic absorption spectroscopy are used.

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CHM 321 Organic Chemistry I 2-2-5
P 202-201 (3 credits)
The object of this course is to teach the student the fundamental principles of organic chemistry which are then applied in the laboratory. Emphasis is placed on the chemical properties, structure and synthesis of carbon based compounds. The influence of steric effects, reaction mechanisms and the nature of the reagents on the products obtained are demonstrated. The theoretical knowledge acquired is then applied to the identification of functional groups in aromatic and aliphatic compounds utilised in industry and by consumers.

CHM 322 Organic Chemistry II 2-2-5
P CHM 321 (3 credits)
This course has the same objectives as CHM 321 . They are achieved through the study of multifunctional and heterocyclic organic compounds. The laboratory work exposes the student to sequential reactions involving aromatic and aliphatic compounds leading to products utilized both in industry and by consumers.

CHM 341 Electrochemistry 2-2-5
P CHM 242, CHM 292 (3 credits)
This course introduces the student to the thermodynamics of non-electrolytes and then extends the same principles to electrolytes, conductivity, ionic mobility, transport number, ionic strength, the dielectric effect are studied. The use of electrolytic reactions and the electromotive force of cells to determine thermodynamic properties such as free energy, activities, and equilibrium constants is covered. Electrochemical cells, storage batteries, and electrodeposition are also studied.

CHM 362 Quantum Chemistry 2-2-5
P 202-101, **and Spectroscopy** (3 credits)
MAT 251
The aim of this course is the application of quantum mechanics principles to the elucidation of chemical problems. The following themes are covered: the behaviour of particles in a restricted space, the spherical potential field, electronic interactions, and atomic spectroscopy, the spectroscopy of diatomic molecules. The electronic spectra of molecules, fluorescence and phosphorescence, rotational and vibrational spectroscopy of molecules and their applications to the study of interstellar molecules, application of some spectroscopic techniques to quantitative and qualitative analysis.

CHM 372 Inorganic Chemistry 2-2-5
P 202-201 (3 credits)
This course is intended to help the student understand the nature, diversity, and stability of bonds present in inorganic compounds and to help him predict the stability as well as the chemical and physical properties of inorganic materials. The following topics will be discussed: solutions of the hydrogen-atom Schrödinger wave equation and its extrapolation to polyelectronic atoms, symmetry concepts, van der Waals forces, ionic solids (structure, lattice energy, ionic radius, conductivity), the hybridization of atomic orbitals theory and molecular properties conveniently interpreted with this approach (bond formation, bond distance and energy), the molecular orbital theory and its application to conductors and diatomic molecules, formation of adducts involving non-metals, survey of compounds of the representative elements, introduction to the transition metals.

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

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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)
Ultra-violet, infrared, nuclear magnetic resonance and mass spectroscopic methods are studied and applied to the rapid identification of carbon based compounds. Emphasis is placed on the study of natural products and the synthesis of commercial polymers. In the laboratory, complex compounds are synthesized and their structures are determined using spectroscopic methods.

CHM 491 Experimental Chemistry and Project 0-6-6
(4 credits)
CHM 492 0-6-6
P CHM 242 (4 credits)
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 and will include the writing of a paper and an oral presentation of results at a year end conference.

COMPUTER SCIENCE AND ENGINEERING

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
Charilaos Fakiris, B.Sc., M.Sc.
Denis Valois, B.Sc., M.Sc.

Lecturers
Michel de Champlain, B.Sc., M.Sc.
Captain Louis-Philippe Durocher, B.Ing., Ing.
Major Steve C. Sibbald, B.Ing., M.Ing., Ing.
Captain François Viens, B.Ing., M.Ing.

Part-time Lecturers
Louise Claveau, B.Ing.
Brian Patrick, B.Comp.Sc., M.Sc., Ph.D.

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, peripheral devices; notions of file, software, data; programming languages, compilation, execution; operating systems, commands; word processing, electronic mail, spreadsheets, database management, 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: computer architecture, 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.

201-408 Computer Programming and Numerical Methods 3-0-3 (2 units)

P 201-103, 201-105, 420-920

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 his/her ideas clearly with the help of the graphic language and to visualize in three dimensions. The student will learn: lettering techniques, geometric constructions, orthographic and pictorial views, sections and conventions, dimensioning and tolerances. The student will also be able to master the techniques of sketching and instrument drawing. A Computer Aided Design (CAD) software will be used in conjunction with traditional techniques in order to provide the student with the knowledge to use, compare and evaluate the appropriate tool needed for the realisation of his/her technical drawing.

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

P ING 210

The purpose of this second course in Engineering Graphics is to give students the knowledge of the drawing techniques required to complete their development. They will study fastening and joining as

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well as assembly and production drawings. Furthermore, students will improve and develop their 3-D visualisation capabilities and will learn to analyze problems in a graphical form by the study of descriptive geometry. Finally, in order to prepare students to the realisation of engineering projects, the design process will be introduced and analyzed.

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 size 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 modelling 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 modelling 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, transient 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 analyze 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
(3 credits)
This course teaches the design of good algorithms and the implementation and execution of computer programs written in a high level language through the use of well-tried and proper programming methodology techniques. Among the concepts studied are the attributes and characteristics of good programming languages, the syntactic description of a language, its semantics, primitives and control statements, definition and declaration of various types and variables, including user-defined types, rules governing their use, procedures and functions, value and variable parameters, local and global variables, recursion, arrays, files, records and pointers. Techniques studied include topdown design, modularisation, stepwise refinement, information hiding and structured programming.

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. Examples 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

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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 developed 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 independent input/output.

INF 363 Structured System Analysis 3-0-6
(3 credits)
This course provides an introduction to System Analysis and Design. We are strictly concerned here with computer based systems. An emphasis is given to the software aspect of these systems, accentuating the close parallel between the system and software development processes. The fundamental questions addressed by this course are *"What problem is the system supposed to solve?"* and *"What does this system need to do to solve the problem?"*. The answers to these questions generally find their way into a system specification. The process that produces a complete system specification is system requirements analysis and definition. System modelling is the media used to represent this specification. The iterative transformation of this specification into a design represents the following phase in the evolution of the system. The course presents a balanced view of the above subject matters, from fundamental concepts to specific methods and techniques. By not subscribing to any specific approach, a general attention is paid to the many different opinions that exists in this field.

INF 371 Data Communications 3-0-6
P INF 362 (3 credits)
This course will introduce the student to data communications network analysis and design principles, with emphasis placed on the Open System Interconnect model. It will prepare the student to select, trouble-shoot and manage computer networks. The following topics will be studied: the OSI model; transmission media; signal types; modulation techniques; communication modes; synchronous and asynchronous communications; the RS-232 protocol; coding techniques; error detection and correction; transmission protocols: X.25; and local area networks: topologies, access methods and performance evaluation.

INF 421 Introduction to Software Engineering 3-0-6
P INF 442 (3 credits)
This course is for fourth year Computer Science students. 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 the analysis and definition of its requirements 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,

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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: functional semantics, ambiguity, declarable objects, parameter passing, static and dynamic environments, compilation techniques, lexical, syntactic and semantic 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 in different ways and to utilize them when they are given implicitly. The student should also be able to evaluate and compare the different alternative implementations for a given structure. The main topics are: concepts of data structures, abstract data types, the most common data structures: sets and sequences, arrays (including sparse arrays), stacks, queues, trees (general, binary, etc.), graphs; their implementations as arrays, linked lists of different kinds (non-circular, circular; single, double, etc.); the algorithms that manipulate them, hashing.

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 (DBMS) 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 modelling, conceptional and representational data models, normalization and normal forms, data security and integrity; the organization, storage and manipulation of hierarchical, network and relational models; relational algebra; relational calculus, distributed systems, E-R diagrams, integration of DBMS with artificial intelligence technology and software engineering technology.

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; artificial intelligence and expert systems in the office environment.

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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.

NF 471 Computer Graphics 3-0-6
P INF 442 (3 credits)
The objective of this course is to familiarize the students with the devices, the principles and the algorithms required to create, manipulate and render graphical models of 2D and 3D objects within an interactive person-machine framework. At the end of the course, the student should understand the capabilities and limitations of raster scan devices with regards to object modelling, and be able to design and implement an interactive graphics applications. The topics will include visual perception, history of computer graphics, basic output primitives for raster devices, 2D and 3D linear transformations, projections, 3D viewing, dialogue design, user interface, and the quest for visual realism (visible-surface determination, illumination, ray tracing, ...).

INF 493 Computer Science Project 0-6-6
(4 credits)
This course consists in the elaboration of a computer related project, which requires an effort of analysis and creativeness in a particular area of computer science related to the orientation in which the student is enroled. 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.

LITERARY STUDIES

DEPARTMENT OF LITERARY STUDIES

Head of the Department
Lorne Shirinian, B.A., M.A., Ph.D.

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.
Adnan Moussally, L.L., M.A., D.L.
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.

Part-time Lecturers
Rosa Contreras, B.A., M.A.
Yves Favreau, B.A., M.A.
Alexander Fodor, B.A. M.A., Ph.D.
Edward Franchuk, B.A. M.A. Ph.D.
Martine Ouellet, B.A., M.A.
Raymond Poulin, B.A., M.A., Ph.D.
Sigrid Simonsen, B.A., M.A.

Les descriptions des cours de langue et littérature française se trouvent dans la section française sous ÉTUDES LITTÉRAIRES.

ENGLISH LANGUAGE AND LITERATURE COURSES

603-107 Effective Writing 3-0-3 (2 units)

The objectives of this course are to raise the student's ability to communicate through writing at a university level in order that he/she will be able to better handle course writing assignments in an organized, precise, unified and coherent manner. Students are placed on this course after a writing placement test.

