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Le Collège militaire royal

de

Saint-Jean

Calendar

1986-1987

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

1986

January

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CANADIAN MILITARY COLLEGES ADVISORY BOARD

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Chief of the Defence Staff
Vice-Chief of the Defence Staff
Assistant Deputy Minister (Personnel)
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Secretary

Major D.B. Evans, CD, PSC*, BA, MBA

THE CANADIAN MILITARY COLLEGES

There are three Military Colleges in Canada:

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

Royal Roads Military College (RRMC) at Victoria, British Columbia; and

Le Collège militaire royal de Saint-Jean (CMR) at Saint-Jean-sur-Richelieu, Québec.

ROLE AND OBJECTIVE

The role and objective of the Canadian Military Colleges is:

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

   (1) providing a university-level education in appropriate disciplines designed on a broad base to meet the unique needs of the forces,

   (2) developing qualities of leadership,

   (3) developing the ability to communicate in both official languages and an understanding of the principles of biculturalism,

   (4) developing a high standard of personal fitness,

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

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

ACADEMIC OPPORTUNITIES

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

Course duration

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

Language training

Commencing with the 1986 new entry candidates, all CMC officer cadets will be required to demonstrate a regular and adequate individual progress in their second official language in order to graduate. Students will be given this opportunity through an intensive compulsory second language training program during each of their academic years, as well as during one of the summer training periods. Those students who initially demonstrate a high level of competence in their second language will be exempted from this program after their preparatory year, as well as being exempted from the summer language training program. They will, however, be required to maintain a high level of competence in order to graduate. College regulations specify the exact requirements for all new entry candidates for 1986 and beyond.

CMR offers its courses in both official languages; except the Military and Strategic Studies program which is offered in French only. In addition, CMR provides an institutional form of bilingualism which means that all aspects of college life and business are conducted in either official language.

RMC offers its courses in English; except for the various Engineering programs which are offered in both official languages.

Military Leadership studies

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

MILITARY TRAINING

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

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

Service Qualifications

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

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

Military Career groups and classifications

Upon enrolment, officer cadets are assigned to one of five Career Groupings — Sea Operations, Land Operations, Air Operations, Engineering or Support. Thus, before making an application, you should think seriously about the selection of your future occupation as an officer. During your first academic year, you will have to make a choice of two or three officer classifications from within your career grouping. This aspect of your application is therefore very important as changes in groupings are not normally approved. It is wise to seek advice from the Military Career Counsellor at the Recruiting Centre before you agree to a career grouping. (See Figure 3 at the end of the English text.)

Armed Forces counselling

Officers from each of the five career groupings are included on the staff of the three colleges and are responsible for the military career counselling of all students. These officers are available at all times to answer queries on military matters and to offer advice on careers in the Canadian Forces.

Initial training

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

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

Training in subsequent summers

Except those entering CMR in the preparatory year, officer cadets will spend the summer following the first academic year pursuing a course of intensive language training as described earlier.

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

PHYSICAL EDUCATION & ATHLETICS

This program 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 program under the professional guidance of the Athletic Department. The physical education and athletic program is divided into four areas: physical education, intramural sports, intercollegiate sports, and recreation activities.

Physical Education

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

Intercollegiate sports

All popular Canadian sports are played at the intercollegiate level. These include team sports such as football, soccer, hockey, volleyball and basketball and individual sports such as judo and cross-country running. Approximately 35 per cent of the students participate in this program.

Athletic activities

Badminton
Basketball
Broomball
Cross-country
Curling
European Handball
Fencing
Football
Golf
Gymnastics
Hockey
Judo
Pistol
Racquetball
Rifle
Rugby
Sailing
Skiing
Soccer
Softball
Squash
Swimming
Tennis
Track and Field
Volleyball
Waterpolo
Wrestling

NOTES — 1. The variety of sports varies slightly at each college and from year to year.

2. Participation in these sports is either at the intercollegiate intramural or physical education class level.

The athletic program offered at the military colleges is comprehensive, well balanced, one which affords students the opportunity to participate in most major team and individual sports. A wide range of facilities, coupled with expert coaching, enables the development of abilities at progressive proficiency levels.

LIFE AT THE COLLEGES

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

Weekday routine

Although the program 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:

06:30 hours	— Réveille
06:35 — 07:20 hours	— Wash, Shave, Dress Defaulters Parade Room Inspections
06:40 — 08:00 hours	— Breakfast
08:00 — 12:00 hours	— Classes
11:30 — 12:15 hours	— Lunch (First Sitting)
12:30 — 13:15 hours	— Lunch (Second Sitting)
13:00 — 16:00 hours	— Classes
16:00 — 18:00 hours	— Sports (Mon-Tue-Thu-Fri) Cultural — Non-Athletic recreation (Wed)
18:00 — 19:00 hours	— Dinner
19:00 — 22:00 hours	— Study Period
23:00 hours	— Lights Out for Preparatory Year Officer Cadets

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

Officer Cadet Organization

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

Activities

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

Cultural organizations

A large number of clubs provide outlets for students special interest, art, chess, debating, drama, photography, war games, Canadian

Aeronautical Space Institute, international relations, and the Engineering Society. Other organizations such as the Music Club (records and record players), the Electronics Club (including short wave stations) and the Entertainment Committee (for dances and other activities), and the production of monthly newspapers and college Year Books will give you experience in management. Student participation is sponsored in national and international gatherings, various university-conducted forums, etc. Religious clubs such as the Newman Club and Iota Sigma are also active. Although some of the listed clubs are active at only one college, most are run in all three colleges, depending upon interest.

Recreation

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

Social

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

Religion

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

The Ex-Cadet Clubs

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

ADMISSION PLANS

There are two alternate plans for admission: the Regular Officer Training Plan (ROTP) and the Reserve Entry Training Plan (RETP).

Regular Officer Training Plan (ROTP)

The defence program 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 principle 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, officier cadets are paid a monthly allowance, with annual increases. This allowance comes as a salary with monthly deductions for income tax, supplementary death benefits, pension plan, rations, and quarters. Free medical and dental care is provided through the entire training period. Annual leave with pay is granted according to regulations.

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

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

At CMR Preparatory year and new First year officer cadets may request to be released without obligation on their part. Such release requests will only be entertained at the following times during the academic year:

(1) on the 1st of November;

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

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

An officer cadet may be granted a voluntary release after the beginning of his second academic year, provided the Crown is repaid the cost of subsidization under the ROTP. Release within five years of graduation 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 ROTP sponsorship at a recognized post-secondary institution under the terms of the ROTP.

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 program.