603-108 Introduction to Literary Studies 3-0-3 (2 units)

This course initiates the student in the understanding of literary texts, notions of genres and historical periodization through an in-depth study of a selection of important texts from a variety of periods in Western literature. As well, methods of research and writing the academic essay will be taught.

603-160 Great Works of Western Literature 3-0-3 (2 units)

In each period of Western civilization, certain literary works capture the ethos and aesthetics of the era, thus presenting the reader with an entry into a moment in man's history. These are the great works of Western literature. A study of such texts sensitizes the student to certain aesthetic notions and will serve as a reference in his/her understanding of man's perception of the human condition. A selection is chosen from Homer, Shakespeare, Dostoevski, Kafka, Mann, Hemingway, Eliot and others.

603-305 Fiction into Film 3-0-3 (2 units)

This course explores the relationships between novels, short stories, and plays and films based on them. Topics studied are language, literary and film techniques and types and problems of adaptations. Bordwell and Thompson's book *Film Art: An Introduction* serves as the basic guide to cinema studies. Texts studied are *Heart of Darkness*, *Slaughterhouse-Five*, *The Apprenticeship of Duddy Kravitz*, *Hamlet*, *Death of a Salesman* and the films based on them.

603-404 Villains, Victims and Sleuths 3-0-3 (2 units)

This course examines the development of a fictional genre that has its beginning in the 19th century: detective fiction. Novels and short stories will be studied focusing on the character of the sleuth, the logic of detection and the characterization of villains and victims.

LITERARY STUDIES

ENG 211 Utopian Literature 2-0-4
(2 credits)
The object of this course for science and engineering students is to study various works of utopian literature such as *Brave New World, Nineteen Eighty-Four, Lord of the Flies*, and *One Flew Over the Cuckoo's Nest* in order to see how the utopian view has turned dystopic in the twentieth century.

ENG 212 Literature of the Twentieth Century 3-0-6
(3 credits)
This course focuses on major works of 20th century literature in all genres from various countries.

ENG 251 Communication and Writing Skills 3-0-6
(3 credits)
This course aims to develop writing skills adapted to the needs of the students studying social sciences and military and strategic studies, to cover grammatical, organizational and stylistic aspects, and the language of national and international affairs and social studies.

ENG 252 Communication and Writing Skills 3-0-6
(3 credits)
This course aims to develop writing skills adapted to the needs of the students studying administration, to cover grammatical and stylistic aspects, formats and the language of business and management, and national administration.

ENG 300 Modern Canadian Literature I 3-0-6
(3 credits)
This course introduces the student to the development of modern literature in Canada through a study of selected texts in a variety of genres. The student will study the major ideas and currents in modern Canadian literature and how they are a reflection of Canadian society.

ENG 310 War and Literature in the Twentieth Century 3-0-6
(3 credits)
This course studies the literary responses to war in this century. The works of writers such as Remarque, Owen, Hemingway, Malraux, Wouk, Mailer and Herr will be analyzed.

LIT 340 Canadian Literature and Military Experience 3-0-6
(3 credits)
The object of this course is to analyze fictional works which reflect the principal military events involving Canadians. It examines the essence of war and its effects on Canadian society.

ENG 400 Modern Canadian Literature II 3-0-6
(3 credits)
This course is a continuation of ENG 300. Texts from the major Canadian writers from the 1960's to the present will be the focus.

ENG 411 Utopian Literature 3-0-6
(3 credits)
This course for social science students will study the utopian vision in various literary texts to see how it has turned dystopic in the 20th century. After an introductory historical survey, the texts will be analyzed to bring out the themes, the literary techniques employed and the social implications of such a vision.

MATHEMATICS

DEPARTMENT OF MATHEMATICS

Head of the Department and Associate Professor
Sylvie Mainville, B.Sc., M.Sc., Ph.D.

Professors
François Dubeau, B.Sc., B.Sc.A., M.Sc.A., Ph.D., Ing.
Robert Gervais, B.A., B.Sc., M.Sc., Ph.D., M.Sc.(Info), N.D.C., (Part-time)
Pierre Gravel, B.Math., M.Math., 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.
Patrice Marcotte, B.Sc., M.Sc., Ph.D.

Associate Professors
Sahnoune Dahel, M.Sc., D.E.S., Ph.D.
Jocelyn Desbiens, B.Sc., M.Sc., Ph.D., M.Sc.(Info), (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.
Gérard Normand, L.Sc., B.Sc., M.Sc.
Jean Savoie, B.Sc., M.Sc., Ph.D.

Assistant Professors
Alain Pautasso, L.Sc., M.Sc., Ph.D., M.Sc.(Info)
Gilles Savard, B.Sc., M.Sc.A., Ph.D.

Lecturers
Captain Denis Gagné, B.Sc.Inf., M.Math.
Captain Luc Lefebvre, B.Ing., M.Sc., Ing.
Major Steve C. Sibbald, B.Ing., M.Ing., Ing., (Part-time)

Part-time Lecturers
Ali Bensebah, M.Sc., Ph.D.
Fabien Chauny, B.Sc., M.Sc., D.Sc.A.
Frédéric Jetzer, B.Sc., M.Sc.
Marie-Jeanne Médane, M.Sc.
Michel Ménard, B.Sc., M.Sc.

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

For students in Science and Engineering.

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.

Subject matter: Review of algebra: factorization, rational expressions, solving linear, quadratic, polynomial and rational equations and inequalities. Equations and inequalities involving absolute value. Exponential and logarithmic functions. Proof by induction. Review of trigonometry: basic notions, trigonometric identities, inverse trigonometric functions.

201-102 Introduction to Applied Mathematics 3-2-3 (2.66 units)

Taken by Arts students.

The objective of this course is to give the students a chance to review complete and gain a deeper understanding of the basic notions of algebra needed in the arts programs. Applications are made to real world problems.

Subject matter: Elementary manipulations of algebraic expressions: factors, complex fractions, radicals, absolute values. Solution of equations and inequations. Graphs of linear and quadratic functions. Derivatives and polynomials. Algebraïc and geometric operations on vectors of dimension 2 and 3.

201-103 Differential and Integral Calculus I

For students in Science and Engineering. 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.

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

Subject matter: 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)

Subject matter: Related rates, graphs and optimization. Mean value theorem. Definition of the integral by Riemann sums. Fundamental theorem of calculus.

201-105 Introduction to Linear Algebra

For students in Science and Engineering, this course is given over two semesters.

This course constitutes an introduction to the theory and practice of linear algebra, as well as to the arithmetic of complex numbers. These notions are prerequisite to the pursuit of scientific studies: calculus in several variables, physics, engineering, optimization, etc.

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

Subject matter: Modeling and solving systems of linear equations. Matrix operations. Elementary properties of determinants. Algebraic and geometric manipulations of vectors.

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

Subject matter: Vectors in 2-space and 3-space. Vector space: subspace, linear independence, basis and dimension. Complex numbers.

201-113 Differential and Integral Calculus I **3-2-3**
(2.66 units)

This course is intended for Arts students.

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.

Subject matter: Functions, graphs and limits. Differentiation: notion of derivative, techniques of differentiation, rate of change, approximation by differentials, marginal analysis, implicit differentiation, higher order derivatives. Graph of function. Optimization problems. Applications to business and economics. Indefinite integral.

201-115 Introduction to Linear Algebra **3-2-3**
(2.66 units)

This course is intended for Arts students.

This course will introduce linear models together with their principal applications in the social sciences and administration. Emphasis will be placed on geometric representations, modeling of concrete situations and interpretation of the results.

Subject matter: Modeling and solving systems of linear equations. Matrix operations. Elementary properties of determinants. Algebraic and geometric manipulations of vectorsof dimension n. Linear programming: geometric approach, basic concepts, the simplex method, applications.

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

For students in Science and Engineering.

The objective of this course is to familiarize the student with the fundamental concepts and the methods related to the differential and integral calculus.

Subject matter: 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. Applications to first-order ordinary differential equations.

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201-213 Differential and Integral 3-2-3
P 201-113 **Calculus II (Arts) (2.66 units)**
For Arts students.

The objective of this course is to initiate the student to the exponential and logarithmic functions, to their use in modeling economic and administrative situations and to familiarize the student with the definite integral and partial derivatives together with their application to problems of interest for these students.

Subject matter: Exponential and logarithmic functions. The integral and its applications. Partial derivatives. Applications in business and economics.

201-303 Differential and Integral 3-2-3
P 201-203 **Calculus III** (2.66 units)
(Science and Engineering)
For students in Science and Engineering.

The objective of this course is to familiarize the student with the fundamental concepts and the methods related to differential equations, sequences and series.

Subject matter: Indeterminate forms. Improper integrals. Sequences and convergence. Convergent and divergent series: tests. Taylor and Maclaurin expansions. Power series, interval of convergence. Differentiation and integration of power series. Introduction to linear second-order ordinary differential equations with constant coefficients: method of undetermined coefficients, method of variation of parameters.

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.

Subject matter: 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 3-0-6
P 201-303 **Calculus IV** (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.

Subject matter: 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 3-0-6
P MAT 221 **Calculus V** (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.

Subject matter: 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 integral. Line integral. Green's theorem. The divergence theorem. Stokes' theorem.

MAT 223 Differential and Integral 3-0-6
P MAT 221 **Calculus VI** (3 credits)
This course is a primer on direct and inverse transformations as tools for the solution of

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mathematical problems, mainly in the fields of integration and of the solution of differential equations. It also extends in detailed way the integral and differential calculus seen in the course MAT 222.

Subject matter: 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 3-0-6
P 201-213 **of Combat** (3 credits)
This course is intended to develop amongst the students an appreciation for the capabilities and limitations of mathematical models of combat by modeling several contemporary conflicts.

Subject matter: The models covered are: the Deterministic model (Lanchester), the Stochastic model (Taylor), the Ad hoc model (Dupuy) and Richardson's arms race model. Two players, zero-sum games and hypergames will also be presented with an emphasis on practice rather than theory.

MAT 251 Probability and Statistics 3-0-6
P MAT 221 (3 credits)
This course is intended to be an introduction to the mathematical theory of probability. It attempts to present not only the mathematics of probability theory, but also, the many diverse possible applications of the subject. This course is an essential prerequisite to the study of statistics and reliability theory.

Subject matter: Combinatorial analysis. Axioms of probability theory. Conditional probability and independence. Discrete random variables: Bernoulli, binomial, Poisson and geometric random variables. Continuous random variables: uniform, normal and exponential random variable. Function of a random variable. Mathematical expectation. Jointly distributed random variables. Sums of independent random variables and 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.

Subject matter: 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
MAT 326 3-0-6
P MAT 221 (3 credits)
The purpose of this course is to introduce continuous models and the mathematical methods used in their study.

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

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a week. Assignments and examinations will differ in content and difficulty for students in different degree programs.

Subject matter: 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 3-1-5
MAT 327 of Physics I 3-0-6
P MAT 222 (3 credits)
The objective is to introduce some of the tools required in the study of dynamical systems and field theories of Physics.

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.

Subject matter: 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.

Theory of linear differential equations with variable coefficients. Systems of linear differential equations with constant coefficients. Series solutions. The Bessel, Hermite and Laguerre equations. Orthogonal functions. Sturm-Liouville problems. Boundary value problems in two and three dimensions.

MAT 326 Differential Equations I 3-0-6
P MAT 221 (3 credits)
MAT 321 and MAT 326 have the same description.

MAT 327 Differential Equations II 3-0-6
P MAT 326 (3 credits)
MAT 322 and MAT 327 have the same description.

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.

Subject matter: 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 $\overline{R}$. 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 $\overline{R}$. 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 the course is to introduce the student to direct and inverse transformations as tools for solving applied mathematical problems. The Fourier series and the Fourier and Laplace transforms are presented. These techniques are used to study signals, linear systems and differential equations encountered in different fields such as remote sensing, image processing, signal processing, simulation and control, physical optics and quantum mechanics.

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Subject matter: Direct and inverse Laplace transforms. Linear systems, transfer function and convolution. Fourier series. Fourier transform. 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 con- cepts and the principal numerical methods of the nonlinear optimization.

Subject matter: 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.

Subject matter: 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.

Subject matter: Probability review: random variable, transformation of random variables, joint distributions. Simulation techniques. Introduction to a statistical package (SPSSX or SAS). 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 411 Modern Algebra I 3-0-6
P MAT 212 (3 credits)
MAT 312 and MAT 411 have the same description.

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.

Subject matter: Algebraic structures: groups, rings, polynomial rings, fields, finite fields. Codes: encoding techniques, detection and correction of errors, linear codes, Hamming codes, polynomial codes, Bose-Chaudhuri-Hocquenghem codes, cyclic 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.

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Subject matter: 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.

Subject matter: 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 algorithms. Maximum flow. Minimum cost flow: Busacker-Gowen and simplex algorithms. Edge coloring. Bipartite matching: the Hungarian method. PERT and CPM. Graphs with gains and losses.

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.

Subject matter: 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 transforms. 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.

Subject matter: 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)
The objective of this course is to familiarize the student with requirements and methods to ensure dependable operation of space systems and to prevent critical failures through effective design.

Subject matter: Empirical reliability measures. Life length of a component: distribution function of the life length, reliability function, hazard function. Probability review and other elements: exponential, gamma and Weibull distributions; probabilistic model selection. Safety factors and reliability. Reliability of multicomponent systems. Active and standby redundancy. Redundancy optimization. Availability and maintainability: systems with repairable elements, preventive maintenance.

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.

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Subject matter: 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. Norms and condition number of a matrix.

MAT 463 Automata and Formal Languages **3-0-6** (3 credits)
P MAT 212, INF 442

The objective of this course is to present theoretical models of computations and their applications.

Subject matter: Regular languages: regular expressions, deterministic and non-deterministic finite automata, Kleene's theorem. Context-free languages: pumping lemma, context-free grammars and their properties, syntactic analysis. Programming language concepts: Chomsky formal languages, syntax diagrams, theoretical models of programming languages, survey of programming languages.

MAT 471 Operations Research **3-0-6** (3 credits)
P MAT 212, INF 201-408

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.

Subject matter: Linear programming. Simplex algorithm. Duality and sensitivity analysis. Integer programming. Branch-and-bound. Network problems: shortest path, maximum flow, assignment, minimum cost flows. PERT and CPM. Applications to practical situations. Case study.

MAT 475 System Simulation **3-0-6** (3 credits)
P MAT 251 or ADM 242

This course introduces the student to simulation methods, model construction, implementations on a computer, and interpretation of simulation results.

Subject matter: 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

The main areas of research at the department of mathematics are:

(i) Operations research: mathematical programming, modeling, logistics, game theory and also statistics, reliability and simulation.

(ii) Infography, coding theory and artificial intelligence.

(iii) Mathematics applied or applicable to physical sciences: control theory, dynamic systems, differential geometry, signal analysis, pattern recognition, numerical methods.

(iv) Nonlinear analysis and optimization.

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.

MILITARY PSYCHOLOGY AND LEADERSHIP

DEPARTMENT OF MILITARY PSYCHOLOGY AND LEADERSHIP

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.

Assistant Professor
Lieutenant-Commander Roger Girard, C.D., B.Ps. M.Sc.

Lecturers
Major Jean Fournier, C.D., B.A., L.OR.
Captain Stephen Eyres, C.D., B.A., M.Sc.

Part-time Lecturers
Kathleen Doran, B.A., M.B.A
Marie-Hélène LaRocque, B.Sc., M.A. (Langue)
Josée Morneau, B.Sc. (Ed. phys.), M.Ps.

PSY 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.

PSY 350-951 Developmental Psychology **3-0-3**
P PSY 350-101 (2 units)
The aim of this course is to teach students the main theoritical concepts related to personal development. This will enable tomorrow's leader to better understant human behavior in its evolutive mode. The course will concentrate on age groups which are susceptible to be represented in the C.F. Students will have an opportunity to verify their knowledge in the field.

PSY 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.

PSY 232 Psychology of Aggression **3-0-6**
P PSY 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.

PSY 312 Applied Military Psychology **3-0-6**
P PSY 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.

PSY 315 Communication and Negotiation **3-0-6**
(3 credits)
In the first part of the course, the students will learn the relation that exists between self-concept, personality and communication. Culture and its influence on verbal and non-verbal communications will also be studied. In the second part of the course, students will learn how to negotiate in different contexts.

MILITARY PSYCHOLOGY AND LEADERSHIP

PSY 322 Organizational Psychology 3-0-6
P PSY 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.

PSY 331 Leadership 3-0-6
P PSY 221 (3 credits)
This course aims to increase the student's awareness of the human and psychological aspects influencing the leader-subordinate relationship in different military environment. The objective is to make a synthesis of the principal components of the leadership process in order to better prepare the student to cope with the new challenges of the year 2000. Finally, the course emphasis the development of effective leaderchip in the Canadian Forces.

PSY 342 Psychology of Small Groups 3-0-6
P PSY 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.

PSY 351 Research Methods 3-0-6
P PSY 221 (3 credits)
This course introduces students enrolled in the minor in military psychology to research methods in the social sciences. The course develops students' capabilities to read the social science literature with a critical eye from a methodological point of view and to design simple research projetcs using the methods taught. Principal themes include: experimental and quasi-experimental methods, surveys, and selected non-parametric methods.

PSY 422 Behaviour in a Military Setting 3-0-6
P PSY 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.

PSY 451 Motivation and Satisfaction at Work 3-0-6
(3 credits)
The general objective of the course is for the student to understand the principal theories concerning motivation and satisfaction at work. At the end of the course, the student should be able to describe the principal theories in the area of motivation; understand and explain the differences and similarities between theories; evaluate a work situation and recommend approaches to improve the motivation and the satistaction at work.

MILITARY AND STRATEGIC STUDIES

DEPARTMENT OF MILITARY AND STRATEGIC STUDIES

Head of department
John D. Young, B.A.(Hon.), M.Sc.soc., Ph.D.

Professors
Harold P. Klepak, C.D., B.A., M.A., Ph.D.
André Dirlik, B.A., M.A., Ph.D.

Associate Professor
Charles-Philippe David, B.Sc., M.A., Ph.D.

Assistant Professor
Janine Krieber, B.Sp. Sc.soc., M.A., Ph.D.

Lecturer
Capt. D.A. Neill, B.A.(Hon.), M.A.

Part-time lecturers
Pierre Binette, B.A., M.A., Ph.D.
Douglas L. Bland, C.D., B.A., M.A., Ph.D.
Pierre Goigoux, B.A., B.sp.H., M.A.
Louis Haeck, LL.L., D.D.N., C.E.T., LL.M., D.C.L.
Gérard A. Montifroy, Dipl. Arch.-Urb.-Planif., Ph.D.
Loïc Tassé, B.Sc.Pol., M.A.Sc.Pol., C.L.C., D.E.A., P.E.D.
Peter Turner, B.A., LL.L.

330-983 Decolonization and Problems of the Third World 3-0-3 (2 units)
The purpose of this course is to provide an introduction to the problems, aspirations and 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 to the present. The great thinkers involved in this development will be studied and will include Thucydides, Sun-Tzu, Xenophon, Machiavelli, Jomini, Clausewitz, Mahan, Liddell Hart, Douhet, Mao and Guevera.