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

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

Fees (Reserve Entry Officer Cadets only)

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

a. $540.00 each term for tuition, clothing, books, instruments, drawing materials and incidental expenses;

b. approximately $875.00 per term to defray the cost of meals and accommodation;

c. an annual Recreation Club Fee of $80.00, including $20.00 for the Recreation Association; and

d. a deposit account of $100.00 to be paid on admission to the initial year to cover losses, breakages and additional expenditures. Each subsequent year, an sum sufficient to restore this account to $100.00. The balance remaining in a cadet's deposit account will be refunded at the time of graduation or release.

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

GENERAL INFORMATION

Information

Complete information on the ROTP or the RETP can be obtained from the Director of Recruiting and Selection, National Defence Headquarters, Ottawa, Ontario, K1A 0K2; from any Canadian Forces Recruiting units listed in the yellow pages under ''Recruiting'', or from the Registrar at one of the Canadian Military Colleges:

Collège militaire royal de Saint-Jean,
St-Jean-sur-Richelieu, Quebec J0J 1R0,
Tel. 514-346-2131 (Ext. 3519)

The Royal Military College of Canada,
Kingston, Ontario K7L 2W3
Tel. 613-545-7302

Royal Roads Military College, Victoria,
British Columbia V0S 1B0
Tel. 604-380-4514

ADMISSION REQUIREMENTS

General qualifications

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

a. be a Canadian citizen;

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

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

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

e. meet the medical standards for enrolment as prescribed;

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

g. be single;

h. possess the necessary academic qualifications.

Physical requirements

Candidates are required to meet the common enrolment standards of the Canadian Forces. The fundamental medical requirement is a sound, healthy body with normal mental and muscular co-ordination. Particular attention is given to the cardiovascular system, the respiratory system, central nervous system, visual acuity, colour vision, eye muscle balance, organs of speech and hearing acuity. Any condition which, in its

present state, or in a more advanced state, could limit your career as a member of the Canadian Forces will be cause for rejection. You should be prepared to participate fully in a vigorous, progressive physical training program.

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

Requirements

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

	CMR — Prep Year Junior Matriculation	RMC, RRMC and CMR Senior Matriculation
Nfld	Grade XI	1st year university, or equivalent
P.E.I.	Grade XI	Grade XII
Nova Scotia	Grade XI	Grade XII
N.B.	according to dossier	Grade XII*
Québec	High School Leaving (XI) Secondaire V**	CEGEP I or equivalent***
Ontario	Grade XII	Grade XIII or equivalent***
Manitoba	Grade XI	Grade XII
Sask.	Grade XI	Grade XII
Alberta	Grade XI	Grade XII
B.C.	Grade XI	Grade XII

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

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

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

** See academic requirements for Preparatory year, page 36.

*** 14 Courses (See: Program Outline — Preparatory Year (Page 50).

Admission Procedure

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

Application date

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

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

Selection procedure

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

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

Final selection is based on academic standing and on the recommendations of the Interview and Medical Boards and is made by the Final Board of Selection. Selection is competitive on the bases of merit, and, possession of the minimum admission requirements does not give assurance of acceptance.

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 BOTC (seniors only), when they must report to their CMC, of the procedures to be followed, and of the clothing and equipment they should bring with them. They also will be given instructions about transportation and travelling allowances.

UNIVERSITY TRAINING PLAN — OFFICERS (UTPO)

Officers of the Regular Force who are candidates for the University Training Plan — Officers (UTPO) may be selected to attend Le Collège

militaire royal de Saint-Jean, the Royal Military College of Canada, or the Royal Roads Military College, in accordance with the rules and procedures set forth in CFAO 9-40, University Training Plan — Officers.

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

UNIVERSITY TRAINING PLAN — OTHER RANKS (UTPOR)

Men and women of the Regular Force who apply for enrolment under the University Training Plan — Other Ranks (UTPOR) may be selected to attend Le Collège militaire royal de Saint-Jean, the Royal Military College of Canada, or the Royal Roads Military College, in accordance with the policy and administrative procedures set forth in CFAO 9-13, University Training Plan — Men.

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.

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

SCHOLARSHIPS, BURSARIES AND DOMINION CADETSHIPS

Scholarships and Bursaries

Regular Officer Training Plan

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

Reserve Entry Plan

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

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.

Royal Military College Club of Canada Foundation Scholarship

Scholarships annually are open to competition among all Reserve Entry applicants for admission to the Canadian Military Colleges. Each scholarship has a value of $1000.00. An applicant, to be awarded a scholarship, must be an accepted Reserve Entry candidate for Royal Military College of Canada, Kingston, Ontario; Royal Roads, Victoria, BC.; or Le Collège militaire royal de Saint-Jean, Saint-Jean-sur-Richelieu (Québec). Further information may be obtained from the Secretary-Treasurer, RMC Club of Canada, Royal Military College of Canada, Kingston, Ontario.

COLLÈGE MILITAIRE ROYAL DE SAINT-JEAN

ACADEMIC YEAR 1986-1987

First term

Aug	9	Sat	Recruits arrive.
Aug	23	Sat	Students return.
Aug	24-26	Sun-Tues	Administration Days.
Aug	27	Wed	Classes start.
Sep	1	Mon	Labor Day: Holiday.
Oct	4	Sat	Fall Prize Giving Ceremonies.
Oct	13	Mon	Thanksgiving: Holiday.
Nov	11	Tues	Remembrance Day: Holiday.
Dec	5	Fri	Classes end.
Dec	6	Sat	Exams start.
Dec	16	Tues	Exams end.
Dec	18	Thurs	Faculty Board/Faculty Council, (Study of Marks).
Dec 19 -	Jan 5	Fri-Mon	Christmas Leave.
Jan	3-5	Sat-Mon	Supplemental Examinations.
Jan	7-8	Wed-Thurs	Faculty Council (Study of Marks).

Second Term

Jan	5	Mon	Students return.
Jan	6	Tues	Classes start.
Feb 28 -	Mar 8	Sat-Sun	Spring break.
Apr	17	Fri	Easter: Holiday.
Apr	20	Mon	Classes end.
Apr	21	Tues	Exams start.
May	2	Sat	Exams end.
May	5	Tues	Faculty Board/Faculty Council (Study of Marks)
May	6-7	Wed-Thurs	Supplemental Examinations for 4th Year.
May	8	Fri	Faculty Council (Study of Marks).
May	8-9	Fri-Sat	End of Year Ceremonies and Graduation Ball.
May	11-12-13	Mon-Tue-Wed	Supplementary Exams for remaining years
May	15	Fri	Faculty Council (Study of Marks)

SENATE OF THE COLLÈGE MILITAIRE ROYAL DE SAINT-JEAN

Chancellor and President

The minister of National Defence, The Honourable Erik Nielsen, DFC, PC, QC, LLB (Dalhousie, MP).

Vice-chancellor

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CD, ADC, BSc (RMC),
Commandant.

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D ès L (Sherbrooke),
Associate Professor of Literary Studies.

GÉRARD NORMAND,
LSc (Phys), BSc (Math (Montréal),
MSc (Math) (McGill),
Associate Professor of Mathematics.