EMS 223 International Relations 3-0-6 (3 credits)
The purpose of this course is to familiarize students with the current schools of thought in inernational relations. It focuses attention on international conflicts and their resolution.

EMS 232 Military History of Canada 3-0-6 (3 credits)
The aim of this course is to give students a solid grounding in Canadian military history beginning with the Ancien Regime and progressing through the British takeover, the wars with the United States and the various western rebellions. Special attention is paid to Canada's participation in the two World Wars.

EMS 319 War and Diplomacy in the 20th Century 3-0-6 (3 credits)
The purpose of this course is to study the political and military precursors to the two World Wars, the wars themselves, and certain key conflicts of the post-World War II period. Emphasis is placed on pre-war diplomatic aspects as well as the direct wartime events themselves.

EMS 324 Collapse of the Soviet Regime and Changes 3-0-6 (3 credits)
The purpose of this course is to provide the students with a basic understanding of the USSR and its successor states. 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 provide in-depth studies of current problems in the Third World particularly in the realm of international security. Different case studies are chosen for elaboration each year.

MILITARY AND STRATEGIC STUDIES

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 concepts of deterrence, detente, escalation and crisis management. It also examines the major strategic doctrines: massive retaliation, graduated deterrence, flexible response, and mutual assured destruction.

EMS 328 International Public Law 3-0-6
(3 credits)
The aim of this course is to provide students with accurate basic concepts of International Public Law which should allow them to better understand the role and the consequences of military interventions. The course also provides an introduction to the internatinal legal foundations of the UN and 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 introduce students to 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 enable students to understand the international and domestic contexts of Canadian defence policy since 1945. There is a review of the issues associated with 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 (3 credits)
The course addresses the phenomenon of irregular warfare via the study of a number of selected guerrilla campaigns. In addition, the contemporary resurgence of terrorism is analyzed, together with the range of proposed counter-terrorist strategies.

EMS 419 Current Strategic Issues 3-0-6
(3 credits)
The purpose of this course is to develop the conceptual and analytical abilities of students with respect to current strategic and military issues associated with the evolving international context. The problems selected for analysis change each year depending on the current status of international problems.

EMS 425 The Law of War 3-0-6
(3 credits)
This course addresses the subject 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 considers 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 those conventions dealing with the wounded and the sick as well as with prisoners of war and the civilian population.

MILITARY AND STRATEGIC STUDIES

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 a variety of different states from the point of view of each country's geopolitical situation. The focus of analysis is on organizational, personnel, doctrinal and material concerns.

EMS 428 American Defence Policy 3-0-6
P EMS 326 (3 credits)
This course provides an analysis and overview of the evolution of American defence and security policies since 1914. Both the international and domestic contexts of U.S. defence policy formulation are presented and evaluated.

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; it will also consider the role that such negotiations and, in certain cases, agreements are said to play as elements of national security policy.

EMS 444 European Security Issues 3-0-6
P EMS 324, EMS 326, EMS 428 (3 credits)
The aim of this course is to examine the issues, structures and current status of European security problems. 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 provide in-depth studies 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)
The 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.

PHYSICS

DEPARTMENT OF PHYSICS

Head of the Department
Gisèle Cory, L.Sc., D. 3e cycle, D.Sc.

Professors
Cheuk Yin Cheung, B.Sc., M.Sc., Ph.D.
Maurice Cormier, C.D.N., B.A., B.Sc., M.Sc., D.Sc.
Roger Favreau, B.Sc., M.Sc., Ph.D.
André Filion, C.D.N., B.Sc., M.Sc., Ph.D.
Bernard Mongeau, B.Sc.A., M.Sc.A., D.Sc.A., P.Eng.
Sesha Subramanian, B.Sc., M.A., Ph.D.

Adjunct Professor
Laurent-G Caron, B.Sc.A., M.Sc.A., Ph.D.

Associate Professors
Fernand Ledoyen, B.A., B.Sc., D.Sc.
Jacques Lewandowski, Eng., M.Sc.A., Ph.D.
Alain Rambo, C.D., B.Sc., M.Sc., Ph.D.

Assistant Professor
William E. Gravelle, B.A., M.A., Ph.D.

Lecturers
Major Jacques Payeur, C.D., B.Sc., M.Eng.
Capt Yves Plourde, C.D., M.Eng., B.Eng.
Capt Jean-F. Simard, C.D., B.Sc., M.Sc.

Part-time lecturers
Larbi Abadli, D. 3e cycle
Richard Boudreault, B.Sc., M.Ing. (Technologies Aérospatiales)
Cécile Drèze, Ph.D., (MPB Technology)
Mario Dumouchel, Ing.
Langis Gagnon, B.Sc., Sp.Phys., M.Sc., Ph.D.
Alain Houdayer, B.Sc., M.Sc., Ph.D.
Adrian Ilinca, Ing.
Paul Lafrance, B.Sc., M.Sc., Ph.D.
Ridha Touzi, Ph.D.
Xiaoli Zhang, Ph.D.
SPAR Aerospace (Space Science)

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.

Subject matter: 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.

Subject matter: 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.

Subject matter: 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 2-3-4
P 203-201 **(Magnetism and Circuits)** (3 units)
This course continues the study of electricity and magnetism with additional emphasis on laboratory work.

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Subject matter: 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.

Subject matter: 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)
This course is shared with the Chemistry Department. Its purpose 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. (For complementary courses in chemistry see Chemistry Department, course 203-927).

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.

Subject matter: Elements of Mechanics: Measurement, Forces, Kinematics, Dynamics, Work, Energy, Power, Complex Motions. Elements of Electricity: Electric forces, Direct Current, Magnetism, Alternating Current.

PHY 211 Dynamics 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.

Subject matter: 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.

Subject matter: The laws of Gauss, Ampere and Faraday in integral form. Displacement current. Maxwell's equations in integral and differential form. Electromagnetic waves. Electric fields in matter. Magnetic fields in matter.

PHY 231 Vibrations and Fluid 3-0-6
P 203-301, 201-303 **Mechanics** (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. The student will acquire a facility in the use of complex numbers in problem-solving which will be applicable to other branches of Physics.

Subject matter: Free, damped, and forced harmonic motion using complex numbers. Superposition of periodic motions. The wave equation and travelling waves. Phase and group velocity. Introduction to fluids, hydrostatics, fluid flow and the equation of continuity.

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PHY 262 Introduction to Quantum Physics 2-1-3 (2 credits)
P PHY 211, PHY 231, MAT 221

The objective of this course is to introduce the student to the notions of Quantum Mechanics with applications to atomic physics, solid state physics, 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.

Subject matter: 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 291/292 Experimental Physics 0-4-4 (2 credits)
P 203-902, 203-301

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.

Subject matter: 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 3-1-5 (3 credits)
P PHY 211, MAT 222

The aim of this course is to present the laws of classical mechanics in a more general way.

Subject matter: 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 3-1-5 (3 credits)
P PHY 311

The objective of this course is to introduce the students to the concepts of fluid mechanics and their application to pertinent problems in technology.

Subject matter: 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 (3 credits)
P PHY 222, PHY 292, MAT 322

This course has as its objective the understanding of information transmission via electromagnetic waves and its application to practical problems.

Subject matter: 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. Scattering.

PHY 323 Electronics and Instrumentation 3-3-6 (4 credits)
P PHY 291

The aim of this course is to enable the student to understand and use electronic circuits using linear active elements.

Subject matter: 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)
P INF 360 or INF 362

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

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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 - Pattern 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 334 Satellite Communications 3-1-5
P MAT 329, PHY 322 (3 credits)
The aim of this course is to get the student acquainted with the concepts and techniques used in communications, particularly with satellite communication systems.

Subject matter: Review of signal theory: Fourier transform, power spectrum, convolution, correlation. Modulation techniques: amplitude modulation, frequency modulation. Pulse coded modulation (PCM). Frequency division multiplexing. Time division multiplexing. Digital modulation techniques (ASK, PSK, FSK). Noise. Channel capacity. Shannon's theorem: Coding. Antennas. Propagation in the atmosphere. Link budget. Anti-jamming techniques. Security in communications. Applications to satellite communication systems. Applications to the analog and digital transmission of voice and TV images. Examples: Intesat, DSCS III, Immarrsat, VSAT.

PHY 341 Statistical Physics 3-1-5
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.

Subject matter: 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 345 Space Sciences 2-1-3
P PHY 211, PHY 262, CHM 242 (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.

Subject matter: 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
P PHY 345 (3 credits)
This course introduces the principles underlying the construction of spacecraft and the techniques pertaining to it.

Subject matter: 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.

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PHY 361 Atomic and Nuclear Physics 3-1-8
P PHY 451 (4 credits)
The objective of this course is the application of quantum mechanics to atomic and nuclear physics.

Subject matter: The hydrogen atom. Perturbation theory. Atomic spectra. Lasers. Introduction to nuclear physics.

PHY 362 Electro-Optics 3-1-5
P PHY 460 (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.

Subject matter: 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, which is shared with the Chemistry Department, 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.

Subject matter: 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 3-1-5
P PHY 311 **and Control** (3 credits)
This course introduces the techniques of satellite attitude dynamics, control and manoeuvre systems.

Subject matter: 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 422 Radiation 2-2-5
P PHY 322 (3 credits)
The objective of this course is to present the interaction of electromagnetic waves with anisotropic media, including plasma.

Subject matter: 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.

Subject matter: Number systems: conversion between 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.

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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.

Subject matter: 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 322 (3 credits)
This course is an introduction to the fundamental ideas of quantum mechanics.

Subject matter: Mathematical tools of quantum mechanics. Postulates of quantum mechanics. The harmonic oscillator. Angular momentum. Spin.

PHY 455 Space Operations 3-1-5
P PHY 350, PHY 411 (3 credits)
This course will enable the student to know and understand the different manoeuvres and operations in space and the motives behind them.

Subject matter: 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 maintenance catalogue.

PHY 460 Remote Sensing and Image Processing 3-1-5
P PHY 222, PHY 292 (3 credits)
The aim of this course is to present and explain the physical, mathematical and computational techniques used in image acquisition and processing.

Subject matter: 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 3-1-8
P PHY 262, PHY 341 (4 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.

Subject matter: Crystalline structures, X-ray diffraction, reciprocal lattice, Brillouin zones, Phonons, Energy bonds, metals semiconductors, insulators, superconductors, choice of experiments.

PHY 493/ PHY 494 Physics Project 0-6-6
(4 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

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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 0-6-6
PHY 496 Project (4 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
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.

Seminars

The Departments of the Division of Science offer their students a series of conferences. These conferences are given by qualified professors and researchers both from CMR and from other institutions, each of whom will discuss his field of specialization as well as its present state and needs.

This series of seminars is an essential complement to the regular courses. The program also includes visits to industries and laboratories, visits which are often of military interest as well. These presentations cover space and terrestrial subjects. They are of interest to all military classifications.

Invited Researcher
MARTIN M. PERLMAN
B.Sc., M.Sc., Ph.D. (McGill), F.A.P.S., F.Inst.P.L.

Research Assistants
PAUL ANDRY
B.Sc. (University of Waterloo, Canada), 1986
M.Sc. (Université de Sherbrooke, Canada) 1990
DIANE BOLOTEN
B.Ing. (McGill University, Canada) 1985
ANDRZEJ OKONIEWSKI
M.Sc. (Université de Pozman, Pologne), 1971
Ph.D (Académie des Sciences, Varsovie, Pologne), 1982

NSERC Visiting Fellowship in a Canadian Government Laboratory
MICHAELA SANIELEVICI
M.Sc. (University of Bucharest, Romania), 1977
Ph.D. (McGill University, Canada), 1986

SECOND LANGUAGES

SECOND LANGUAGE CENTRE

Centre Director
Ronald Wilkinson, B.A., B.Ed., M.A.

Senior Teachers
Jeannine Théberge, B.A., B.Péd.
Dorothy Zalcman Howard, B.A., D.I.A.

Language Teachers
Normand Arseneault, B.A., B.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.
Gregory Reid, B.A., M.A., G.D.C.S., Ph.D.
André Robichaud, B.A.
Judith Wolfe-Labbé, B.A., M.A.

Les descriptions des cours d'Anglais langue seconde se trouvent dans la section francaise sous «LANGUES SECONDES».

FRANÇAIS LANGUE SECONDE

602-102 L'année préparatoire (CMR 001) 3-1-2
602-202 (CMR 011) 3-1-2
(2 unités)

Le but de ce cours est de fournir à l'étudiant un aperçu des données fonctionnelles et grammaticales de base et de vérifier la compréhension par des contrôles réguliers selon un programme de lectures simples.

602-113 (CMR 002) 3-1-2
602-213 (CMR 012) 3-1-2
(2 unités)

L'objectif de ce cours est d'initier l'étudiant aux échanges oraux dans la salle de classe et à une participation à des activités d'écoute et d'expression au laboratoire de langue. Suite à ses activités, l'étudiant accomplira certaines tâches de lecture et d'exercices écrits comme travaux personnels en dehors des heures de classe.

602-323 (CMR 003) 3-1-2
602-403 (CMR 013) 3-1-2
(2 unités)

Le but de ce cours est d'atteindre les objectifs du niveau III en initiant l'étudiant à faire des lectures, à travailler en laboratoire, à comprendre et à appliquer des règles essentielles dans des devoirs revus et corrigés. Il appliquera ensuite ses nouvelles acquisitions dans la production orale, dans l'élaboration de jeux linguistiques et dans des jeux de rôles.

602-433 (CMR 004) 3-1-2
602-901 (CMR 014) 3-1-2
(2 unités)

Le cours utilise fréquemment des activités d'apprentissage telles que : forum, discussion, et table ronde où l'étudiant est amené à défendre ses opinions sur un roman, un article de journal ou un film visionné en classe. Il apprendra aussi à rédiger des textes.

602-911 (CMR 005) 3-1-2
602-934 (CMR 015) 3-1-2
(2 unités)

Dans ce cours on étudie le roman, le théâtre, la nouvelle, la chanson et la poésie. L'étudiant est responsable d'exposés, de travaux de recherche et de discussions sur les divers aspects culturels du Canada français ainsi que présenter en équipes divers projets faisant appel à toutes les ressources audio-visuelles.

602-302 Première année (CMR 101) 3-1-2
602-402 (CMR 111) 3-1-2
(2 unités)

Dans ce cours l'étudiant apprend à l'étudiant à utiliser sa compréhension auditive et son expression orale dans certaines formules de courtoisie et d'expressions simples se rapportant à "recevoir et donner des renseignements," ainsi qu'à "maîtriser certains dérivés et mots usuels." Le niveau visé en lecture sera "élémentaire" et l'étudiant devra pouvoir exprimer par écrit des idées simples en phrases courtes et faciles.

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602-303 **(CMR 102) 3-1-2**
602-313 **(CMR 112) 3-1-2**
(2 unités)

Ce cours amène l'étudiant à développer la communication orale et écrite afin de s'exprimer convenablement. Pour y parvenir, il devra utiliser un contenu linguistique et des fonctions à ce niveau et faire des exercices oraux au laboratoire. De plus, l'étudiant sera appelé à rédiger de courts textes dans le but d'améliorer son expression écrite.

602-413 **(CMR 103) 3-1-2**
602-423 **(CMR 113) 3-1-2**
(2 unités)

Dans ce cours l'étudiant aura à faire des exercices de compréhension auditive auxquels s'ajoutent des activités d'expression orale soit en classe, soit au laboratoire de langue. De plus on veut habiliter l'étudiant à lire des romans adaptés et à rédiger des résumés de lecture.

602-913 **(CMR 104) 3-1-2**
602-908 **(CMR 114) 3-1-2**
(2 unités)

Ce cours a pour but d'aider l'étudiant à prendre connaissance des nouveaux points grammaticaux en faisant des exercices écrits et oraux en classe, ainsi qu'au laboratoire, puis en les utilisant dans sa langue seconde. L'étudiant enrichira son vocabulaire, en faisant des lectures, en analysant des textes, en écoutant des cassettes audios et vidéos pour ensuite s'exprimer sur les sujets traités dans ces divers médias. Il apprendra aussi à s'exprimer à l'écrit, à nuancer sa pensée et à faire valoir ses opinions dans l'élaboration de rapports, de lettres à l'éditeur ou de lettres de service.

602-941 **(CMR 105) 3-1-2**
602-991 **(CMR 115) 3-1-2**
(2 unités)

Ce cours veut faciliter l'expression orale et les activités d'écoute par l'apport de films, de documentaires, d'émissions de radio et de télévision. On mettra l'accent sur l'expression de plus en plus précise de la pensée. Des revues scientifiques et générales serviront aux exercices de lecture et d'écriture.

FLS 201 **Deuxième année** **2-1-2**
FLS 211 **2-1-2**

Dans ce cours l'étudiant devra utiliser sa compréhension auditive et son expression orale dans certaines formules de courtoisie et d'expressions simples se rapportant à "recevoir et donner des renseignements," ainsi qu'à "maîtriser certains dérivés et mots usuels." Le niveau visé en lecture sera "élémentaire" et l'étudiant exprimera par écrit des idées simples en phrases courtes et faciles.

FLS 202 **2-1-2**
FLS 212 **2-1-2**

Ce cours apprendra à l'étudiant à se tirer d'affaire en compréhension auditive suffisamment bien pour lui permettre d'apprécier le sens général d'une communication. Il devra être capable de s'exprimer oralement sur les questions routinières en tenant compte cependant d'une certaine interférence de la langue maternelle. La compréhension de l'écrit et l'expression écrite seront contrôlées par l'utilisation des structures de base et des expressions les plus fréquentes.

FLS 203 **2-1-2**
FLS 213 **2-1-2**

L'objectif du cours est d'approfondir la grammaire de base; telle la concordance des temps : présent, passé composé, imparfait, conditionnel et subjonctif et l'utilisation de tous les pronoms. Le cours favorisera à ce niveau la forme du débat en langue seconde, les jeux de rôle, les présentations orales, ce qui permettra à l'étudiant de s'exprimer sans l'aide de modèle sur un sujet particulier. L'étudiant se familiarisera aussi avec les divers médias d'information : nouvelles enregistrées à la radio ou à la télévision, lecture de revues et de journaux.

FLS 204 **2-1-2**
FLS 214 **2-1-2**

Ce cours utilisera des films, des documentaires, des émissions de radio et de télévision comme point de départ à l'expression orale. Il assurera une revue

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complète de la grammaire française à ce niveau et comme générateurs d'activités d'écriture. L'étudiant exploitera journaux, revues scientifiques et générales.

FLS 302 **Troisième année** **2-1-2**
FLS 312 **2-1-2**
Ce cours veut amener l'étudiant à développer la communication orale et écrite pour s'exprimer selon les normes de connaissance qui correspondent à son niveau. Il utilisera pour ce faire un contenu linguistique et des fonctions de niveau II de même que des exercices oraux faits en laboratoire. L'étudiant aura également à rédiger de courts textes dans le but d'améliorer son expression écrite.

FLS 303 **2-1-2**
FLS 313 **2-1-2**
Dans ce cours l'étudiant aura à approfondir ses connaissances grammaticales et fonctionnelles selon les données générales du niveau III. Il apprendra à contrôler la concordance des temps : présent, passé composé, imparfait; mode subjonctif et l'utilisation de tous les pronoms.