MARIAN OLYNYK,
BA (SGWU), MA (Columbia), PhD (Montréal),
Assistant Professor of Second Languages.

MICHEL PAGEAU,
CD, BA (Ottawa), MPs (Montréal),
Associate Professor of Military Leadership and Management.

PIERRE PAQUETTE,
BCom (Montréal), MA, PhD (McGill),
Assistant Professor of Economics.

CLARENCE PARÉ,
BA (Windsor),
Academic Advisor, Senior Instructor in French.

RICHARD PELLETIER,
BA, BPéd (Montréal), BA Sp.
Cert. TME (Credif) (Paris),
Language Instructor in French.

ROBERT PLOUFFE,
BPéd, BA, MA,
Language Instructor in French.

MARTIN PERLMAN,
BSc, MSc, PhD (McGill), F.Aps.,
F. Inst. P (UK),
Professor of Physics and
Associate Professor at Sherbrooke Univ.

GUY PROVOST,
BA (RMC), MA, D ès L (Laval),
Associate Professor of Literary Studies.

CAPTAIN ALAIN RAMBO,
BSc (CMR), MSc, PhD (Sherbrooke),
Assistant Professor of Physics.

GREGORY REID,
BA, MA (Carleton), Dip.Com. (Loyola),
Language Instructor in English.

MAJOR PIERRE RIVARD,
CD, BEng (Mech) (RMC), MBA (Western),
Lecturer in Administration.

JEAN-PAUL RIVET,
BSc (SGWU), MA (Columbia),
Associate Professor of Mathematics.

ANDRÉ ROBICHAUD,
B ès Arts, BAcc (Trois-Rivières),
Language Instructor in French.

DAVID RUDDY,
BSc, MA (Fordham), PhD (St. Andrews),
FSA (Scot), KCLJ, KH.,
Associate Professor of History
and Political Science.

JEAN SAVOIE,
BSc, MSc, PhD (Montréal),
Assistant Professor of Mathematics.

LORNE SHIRINIAN,
BA (Toronto), MA (Carleton),
Language Instructor in English.

PIERRE SMITH,
BSc, PhD (McGill),
Assistant Professor of Chemistry.

ARMAND ST-PIERRE,
BSc (Sherbrooke), BCom (Laval),
BScCompt (UQAM), MBA (McGill),
D. in Management (McGill), RIA, CGA,
Associate Professor of Management.

SESHA SUBRAMANIAN,
BSc, MA (Madras), PhD (Indian Inst.
of Science, Bangalore),
Associate Professor of Physics.

MOHOMMAD TAJUDDIN,
BA, MA (India), MA (Chicago),
PhD (Indiana),
Associate Professor of Literary Studies.

RAYMOND THIBAULT,
BPéd,
Language Instructor in French.

JAMES L. THOMPSON,
BA, MA, PhD (Queen's), PChem.,
Professor of Chemistry.

JOAN THOMPSON,
BA, TESL, MA,
Language Instructor in English.

LIEUTENANT-COMMANDER
ALLISTER THORNE,
CD, BEng (RMC), MBA (Dalhousie),
Assistant Professor of Management.

PETER TOY,
BA (McGill), MA (California),
DAc (Montréal),
Lecturer in Military Leadership
and Management.

FLORENT TREMBLAY,
BA (Montréal), BEd (Laval),
MA (Cleveland), PhD (Washington),
Associate Professor of Literary Studies
and of Second Languages.

MAJOR RÉAL TREMBLAY,
CD, BCom (Ottawa), MBA (Montréal),
AdmA,
Assistant Professor of Management.

CAPTAIN GUIMOND VACHON,
CD, BEng (Laval), MEng (Queen's), Ing.,
Assistant Professor in Sciences and
Engineering.

DENIS VALOIS,
BSc (Montréal),
Lecturer in Computer Sciences and
Engineering.

MAJOR PAUL VEILLET,
BSc, MSc,
Lecturer in Mathematics.

JUDITH WOLFE,
BA (Trinity College), MA (Queen's),
Language Instructor in English.

JOSEPH ZAUHAR,
BSc (Ottawa), MSc, DSc (Laval), PChem.,
Professor of Chemistry.

Library Staff

GRETCHEN CHEUNG,
BA (UBC), MLS (McGill),
Chief Librarian.

LÉANDRE RACICOT,
BA (Laval), B Bibl (Montréal),
Assistant Librarian and Chief Cataloguer.

PAUL TREMBLAY,
BA, B Bibl (Montréal),
Reference Librarian.

LISE LAFLÈCHE,
BA (Montréal), MLS (Montréal),
Acquisitions Librarian.

Audio-Visual Resources Center

CAPTAIN DENIS BEAULIEU,
CD, BADM (CMR),
Director.

Computing Services Center

A.J. BYSTRZYCKI,
B Comp Sc. (Concordia),
Director.

A. BÉLANGER,
BEng, (B Comp Sc.) (Laval),
Analyst-Programmer.

M. SCHMIDT,
Honeywell Senior-Analyst.

R. FOURNIER,
BA (Western Ontario),
Honeywell Analyst.

Y. DESHAIES,
BSc (Geography) (Sherbrooke),
Honeywell Programmer/Operator.

T. PROULX,
B Comp Sc. (UQAM),
Honeywell Programmer/Operator.

Research Assistants

P. BOUCHARD
B.Ing. (Polytechnique), MScA (Polytechnique)
Member of OIQ.

S. HARIDOSS,
BSc (Madras, India),
MSc, PhD (Indian Inst. of Technology, Madras, India).

J. LEWANDOWSKI,
B.Ens.Sec. (France), Engineer (École supérieure d'optique, Paris)
MSc (Phys) (Polytechnique, Montréal), and *member of OIQ*

B. NOIRHOMME
Licence et PhD (Université libre de Bruxelles).

Chemistry
Research Assistants

D. BOUCHER,
BSc (Montréal).

N. HOTA,
BSc (India), MSc (BC), PhD (Western Ontario).

MILITARY WING

Director of Officer Cadets

Lieutenant-Colonel L.A. Vachon
CD, plsc, pcsc, BA (RMC)

Staff Officers

Training: Major G. Babkine, CD, psc, BA (RMC)
Careers: Major J.R. Lessard
Projects and Bilingualism: Lieutenant-Commander D.J. LeBlanc
CD, psc, BSc (CMR)

Squadron Commanders

Vaudreuil (No. 1) Squadron
Captain J.P.A. Chiasson, CD, psc, BSc (CMR)

Tracy (No. 2) Squadron
Captain J.R.M.G. Laroache

Jolliet (No. 3) Squadron
Captain J.L.C.M. Lavallée

Hudson (No. 4) Squadron
Captain L.M.Y. Picard

Iberville (No. 5) Squadron
Lieutenant (N) J.J.R.R. Bergeron, BAdm (CMR)

Preston (No. 6) Squadron
Captain J.J.R. Rouillard, BSc (CMR)

Montcalm (No. 7) Squadron
Captain J.R.C. Tardif, CED, psc, BAdm (CMR)

St-Laurent (No. 8) Squadron
Lieutenant-Commander D.J. LeBlanc, CD, psc, BSc (CMR)

Physical Education and Sports

Director of Athletics
Major H.R. Helgason, CD, BPE

Assistant Director of Athletics
Captain R.F. Folkmann, CD, BPE

Physical Education Officer
Captain J.D.G. Melançon, BPE, CD

Chief Monitor
Master Warrant Officer J.M.S. Nadeau, CD

University Liaison Officers

Captain J.R.A. Voyer, CD
Captain J.R. Bélanger, CD, plsc

Military Training and Drill

Chief Instructor and Regimental Sergeant-Major,
Chief Warrant Officer C. Desjardins, MMM, CD

Instructors:

Master Warrant Officer J.J.M. Dessureault, CD
Sergeant J.R. Galarneau
Sergeant J.G. Parent, CD

Musical Director

Sergeant J.S. Fréchette

ADMINISTRATIVE WING

MAJOR J.Y.D. CORRIVEAU
CD, BA (Laval)
Director of Administration

CAPTAIN J.R.J. BÉLAND
CD, AA (Maryland)
Staff Officer — Personnel

CAPTAIN J.J.C. GIRARD
CD
Staff Officer — Logistics

LIEUTENANT T.T-L NGUYEN
BA (Montréal)
Food Services Officer

MAJOR J.M.B. PERREAULT
BA, BTh (Ottawa)
Roman Catholic Chaplain

CAPTAIN E.L. CLIFTON
M.T.H., MDU (Toronto), BA (Peterborough, Ont.)
Protestant Chaplain

CAPTAIN S.R. GOSSIP
DDS (McGill)
Dental Officer

V. PERRON
Civilian Personnel Officer

MASTER WARRANT OFFICER M.G.A.D. MERCIER
CD
Superintendant College Administrative Center

GENERAL

History and Location

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

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

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

A maximum of 570 Officer Cadets are in residence at CMR, of whom approximately 250 are in Preparatory year.

Degree Programs Offered

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

BAdm
BSc
BA

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

Preparatory year students

If you have completed junior matriculation (but not a senior matriculation), you will enter Preparatory year.

As a Preparatory year student you take courses in your mother tongue (Français or English); a Second Language (Anglais or French);

History; Economics; Philosophy; Mathematics; Chemistry; Physics; Physical Education and Military Drill.

Academic requirements for Preparatory year

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

Quebec Applicants*	All Other Applicants
Français or English (mother tongue)	Français or English (mother tongue)
Mathematics (Series 500)	Physics
Physics (Series 400 or 500)	Chemistry
Chemistry (Series 400 or 500)	Mathematics (algebra, geometry and trigonometry or relations and functions)

Academic requirements in sciences for admission to the Preparatory Year at CMR.

Chemistry:

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

Physics:

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

Mathematics:

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

Special considerations:

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

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

The Senate

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

The Faculty Council

The Faculty Council is composed of the Principal and Director of Studies as Chairman, the Director of Cadets, the Deans, the Registrar as Secretary, and the Heads of academic departments as members. The function of the Council is to determine on all matters of an educational character, to foster and encourage Faculty participation in Research in order to sustain academic excellence (Research with a Defence focus is encouraged), and generally to make recommendations to the Commandant for promoting the interest of the College.

The Faculty Board

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

INTERNAL ORGANIZATION

Library

The Library contains approximately 160,000 books, pamphlets, periodicals, and government publications. The collection is growing at the rate of 4,000 books per year and the Library subscribes to 800 periodicals. The collection deals with various topics, but covers particularly the following academic subjects: administration, social sciences, physics, chemistry, mathematics, engineering, strategic studies, psychology, and English and French literature.

Services provided include information services and bibliographic searching, and on-line information retrieval. The Library facilities are extended to the officer cadets, professors, and other members of the College staff.

During the academic session, the Library is open, Monday to Friday, from 08:00 to 16:30 and 19:00 to 22:00 hours; on Saturdays and Sundays, from 13:00 to 17:00 and 19:00 to 22:00 hours.

Computing Services Centre (CSC)

The Computing Centre operates a Honeywell dual DPS 8/62C mainframe computer. Its operating system, Control Program 6″ (CP 6) manages a main memory of 12 million characters (bytes), secondary disk storage of 2.4 billion characters and two front end communication processors which handle concurrently approximately 140 users in a time-sharing mode.

The system has an impressive software collection. The most often used language compilers are: PL 6, FORTRAN 77, COBOL, PASCAL, BASIC and APL. Also available on the system is a program library for simulation, statistical analysis, numerical calculation, linear programming and advanced mathematical analysis.

A computer graphics laboratory tied in to the central computer offers 8 high resolution Tektronix terminals, hard copy units and a CALCOMP 30 inch drum plotter. Fifteen micro-computers are available to students and faculty for course support and research.

Access to the computing facility is available 24 hours a day. It is used extensively by the students in their computer courses as well as in other courses where it has become an invaluable tool.

Audio-Visual Resource Centre (AVRC)

The AVRC offers to College personnel, the audio-visual means and techniques required for teaching, military and athletic education, and research. The AVRC has five members and includes the following sections:

a. production and diffusion services: language laboratories, (with micro-processors), mini television studio, draughting laboratory, and room for edition and teaching;

b. audio-visual equipment loan and maintenance services;

c. service for the purchasing, classification, and loan of audio-visual documents;

d. research services which look after the organization of research in the pedagogical field; and

e. service for the information, organization and animation of different pedagogical activities as well as the short and long term planning of the pedagogical requirements.

The AVRC is also available to help the students in the use of audio-visual material as a learning device, and as a pedagogical tool which could support the presentation of their written projects or research. It also provides equipment for the CMR — Audio-visual club and the Photography club, and advises them on the use of audio-visual equipment in their respective activities.

The AVRC is located on the south-east wing of the third floor of De Lery Hall.

MEDALS AND PRIZES

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.

The following annual awards may be won by students who meet the requirements as specified by the donors or as determined by the Faculty Council and approved by the Commandant.

Medals

The Governor-General's Gold Medal, awarded to the student with the highest academic standing in the fourth year.

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

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

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

Sword of honour

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

UTPOR Silver Tray

The UTPOR Silver Tray is awarded to the student in the University Training Program — Other Ranks — who achieved highest all-around proficiency.

INTERNAL ORGANIZATION

Robert Gervais award

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

Proficiency prize

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

Departmental prizes

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

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.

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 May 26th to August 20th, from 09:30 to 16:00 hours.