FLS 304 **2-1-2**
FLS 314 **2-1-2**
Dans ce cours l'étudiant devra être capable de maîtriser une compréhension parfaite de la conversation en général et la capacité de saisir les nuances et les allusions. Sa performance orale témoignera d'une connaissance étendue et précise du vocabulaire général et d'une bonne connaissance des expressions idiomatiques. Il aura à démontrer une bonne compréhension des documents authentiques, de nature générale, technique et abstraite. Il lui faudra écrire en utilisant un niveau de vocabulaire avancé et des structures complexes.

FLS 402 **Quatrième année** **2-1-2**
FLS 412 **2-1-2**
Ce cours a pour but de permettre à l'étudiant de se tirer d'affaire en compréhension auditive suffisamment bien pour lui permettre d'apprécier le sens général d'une communication. Il devra être capable de s'exprimer oralement sur les questions routinières en tenant compte cependant d'une certaine interférence de la langue maternelle. La compréhension de l'écrit et l'expression écrite seront contrôlées par l'utilisation des structures de base et des expressions les plus fréquentes.

FLS 403 **2-1-2**
FLS 413 **2-1-2**
Ce cours veut rendre l'étudiant capable de faire fréquemment et régulièrement des exercices de laboratoire, des discussions dirigées et des analyses de textes extraits de journaux, de revues, etc. Les élèves doivent aussi rédiger des résumés de lecture de romans afin d'en discuter en table ronde.

FLS 404 **2-1-2**
FLS 414 **2-1-2**
Dans ce cours l'étudiant devra faire des exposés et défendre ses prises de position en expression orale; rédiger des rapports et faire des résumés d'articles en expression écrite. L'utilisation du conditionnel, des pronoms relatifs et indéfinis, les prépositions et toutes les propositions françaises constituent le programme de base. On ajoutera à l'occasion des articles de journaux et de revues que l'étudiant devra lire d'abord pour ensuite les présenter et les discuter en classe.

SOCIAL SCIENCES

DEPARTMENT OF SOCIAL SCIENCES

Head of Department
Philippe Constantineau, B.A., M.A., Ph.D.

Associate Professors
Marcel Bellavance, B.A., B.Hist., L.L., D.E.S., Ph.D.
François Gendron, B.A., M.A., LL.L., D.L.
Pierre Paquette, B.Com., M.A., Ph.D.

Assistant Professor
Captain Jean Gagnon, C.D., B.A., M.A., M.B.A.

Part-time Lecturers
Cylvie Claveau, B.A., M.A.
Donald Cuccioletta, B.A., M.A.
Jan Grabowski, B.A., M.A.
Marc Imbeault, B.A., M.A., D.E.A., Ph.D.
David Irwin, B.Sc., M.Sc.
Michel Lalonde, B.A., M.A., Ph.D.
Jean Matuszewski, B.Sc. Eco., M.B.A.
Gérard Montifroy, M.A., Ph.D.
Myroslaw Smereka, B.A., M.Sc.Eco.

300-300 Introduction to the methodology of the Social sciences 3-0-3 (2 units)
This course offers an updated assessment of the status of the social sciences in the field of knowledge, presents all of the basic concepts necessary for the analysis, evaluation and critique of scientific works, and practical knowledge on how to conduct a research project, from the initial hypothesis through to the final draft.

320-901 Economic Geography of Canada 3-0-3 (2 units)
This course presents the basic elements of the theory of economic geography as applied to the territory of Canada: the physical and human dimensions, the constants and the variables, the realities of a "crossroads" geography, the diversity of its major regions, its external/internal strongpoints, the realities of economic interdependance and the present trends.

330-915 Modern and Contemporary History from 1789 to the Present 3-0-3 (2 units)
The purpose of this course is to familiarize the students with the major 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 XXth century.

330-925 Canadian History from the Beginning to the Present 3-0-3 (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, by way of the great classic authors, 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 political regime; 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 explain the overall behaviour of an economy particularly that 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

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nationally and internationally, and enabling the students to evaluate and judge contemporary economic events, phenomena and policies. The course objectives are pursued in class 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)
This course aims at initiating students to the political, historical, cultural, economical and legal aspects of the Canadian political system and institutions.

SCH 252 Introduction to Canadian Studies 3-0-6
(3 credits)
The aim of this course is the study of all aspects of everyday life in Canada that make up the Canadian cultural identity, as it expresses itself in Canadian literature, performing arts, cinema, magazines, newspapers, radio and television.

SCH 254 Introduction to Sociology 3-0-6
(3 credits)
The purpose of this course is to introduce students to the basic concepts of sociology. It discusses the present the social basis of the interrelationship of individuals and society, it underlines the originality of modern society with regard to other types of society, and it provides an overview of the main social changes in contemporary societies (cultural, political, economic, etc.). Students will also be initiated to research methods in sociology.

SCH 311 Economic History in a Social Context 3-0-6
(3 credits)
This course is designed to give an overview of the evolution of economic thought (theory and doctrine) and of its relation to economic events, from Adam Smith to the present day. It will also confront students to contemporary socio-economic problems, particularly the relations between industrialized and poor countries.

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

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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)
This course proposes 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 undertake a comparative study of the two major partners who share the North American continent. By examining historical, political, economic and cultural dynamics between these two countries the students will be called upon to analyse the founding myths of Canada and the United States. Certain historical issues such as reciprocity and free trade and contemporary issues regarding multiculturalism and the "melting pot", as well as cross-cultural phenomenons and the role and structure of the State will be surveyed.

SCH 452 Canadian Society 3-0-6
(3 credits)
This course will endeavour to study and investigate, from a historical and critical perspective, certain social, political and economic policies and phenomenons that have contributed to developing Canada into a modern nation-state. The focus of study will be placed on various topics such as: the rise of liberalism and conservatism, immigration and the policy of multiculturalism, Canadian nationalism, Québec nationalism, economic regionalism, the labour movement, feminism and native rights.

SCH 460 Directed Research in Social Sciences and Practical Assignments 0-6-12
(6 credits)
Final year students complete their programme of studies in the Social Sciences with a research project demonstrating clearly not only an ability to properly put into practice the specific methodology of the social sciences but also the art of communicating their findings in a coherent and well-written paper which meets the requirements for a first university degree.

ACADEMIC REGULATIONS

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 of 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 a particular set of general and specific learning objectives sanctioned by CMR.

6. Discipline

A discipline is one of the various branches of learning (e.g., 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 (e.g., 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 (e.g., 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 enrolled in a particular curriculum.

11. Advanced course

A course normally within a 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

A course that a student must select from an offered group within his programme of study. Such elective courses carry appropriate credit, and marks obtained are included in the student's grade average.

13. Optional course

A course that a student may select and follow within his programme of study. This course is valid for credits but is not included in the student average.

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14. Extra course

A course that a student may take, even 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 prerequisite to other courses has been completed.

17. Carry a Course

When it has been recommended by the Faculty Council and approved by the Commandant, a student who fails a course carries it 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 meet in order to carry a course are determined by the Faculty Council. (see regulation 30,f)

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 from the CMC to which the student is transferring, a course may not be carried from one CMC to another.

18. Credits and Units

a. Credit

(1) 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.

(2) A credit represents 45 hours or periods per term of 15 weeks in a learning activity (courses, research, laboratories, seminars, individual work).

(3) 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...

b. 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.

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19. Bachelor's Degree

A Bachelor's degree programme requires at least 90 credits.

20. General Bachelor's Degree Programme

A General Bachelor's degree programme requires 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 in the same discipline or the same field of learning.

22. Major

A major requires 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 requires 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 requires a minimum of 18 credits which may be obtained in any discipline or field of learning.

25. Certificate Programme

A certificate programme requires a minimum of 30 credits.

26. Duration of the Programmes of Study

a. 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.

b. Entrance to the Preparatory Year requires completion of Junior Matriculation or its equivalent on condition the required prerequisite courses have been passed. 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: Academic Standing

The academic standing granted to the CMR university graduates is based on the cumulative average of the last two university years (see regulation 46).

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29. Collegiate Studies Certification

The College grants a Certification of Collegiate Studies to the students who have successfully completed the Preparatory Year and the First Year.

30. Programmes of study

a. Preparatory Year. All students registered in Preparatory Year are normally required to take the courses prescribed for the programme of study in which they are registered.

b. First Year. All First Year students are normally required to take the courses prescribed for the programme of study in which they are registered.

c. Second Year. All Second Year students are required to take the courses prescribed for the programme of study in which they are registered.

d. Third and Fourth Years.

Programmes for Third and Fourth Years are as follows:

(1) 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 discipline at Le Collège militaire royal de Saint-Jean.

(2) The remainder of the students may elect to complete their Third and Fourth Years as follows:

(a) at CMR in Science or in another programme of study, under the conditions specified by CMR;

(b) at RMC in Arts, Science or Engineering, under the conditions specified by RMC;

(c) at RRMC in Military and Strategic Studies, Sciences or Oceanography, under the conditions specified by RRMC.

(3) 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.

e. 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" of this calendar.

f. 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.

g. 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.

h. For cause stated, the Faculty Council may 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.

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i. A student who has been advised not to take certain specific courses or programmes 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.

j. 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.

k. 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 programme at a school or university for two years may be admitted at CMR as mature students.

l. 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.

31. Second language

a. 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 "exemption" bilingualism level.

b. After Preparatory Year, students who attain the "exemption" level are no longer required to take second language training

c. The "exemption" level is defined as scores of at least 4 in listening and speaking, with a minimum total of 14 (eg: 4433).(see following paragraphe)

d. Second language proficiency is a degree requirement for officer cadets. The minimum language profile requirement (which is under review) has been established at 2222 (or any combination of the four profile scores totalling not less than 8) in the four second language skills: listening comprehension, oral expression, reading comprehension and written expression.