The objective of the Museum is to perpetuate the memory of Fort Saint-Jean and to remind the officer cadets of the heritage of their College, 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 day. To accomplish this, the exhibits are divided into six periods: two dealing with Fort Saint-Jean in the hands of the French; two dealing with the English Fort Saint-Jean; one depicting the Canadian Fort; and the last one dealing with one of the Canadian Military Colleges, Le Collège militaire royal de Saint-Jean.

PROGRAMS OF STUDY

Distribution of Work

After the name of each course, there are three digits separated by dashes; for instance.

3-1-5

This series of digits indicates how the weekly work is distributed in each particular course. The first digit shows the number of periods allotted to theory, the second digit determines the number of periods spent in laboratory work of practical exercices, and the third digit, the recommended number of hours to be spent for personal assignment. (Refer to the definition of a credit.)

Duration of the Programs of Study

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

2. Entrance to the Preparatory year requires completion of junior matriculation or its equivalent. Entrance to the First year requires completion of a course equivalent to the Preparatory year course of studies.

Choice of the Programs of Study

1. COMPUTING SCIENCE AT CMR (BSc)

The general objective of this program is to prepare officers in the different fields of Computing Science which are of interest to the Canadian Forces. Because of the diversity of classification requirements, the programs are of a broad nature.

The following concentrations are available: Systems, Management, Physics and Mathematics.

a. The objective of the Systems concentration is to impart to the students the hardware and software knowledge required to operate efficiently in an environment strongly oriented towards computerized and automated systems.

b. The goal in the Management concentration is to impart to the student a good knowledge of modern management techniques and to give him the capability of making his science serve these techniques.

c. The objective of the Physics concentration is to provide the student with a fundamental background in Computing Science (particularly in software) completed by a good knowledge of Physics in general, and more specifically of the Physics related to computers.

d. The goal of the Mathematics concentration is to provide the student with the fundamental background in Mathematics and Computing Science which will enable him to use the most modern techniques in tackling the numerous logistics and tactics problems which are encountered in the different classifications of the Canadian Forces. To familiarize the student with the components of a modern computerized system of defence.

2. PHYSICAL SCIENCES AT CMR (BSc)

The physical sciences options at CMR are designed to impart a full appreciation of quantitative and analytical methods. They encourage and simulate a critical analysis of cause and effect, a demand for precision, and a powerful curiosity. With the increasing influence of scientific progress in the Canadian Forces, the general objective of these programs includes the preparation of the student to perform in a professional environment in the Canadian Forces.

The following programs are available:

a. Bachelor of Science with Honours in Physics.
This most demanding program emphasizes fundamental physical principles. The particular objective of this program is to form modern physicists and prepare them for post-graduate studies. This program is intended for students who have prime interest in physics and have results that are above average.

b. Bachelor of Science with Major in Physics and Minor in Mathematics.
Principles and applications of physics and mathematics are stressed in this program. It is intended for students with strong scientific and technological interests who have demonstrated at least an average achievement in previous science course.

c. Bachelor of Science (General).
The particular objective of this program is to procure a modern scientific university formation in offering the possibility to stress personal interests by a choice of courses. It is intended for students who have succeeded a second year program in Sciences or Engineering.

3. ADMINISTRATION OPTION AT CMR (BAdm)

Major objective — The main purpose of the program leading to the degree of Bachelor of Administration, is to provide for the development of efficient leaders and managers capable of adapting to different types of organizations. The program is designed for people who want to be leaders and managers not just learn about it.

Secondary objectives —

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 a fair knowledge of Public Administration which will enable him to be an effective manager in the Canadian Forces;

d. to provide the future manager with the knowledge which will permit utilization of quantitative methods in his decision making.

Methods of instruction — Many approaches to learning are used: case method, role playing, films, lectures, reading, report writing, business games, classroom discussions, tours of industry, and simulation exercises. Students are also called upon to do a major consulting report on an organization outside of the College.

4. MILITARY AND STRATEGIC STUDIES AT CMR (BA)

This course has attracted wide attention in at least three areas: military, university and professional.

Following a progressive evolution from first through the second year, the program terminates by an in-depth study during the third and fourth years.

The unique interdisciplinary character of the B.A. in Military and Strategic Studies is evident. Courses include Military History, Science of War, International Relations, Defence Policy, Social and Administration Science, Arts, Chemistry, Physics, Mathematics and Psychology.

In addition to allowing the student to move from one military college to another, this programme supplies him with a solid foundation for post-graduate studies and for a professional career with unlimited possibilities.

5. CANADIAN STUDIES AT CMR (BA) (MINOR: ADMINISTRATION)

Primary objective — The Canadian Studies Program is being offered in conjunction with various departments to give the officer cadet an opportunity to gain a fairly comprehensive understanding of the Canadian civilization as a living culture.

Secondary objectives —

a. the Canadian Studies Program is designed to provide the future officer with a better understanding of his fellow-countrymen for whom and with whom he will be required to work;

b. to provide the student with a university education which will enable him to be an effective young officer in the Canadian Forces;

c. to offer the officer cadet the possibility of earning a BA degree in relation with his aptitudes and interests.

Methods of Study —

a. The field method: students have the opportunity to experience CMR and the Montréal area as a microcosm of the Canadian reality and the interface of the three major components of our society.

b. Content analysis method: the qualitative and quantitative study in a systematic way; through history, literature, arts and institutions, etc., of the values, beliefs and norms of the Canadian.

c. Cross-cultural method: the study of the English and French Canadian Cultures — their similarities and differences.

Conditions for Admission into Courses of Study in Computing Science at CMR

1. BSc in Computing Science: Systems Concentration

As a general rule, students from the three Canadian Military Colleges who have successfully completed the second year of a Science or Engineering course are admitted provided that they have taken MAT 212, MAT 251 or the equivalent, and have obtained a 60 per cent general average. Admission to the course is always subject to approval by the Chairman of the department involved and must be sanctioned by the Dean of the Division concerned.

2. BSc in Computing Science
(Management, Physics or Mathematics Concentration)

As a general rule, students from the three Canadian Military Colleges, who have successfully completed the second year of a Science or Engineering course are admitted to the Management, Physics or Mathematics concentrations provided that they have taken MAT 212, MAT 251 or the equivalent, and have obtained a 55 per cent general average. Admission to these courses is always subject to approval by the Chairman of the department involved and must be sanctioned by the Dean of the Division concerned.

Conditions for Admission into Courses of Study in Physical Sciences at CMR

1. BSc with Honors in Physics

Entry will normally be open to candidates from the three Canadian Military Colleges who have successfully completed the second year of a Science or Engineering program, provided that they have taken, in second year, MAT 212, MAT 251 or the equivalent, and have obtained a minimum combined average of 66 per cent in mathematics and physics and an overall average of at least 60 per cent. Entry to this Honours program is subject to the approval of the Mathematics and Physics Departments at CMR and must be sanctioned by the Dean of the Division concerned.

2. BSc with Major in Physics and Minor in Mathematics

Entry will normally be open to those candidates who have successfully completed the second year in a Science or Engineering program of study at RMC, RRMC, or CMR, provided that they have taken MAT 212, MAT 251 or the equivalent, and have obtained a minimum combined average of 55 per cent in mathematics and physics.

3. BSc (General)

Entry will normally be open to those candidates who have completed the second year in any of the Science or Engineering programs of study at RMC, RRMC, or CMR.

Conditions for Admission into Courses of Study in Administration at CMR

Entry into the BAdm program can be made at the end of first or second year, contingent upon a review of the applicant's academic record. It is recommended that those students wishing to transfer at the end of second year take a course in accounting.

Conditions for Admission into Courses of Study in Canadian Studies at CMR

1. Students from RMC and RRMC

Entry will normally be open to those candidates who have completed their second year in Arts and preferably to those who have taken CO 304 Principles of Accounting, or RR 203 Commerce (one semester course). Other candidates from other options may be accepted subject to a special review of their academic records.

2. Students from CMR

Entry will normally be open to those candidates who have completed their second year in Canadian Studies. Other candidates from other options may be accepted subject to a special review of their academic records.

Conditions for Admission into Courses of Study in Military and Strategic Studies at CMR

1. Students from RMC and RRMC

Entry will normally be open to those candidates from RMC and RRMC who have completed their second year in Arts. Other candidates from other options may be accepted subject to a special review of their academic records.

2. Students from CMR

Entry will normally be open to those candidates who have completed their second year in Military and Strategic Studies.

CONDITIONS FOR TRANSFER FROM THE OTHER CANADIAN MILITARY COLLEGES INTO THIRD YEAR DEGREE COURSES AT RMC

General

General conditions for admission to third year courses of study leading to a degree at RMC are as prescribed in the RMC Calendar and the RMC Academic Regulations. However, admission to all degree course programs 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 programs. General enquiries should be directed to the Registrar, Royal Military College of Canada, Kingston, Ontario, K7L 2W3.

General Requirement for admission to Third Year at RMC

The general requirement for admission to a Third Year degree course at RMC is that candidates will have the same basic preparation for their course no matter which Canadian Military College they have attended.

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. An overall average of at least 60 per cent will also normally be required.

Entry Requirements for RMC Degrees in Arts (BA)

The general requirement for admission to all Third year Arts (B.A.) programs at RMC is met by successful completion of one of the Second Year courses of study available at a CMC.

However, specific requirements for honour standing in particular courses will apply for admission to Honours Arts degree courses. Also, depending on the Arts degree program entered, specified courses may have to be taken in place of electives in either Honours or General courses of study.

Entry Requirements for RMC Degree in Science (BSc)

MATHEMATICS AND PHYSICS

The following Second Year courses of study will meet the requirements for admission to Third Year Mathematics and Physics (General and Honours) at RMC:

a. Science.

b. Engineering.

Entry into the Honours course of study is limited to those who obtain at least 66 per cent combined average in mathematics and physics courses in the Second Year. An overall average of at least 60 per cent will normally be required. For entry into the General course of study, the

combined average must be at least 55 per cent and the overall average at least 50 per cent.

SCIENCE (APPLIED)

The following second year course of study will meet the requirements for admission to third year Science (Applied) at RMC:

a. Science.

b. Engineering.

Entry requirements for RMC Degrees in Engineering (BEng)

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

a. Engineering Physics:	66 per cent combined average in Mathematics and in Physics
b. Fuels and Materials Engineering:	55 per cent combined average in Chemistry, Mathematics and in Physics
c. Civil Engineering:	55 per cent combined average in Mathematics and in Physics
d. Computer Engineering:	55 per cent combined average in Mathematics and in Physics
e. Electrical Engineering:	55 per cent combined average in Mathematics and in Physics
f. Engineering and Management:	55 per cent combined average in Mathematics and in Physics
g. Mechanical Engineering:	55 per cent combined average in Mathematics and in Physics

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

Royal Roads Military College offers degree programs in Physics and Oceanography, in Physics and Computer Science, in General Science, and in Military and Strategic Studies.

Bachelor of Science (BSc) in Physics and Oceanography

The purpose of this program is to produce general service officers who are capable of working in land, sea and air environments; who have a sound knowledge of basic physics, chemistry, and mathematics; who have an appreciation of general engineering subjects; and who will appreciate those aspects of the social sciences and humanities relevant to

the military profession and ethic. The programs fit students for military service in most classifications upon graduation, and are a suitable basis for further academic and military training.

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

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

Entry requires satisfactory completion of second year in any CMC science or engineering program of study. For admission to the General program, preference will be given to candidates whose programs included Mathematics RR 241 and Engineering RR 232, or their equivalents. Both are required for admission to the Combined Major, as is a weighted grade average in mathematics, science and engineering subjects of at least 55 per cent. Mathematics RR 252, or its equivalent, is also very desirable. For admission to the Honours program, completion of third year in the Combined Major program in Physics and Oceanography with a weighted average in courses in mathematics, science, and engineering of at least 66 per cent is required.

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

Bachelor of Science (BSc) in Physics and Computer Science

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

to enable the student to keep up with the developments in this growing field.

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

Completion of second year in a CMC science or engineering program of study which includes a course in chemistry and in Mathematics RR 241 and Mathematics RR 252 or their equivalents is required for admission. A weighted average of at least 55 per cent is required in mathematics, science and engineering courses.

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

Bachelor of Science (BSc) in General Science

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

Satisfactory completion of second year in any CMC science or engineering program of study which includes a course in chemistry is required for admission.

Bachelor of Arts (BA) in Military History and Strategic Studies

The program in Military History and Strategic Studies, offered at the General and Honours level, 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 new program is interdisciplinary, and will offer electives in Computing Science, Economics, English and Philosophy. Despite its interdisciplinary nature, students can achieve considerable subject specialization through the Honours stream.

The BA Military History and Strategic Studies degree builds upon the existing two-year course of studies in effect at all Canadian Military Colleges. Accordingly, students who have satisfactorily completed two years of study at any CMC are eligible for admission to the new program. The program is sufficiently flexible to enable students who, during their two initial years, may not have taken courses that are considered essential to "core subjects" in the third and fourth years, to do so.

NOTE — More details about transfers between Colleges may be obtained from the Registrar at RRMC.