32. Language of instruction

Students normally take their courses in their mother tongue. However in order to perfect his mastery in his second language, at the end of his second year a student may request permission from the Faculty council to take a course and/or programme in his second language. Permission may be granted under the following conditions;

a. the study programme is available in that language;

b. the student's mastery in writery his mother tongue is good (he has passed the classification test and maintained average marks in his litterary studies courses);

c. the student's mastery of second language is sufficient to insure he can grasp the course content (linguistic profile 3333).

33. Drill and Physical Education

Courses in Drill and Physical Education must be taken by all students in all years.

34. Continuity of Studies

a. 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.

b. Interruption of Studies - Under normal circumstances, a student may not postpone a year of study.

c. Change in the programme of study:

(1) The Deans' Committee may, at any time during the first semester of the Preparatory

ACADEMIC REGULATIONS

Year, authorize a change of programme request from a student having learning difficulties.

(2) A student other than those mentioned in the previous regulation may not change his programme of study without the permission of the Faculty Council.

(3) Withdrawal from a Course:

(a) 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;

(b) Advanced course - A student may withdraw from an advanced course, which is an integral part of his programme of study and which he has chosen at registration, only during the first four (4) weeks of the term during which the course is offered. After the four week period, any withdrawal, success or failure on a final examination as well as success or failure on a supplemental examination will be reported on the report card;

(c) Extra course - A student may withdraw from an extra course, which he has chosen at registration only, during the first eight (8) weeks of the term during which the course is offered. After the eight week period, any withdrawal, success or failure on a final examination as well as success or failure on a supplemental examination will be reported on the report card;

(d) Optional course - A student may only withdraw from an optional course, which he has chosen at registration only, during the first eight (8) weeks of the term during which the course is offered. After the eight week period, any withdrawal, success or failure on a final examination as well as success or failure on a supplemental examination will be reported on the report card.

d. 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.

35. 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 exemption level of bilingualism is not required to take second language courses.

36. 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

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must be judged by CMR to be equivalent in content to courses required for a CMR degree.

37. Success Criteria

a. To successfully complete a programme, a student must successfully complete all courses of his/her programme of study and earn a favourable report on officer-like qualities as well as meeting the Physical Education, Drill and Second Language standards;

b. To be granted Pass Standing, a student must obtain:

(1) a minimum overall average of 50 per cent except fo a student's first term at CMR;

(2) a minimum of 50 per cent in each course excluding a course passed with failed-credit;

(3) Further to academic requirement, an officer cadet must obtain a satisfactory standard in Physical Education, Drill and Second Language, and a favourable report on officer-like qualities;

c. 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.

38. Final Examinations

a. Final examinations will be held at the end of each term.

b. A student may write his examinations in either English or French, except for the examination in Second Language.

c. 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.

d. A student may be refused permission to write an examination:

(1) in any course involving practical work in a laboratory, if his laboratory work has been unsatisfactory;

(2) in any other course if he fails to meet the requirements with regard to assignments.

39. Supplemental Examinations

a. 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 have obtained at least 20 per cent in the failed subject.

b. Supplemental examinations will be written at the end of each term.

c. Following an end of term failure in a course, no second supplemental examination is allowed in that course for that term.

d. To obtain pass standing in a supplemental examination, a student must obtain 50 per cent, not including the previous term marks or examination mark.

e. Marks obtained in supplemental examinations shall not be used to raise a student's academic average in any term.

f. Normally a student must obtain at least 30 per cent in a supplemental exam before being considered eligible to carry a course.

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40. 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.

41. Failure of 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.

42. Repeating a Term

a. A student:

(1) may be permitted to repeat any term, but he may only repeat once in the four or five-year program; and

(2) must be authorized to repeat a term by NDHQ on the recommendations of the Faculty Council and the Commandant.

b. A student permitted to repeat a term must carry the equivalent workload of his full programme of study.

43. Dismissal

a. A student who fails in more than three courses in any term programme of study shall normally be required to withdraw.

b. 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.

c. 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.

44. Academic Misconduct

a. PLAGIARISM:

Plagiarism is the presentation or 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 constitutes plagiarism.

b. 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.

c. 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.

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45. Prizes and awards

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.

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 for prizes and awards.

Officers of the UTPO plan are not eligible for prizes and awards offered to officer cadets of the ROTP/RETP/UTPNCM plans.

46. Academic Standing

The grading scale for Academic Standing is as follows:

	Percentage Grade	Letter Grade	Conversion Scale
First	94-100	A+	95
Class	87-93	A	90
Honours	80-96	A-	83
Second	76-79	B+	78
Class	73-75	B	75
Honours	70-72	B-	72
Third	66-69	C+	68
Class	63-65	C	65
Honours	60-62	C-	62
Pass	56-59	D+	58
Standing	53-55	D	55
	50-52	D-	52
Failure	40-49	E	45
Serious Failure	Less than 40		20

Note:

Professors may give percentage grades or letter grades. The Registrar will use the conversion scale shown above to calculate general averages and establish grade.

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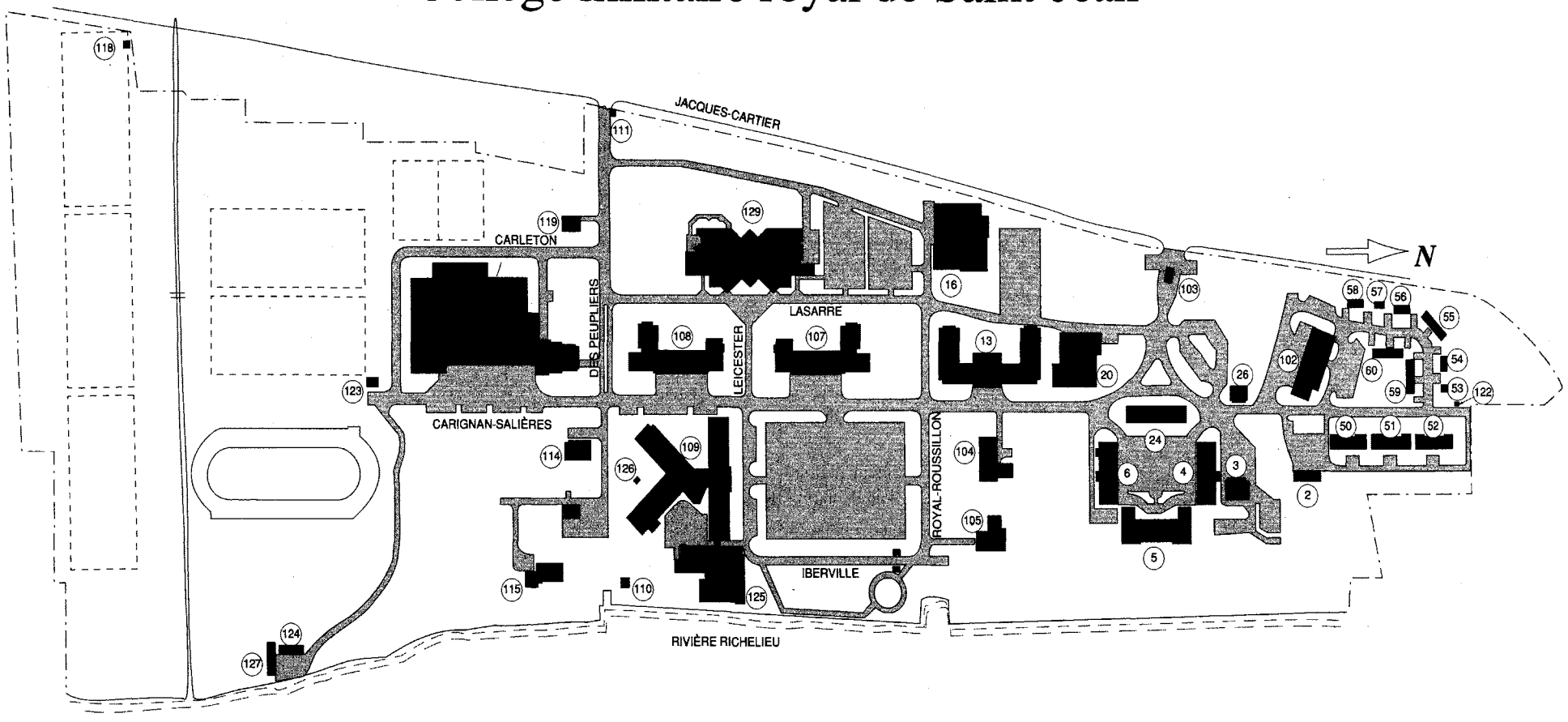
OCCUPATIONS AND UNDERGRADUATE COURSE PATTERNS