PROGRAM OUTLINES

Preparatory Year

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue: English 603-110, 603-210	3	—	3	3	—	3	
Second Language: French	(4)	—	(4)	(4)	—	(4)	(a)
Social and Economic History of Canada: 330-924	3	—	3	—	—	—	
Introduction to Economics I: 383-920	3	—	3	(3)	—	(3)	(b) (d)
Introduction to Applied Mathematics A: 201-101	2	1	3	—	—	—	
Linear Algebra 201-105	2	1	3	2	1	3	
Differential and Integral Calculus: 201-103	2	1	3	2	1	3	
Mechanics: 203-101	—	—	—	3	2	5	
General Chemistry: 202-111	(3)	(2)	(5)	—	—	—	(c)
General Chemistry: 202-101	—	—	—	3	2	5	
Additional Courses (Mathematics, Chemistry, Physics)	—	(2)	(2)	—	(3)	(3)	
Number of periods per week*	15-22	6-10	21-32	13-20	9-12	22-32	

(a) Students who have not attained the (fully) integral level in French second language take this course.

(b) During the first term, 383-920 is given to half of the students, and to the other half during the second term.

(c) For those students who are lacking the prerequisite background to undertake the study of General Chemistry, 202-101.

(d) Students who are taking course 202-111 will take course 383-920 during the second term.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

First Year — Science and Engineering

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue: English 603-310, 603-410	3	—	3	3	—	3	
Second Language: French	(4)	—	(4)	(4)	—	(4)	(a)
Introduction to Psychology I: 350-101	3	—	3	—	—	—	
Differential and Integral Calculus II: 201-203	3	2	5	—	—	—	
Numerical Methods: 201-408	—	—	—	3	2	5	
Political and Social Philosophy: 340-225	—	—	—	3	—	3	
Electricity and Magnetism: 203-201	3	2	5	—	—	—	
Waves and Modern Physics: 203-301	—	—	—	3	2	5	
Experimental Physics: 203-902	—	2	2	1	2	3	(b)
Chemistry of Solutions: 202-201	3	2	5	—	—	—	
Introduction to Economics I: 383-920	(3)	—	(3)	—	—	—	(c)
Additional Courses (Mathematics, Chemistry, Physics)	—	(3)	(3)	—	(2)	(2)	
Number of periods per week*	15-22	11-14	26-36	13-17	9-11	22-28	

(a) Students who have not attained the (fully) integral level in French second language take this course.

(b) Part of this course is given during the first term to optimize the use of the laboratory facilities.

(c) Compulsory for students who have not taken this course in the preceding year.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

First Year — Administration and Arts

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue: English 603-310, 603-410	3	—	3	3	—	3	
Second Language: French	(4)	—	(4)	(4)	—	(4)	(a)
Differential and Integral Calculus II: 201-213	—	—	—	3	2	5	
Introduction to Economics II: 383-921	—	—	—	3	—	3	
Economic Geography of Canada: 320-901	3	—	3	—	—	—	
Introduction to Psychology I: 350-101	3	—	3	—	—	—	
Introduction to Psychology II: 350-201	—	—	—	3	—	3	
Western Civilization: 330-901	—	—	—	3	—	3	
Decolonization & Problems of the Thirld World: 330-983	3	—	3	—	—	—	
Political and Social Philosophy 340-225	3	—	3	—	—	—	
Physical Science: 203-927	3	—	3	—	—	—	
Topics in Administration: 410-102	—	—	—	3	—	3	
Introduction to Computer Programming: 420-919	3	—	3	—	—	—	
Introduction to Economics I: 383-920	(3)	—	(3)	—	—	—	(b)
Number of periods per week*	21-28	3	24-31	18-22	5	23-27	

(a) Students who have not attained the (fully) integral level in French second language take this course.

(b) Compulsory for students who have not taken this course in the preceding year.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — Engineering (1)

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue:							
English: ENG 211	—	—	—	2	—	2	
Second Language:							
French	(3)	—	(3)	(3)	—	(3)	(a) (b)
MLM 221 Social Psychology	3	—	3	—	—	—	
MAT 212 Linear Algebra	3	1	4	—	—	—	
MAT 221 Differential and Integral Calculus III	3	—	3	—	—	—	
MAT 222 Differential and Integral Calculus IV	—	—	—	3	—	3	
MAT 223 Differential and Integral Calculus V	—	—	—	(3)	—	(3)	(c)
MAT 251 Probability and Statistics	—	—	—	3	—	3	
PHY 211 Mechanics	3	1	4	—	—	—	
PHY 222 Electromagnetism	—	—	—	3	1	4	
PHY 231 Oscillations, Waves and Electric Circuits	3	1	4	—	—	—	
PHY 262 Modern Physics	—	—	—	3	1	4	
CHM 241 Physical Chemistry	3	—	3	—	—	—	
CHM 242 Physical Chemistry	—	—	—	3	—	3	
ING 210 Engineering Graphics I	1	2	3	—	—	—	
ING 220 Engineering Graphics III	—	—	—	1	2	3	
ING 230 Strength of Materials	—	—	—	3	1	4	
FLS 203 — FLS 213	(3)	—	(3)	(3)	—	(3)	(d)
Number of periods per week *	19-25	8	27-33	21-30	8	29-38	

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

(a) Students who have not attained the "integral" level in French second language (FSL) take this course.

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

(c) Optional course — MAT 223 is recommended for admission into Honours Physics and into Major in Physics and Minor in Mathematics at CMR and for admission into Honours Mathematics and Physics at RMC.

(d) Optional course. Anglophones who have attained functional level in FSL may, upon request, be permitted to take this course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — Science (1)

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue:							
English: ENG 211	—	—	—	2	—	2	
Second Language:							
French	(3)	—	(3)	(3)	—	(3)	(a) (b)
MLM 221 Social Psychology	3	—	3	—	—	—	
MAT 212 Linear Algebra	(3)	(1)	(4)	—	—	—	(c)
MAT 221 Differential and Integral Calculus III	3	—	3	—	—	—	
MAT 222 Differential and Integral Calculus IV	—	—	—	3	—	3	
MAT 223 Differential and Integral Calculus V	—	—	—	(3)	—	(3)	(d)
MAT 251 Probability and Statistics	—	—	—	3	—	3	(c)
PHY 211 Mechanics	3	1	4	—	—	—	
PHY 222 Electromagnetism	—	—	—	3	1	4	
PHY 231 Oscillations, Waves and Electric Circuits	3	1	4	—	—	—	
PHY 262 Modern Physics	—	—	—	3	1	4	
CHM 241 Physical Chemistry	3	—	3	—	—	—	
CHM 242 Physical Chemistry	—	—	—	3	—	3	
CHM 252 Physical Chemistry Laboratory	—	—	—	—	3	3	(e)
INF 361 Computer Architecture and Assembler Programming	(3)	—	(3)	—	—	—	(f)
INF 362 Minicomputer Systems	—	—	—	(3)	—	(3)	(e)
ING 230 Strength of Materials	—	—	—	3	1	4	(e)
FLS 203 — FLS 213	(3)	—	(3)	(3)	—	(3)	(g)
Number of periods per week*	15-24	5-6	20-30	14-29	6-8	22-35	

(1) Students who intend to complete their undergraduate studies at CMR in any Science Program may take this program of studies.