		•Programmes offered at CMC	ENGINEERING														SCIENCE													
			General	Aeronautical	Aerospace	Chemical & Mathematics•	Civil•	Computer•	Electrical•	Engineering & Management•	Engineering Physics•	Marine	Naval Architecture	Mechanical•	Nuclear	Software	Systems	General•	Applied (RMC)•	Applied Military Psychology•	Astronomy	Biochemistry	Biology	Chemistry•	Computer•	Geology	Information Systems	Mathematics & Physics•	Mathematics, Applied Math	Oceanography	Physics,• Applied Physics•	Physics & Oceanography•	Space Science•
21	ARMD		1	4	3	2	2	2	2	1	2	4	4	2	3	2	2	1	1	2	4	3	3	3	2	3	2	2	2	4	2	3	2
22	ARTY		1	4	3	2	2	2	2	1	2	4	4	2	3	2	2	1	1	2	4	3	3	3	2	3	2	2	2	4	2	3	2
23	INF		1	4	3	2	2	2	2	1	2	4	4	2	3	2	2	1	1	1	4	3	3	3	2	3	2	2	2	4	2	3	2
31	A NAV		2	1	1	2	3	2	2	2	2	4	4	2	3	2	2	2	2	2	2	1	3	3	3	2	3	2	2	2	4	2	2
32	PLT		1	1	1	2	2	2	1	2	2	4	4	2	3	2	2	2	2	2	2	3	3	1	2	3	2	2	2	4	2	3	2
41	AERE		2	1	1	2	1	1	1	2	2	4	4	1	4	2	2	4	3	4	4	4	4	4	2	4	3	2	3	4	2	4	2
42	CELE		2	2	2	2	2	1	1	1	2	4	4	2	3	1	2	3	2	4	4	4	4	4	1	4	1	2	2	4	2	3	2
43	LEME		2	2	2	1	2	1	1	1	1	4	4	1	3	1	1	2	2	4	4	4	4	3	1	4	1	1	2	4	1	2	2
44B	MARE/MS		2	4	4	2	2	2	1	2	2	1	2	1	2	2	2	4	2	4	4	4	4	4	2	4	3	2	3	4	2	2	4
44C	MARE/CS		2	3	3	2	2	2	1	2	2	2	3	2	3	2	2	4	2	4	4	4	4	4	2	4	2	2	2	4	2	2	2
44E	MARE/NA		3	4	4	2	1	3	2	3	2	1	1	1	4	3	3	4	3	4	4	4	4	4	3	4	4	2	2	4	2	2	4
45	MILE		2	4	4	2	1	2	2	2	3	4	4	2	3	3	3	4	2	4	4	4	4	4	2	4	3	3	3	4	3	4	4
63	ATC		2	1	1	3	3	1	3	2	4	4	4	2	3	1	1	2	2	3	3	3	3	3	1	3	2	1	1	4	2	2	2
64	AWC		1	1	1	3	2	1	2	1	2	4	4	1	3	1	1	1	1	2	3	3	3	3	1	4	1	1	1	3	2	2	1
68	PADM		4	4	4	4	4	3	4	4	4	4	4	4	4	2	3	3	3	2	4	4	3	3	2	4	2	3	3	4	3	4	4
69	LOG		2	4	4	2	3	2	3	2	3	4	4	3	3	2	3	2	2	2	4	4	3	3	2	3	2	2	2	4	2	3	2
71	MARS		2	4	4	2	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	1	1	2	3	3	3	3	1	3	2	2	2
81	SEC		2	4	4	2	2	2	2	2	2	4	4	2	3	2	2	1	1	1	4	4	2	2	1	3	1	3	2	4	2	2	3

		•Programmes offered at CMC	ARTS																						
			General	Accounting	Administration•	Anthropology	Applied Military Psychology•	Asian Studies	Business Administration	Canadian Studies	Commerce•	Criminology	East Asiatic Studies	Economics•	English•	Finance	French	Geography	History•	International Studies	Languages	Military & Strategic Studies•	Political Science•	Psychology	Social Science•	War Studies
21	ARMD		1	1	1	3	2	2	2	2	2	3	2	2	2	2	2	2	2	1	1	1	2	2	2	1
22	ARTY		1	2	2	3	2	2	2	2	2	3	2	2	2	2	2	2	2	1	1	1	2	2	2	1
23	INF		1	2	1	3	2	2	2	2	2	3	2	2	2	2	2	2	2	1	1	1	2	2	2	1
31	A NAV		2	2	2	3	2	3	2	2	2	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
32	PLT		2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	2	2	1	2	1	2	2	2	2
41	AERE		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
42	CELE		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
43	LEME		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
44B	MARE/MS		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
44C	MARE/CS		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
44E	MARE/NA		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
45	MILE		4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
63	ATC		2	2	1	3	3	3	2	2	2	4	3	1	2	2	2	2	2	2	2	2	2	2	2	2
64	AWC		2	3	1	3	2	2	2	2	2	4	2	2	2	2	2	2	2	2	2	2	2	2	2	2
68	PADM		2	3	1	2	2	3	1	2	1	3	3	2	2	2	2	2	2	2	2	2	2	2	2	2
69	LOG		2	2	1	3	2	2	1	2	2	3	2	2	3	1	2	2	2	2	2	2	2	2	2	2
71	MARS		1	2	1	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
81	SEC		2	2	1	3	1	2	2	2	2	1	2	2	2	2	2	2	2	1	2	1	1	2	2	2

LEGEND
1. Preferred
2. Fully acceptable
3. Acceptable
4. Not subsidized

Collège militaire royal de Saint-Jean



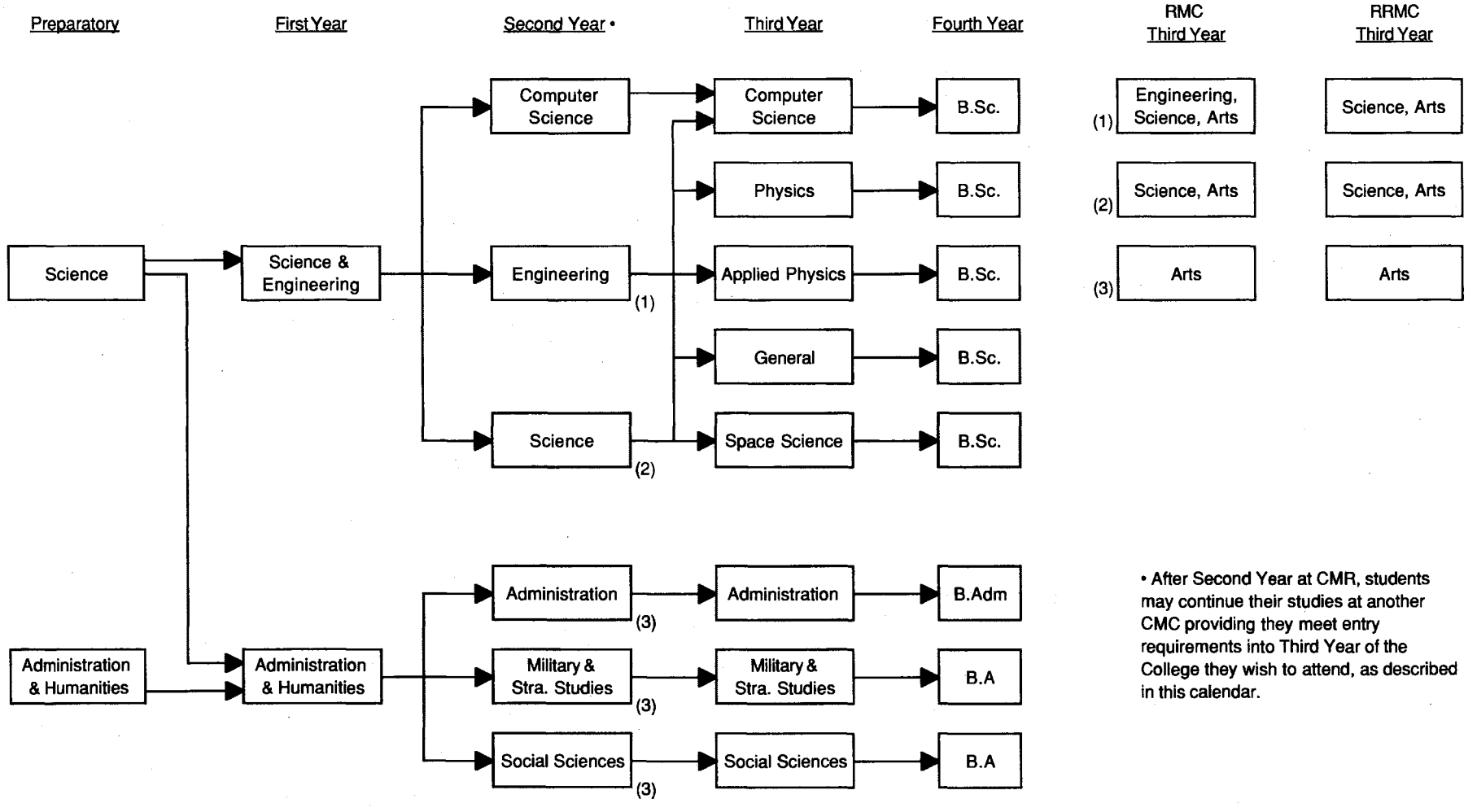
2. C.E. Storage
3. WO & Sgts Mess
4. Montcalm Block
5. Officers' Mess
6. La Galissonnière Blk.
13. Maisonneuve Block
16. Drill Hall
20. Supply
24. Massey Pavillon
26. Museum

50. P.M.Q. 4, 5, 6, 7
51. " 8, 9, 10, 11
52. " 12, 13, 14, 15
53. " 16
54. " 18, 20
55. " 22, 24, 26, 28
56. " 30, 32
57. " 33
58. " 34, 35
59. " 17, 19, 21, 23
60. " 25, 27, 29, 31

102. Service Building
103. Gate House
104. R.C. Chapel
105. PROT. Chapel
107. Champlain Block
108. Cartier Block
109. De Lery Pavillon
110. Storm lift station
111. San. lift station
114. P.M.Q. 2
115. P.M.Q. 1

116. Vanier Hall
118. Meter pit
119. P.M.Q. 3
122. North flow bldg.
123. South flow bldg.
124. Marina
125. Lahaie Pavillon
126. Chem. Warehouse
127. Marina warehouse
129. OCdts' Mess

Programmes of study



• After Second Year at CMR, students may continue their studies at another CMC providing they meet entry requirements into Third Year of the College they wish to attend, as described in this calendar.