(a) Students who have not attained the integral level in French second language (FSL) take this course.

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

(c) May be postponed till next year by students who intend to register in the B.Sc. (General) program at CMR.

(d) Optional course — MAT 223 is recommended for admission to Honours Physics and to Major in Physics and Minor in Mathematics at CMR.

(e) One elective course.

(f) Advance course that can be taken by the students who will choose the Computing Science Program.

(g) Optional course. Anglophones with functional level in FSL may, upon request, be permitted to take this course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — Science (Applied) (1)

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
Mother Tongue:							
English: ENG 211	—	—	—	2	—	2	
Second Language:							
French	(3)	—	(3)	(3)	—	(3)	(a) (b)
MLM 221 Social Psychology	3	—	3	—	—	—	
MAT 212 Linear Algebra	(3)	(1)	(4)	—	—	—	(c)
MAT 221 Differential and Integral Calculus III	3	—	3	—	—	—	
MAT 222 Differential and Integral Calculus IV	—	—	—	3	—	3	
MAT 251 Probability and Statistics	—	—	—	3	—	3	(c)
PHY 211 Mechanics	3	1	4	—	—	—	
PHY 222 Electromagnetism	—	—	—	3	1	4	
PHY 231 Oscillations, Waves and Electric Circuits	3	1	4	—	—	—	
PHY 262 Modern Physics	—	—	—	3	1	4	
CHM 241 Physical Chemistry	3	—	3	—	—	—	
CHM 242 Physical Chemistry	—	—	—	3	—	3	
CHM 252 Physical Chemistry Laboratory	—	—	—	—	3	3	(d)
ING 210 Engineering Graphics I	1	2	3	—	—	—	
FLS 203 — FLS 213	(3)	—	(3)	(3)	—	(3)	(e)
Number of periods per week*	16-25	7-8	23-33	14-26	6-8	22-32	

(1) This program should normally be taken by those students who intend to take third year in Science (Applied) at RMC. May also be taken by students who intend to register in the B.Sc. (General) program at CMR.

(a) Students who have not attained the integral level in French second language take this course.

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

(c) Not required for Science (Applied) degree at RMC, but recommended. Required either in the second year or the third year for Science (General) degree at CMR.

(d) May be replaced by ING 230 (See Second Year — Engineering).

(e) Optional course. Anglophones with functional level in FSL may, upon request, be permitted to take this course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — Administration

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
Second Language: French	(3)	(3)	(a) (b)
Mother Tongue:			
English: ENG 212	3	—	
ADM 201 Management	—	3	
ADM 231 Accounting I	3	—	
ADM 232 Accounting II	—	3	
ADM 242 Probability & Statistics	3	—	
ADM 243 Applied Statistics	—	3	
ADM 251 Written and Oral Communication	—	3	
INF 251 Introduction to Business Data Processing	3	—	
MLM 221 Social Psychology	3	—	
SCH 221 Political Science	3	—	
SCH 222 Canadian Political Institutions	—	3	
SCH 223 International Relations	—	3	
Seminars, Symposia, Industrial Visits	3	3	
FLS 203 — FLS 213	(3)	(3)	(c)
Number of periods per week*	24-30	24-30	

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

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

(c) Optional Course. Anglophones with functional level in FSL may, upon request, be permitted to take this course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — BA (Canadian Studies and Administration)

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
Mother Tongue:			
English: ENG 212	3	—	
Second Language:			
French	(3)	(3)	(a) (b)
ADM 201 Management	—	3	
ADM 231 Accounting I	3	—	
ADM 242 Probability & Statistics	3	—	
ADM 251 Written and oral communication	—	3	
INF 251 Introduction to Business Data Processing	3	—	
MLM 221 Social Psychology	3	—	
MLM 322 Organizational Psychology	—	3	
SCH 221 Political Science	3	—	
SCH 222 Canadian Political Institutions	—	3	
SCH 254 Canadian Society	—	(3)	(c)
FLS 203 — FLS 213	(3)	(3)	(d)
Number of periods per week*	21-27	15-21	

(a) Students who have not attained the integral level in French second language (FSL) take this course.

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

(c) This course will be offered every two years from 1985-1986.

(d) Optional course. Anglophones with functional levels FSL may, upon request, be permitted to take this course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Second Year — BA (Military and Strategic Studies) (1)

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
INF 251 Introduction to Business Data Processing	3	—	
MLM 221 Social Psychology	3	—	(a)
SCH 216 Classical Strategy	3	—	
SCH 221 Political Science	3	—	
SCH 421 International Relations II	—	3	
Seminars, visits CMR 201	3	—	(d)
and meetings CMR 202	3	—	(d)
ADM 242 Probability & Statistics	—	3	
MLM 232 Psychology of Aggressive Behaviour	—	3	
SCH 222 Canadian Political Institutions	—	3	
SCH 232 Canadian Military History	—	3	
SCH 421 International Relations II	—	3	
FLS 203	(3)	—	(b)
FLS 213	—	(3)	(b)
Mother Tongue: English:			
ENG 212	3	—	
ENG 251 Written and Oral Communication	—	3	
Second Language: French	(3)	(3)	(c)
Number of periods per week*	18-24	21-27	

(1) This program may permit the normal degree of transferability within the CMC's and different options.

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

(b) Optional course. Anglophones with functional level FSL may, upon request, be permitted to take this course.

(c) Students who have not attained the functional level in French second language (FSL) take this course.

(d) These courses will not be offered in 1986-1987.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc with Honours in Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
FLS 302	(3)	—	(3)	—	—	—	(a) (b)
FLS 312	—	—	—	(3)	—	(3)	(a) (b)
MAT 321 Differential Equations I	3	1	4	—	—	—	
MAT 322 Differential Equations II	—	—	—	3	1	4	
MAT 422 Methods of Mathematical Physics	—	—	—	3	1	4	
MAT 461 Numerical Analysis	3	—	3	—	—	—	
PHY 311 Classical Mechanics I	3	1	4	—	—	—	
PHY 316 Mechanics of Continuous Media	—	—	—	3	—	3	(c)
PHY 321 Electronics I	2	—	2	—	—	—	
PHY 322 Electronics II	—	—	—	2	—	2	
PHY 331 Physical Optics	3	—	3	—	—	—	
PHY 341 Statistical Physics	3	—	3	—	—	—	
PHY 391 Experimental Physics	—	3	3	—	—	—	
PHY 392 Experimental Physics	—	—	—	—	3	3	
PHY 421 Electrodynamics I	—	—	—	3	—	3	
PHY 426 Logic Circuits Design	—	—	—	(2)	(2)	(4)	(c)
PHY 342 Quantum Statistics	—	—	—	3	—	3	
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(d)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(d)
Number of periods per week*	20-33	8	28-31	20-25	8-10	28-35	

(a) Students who have not attained the "integral" level in French second language (FSL) take this course.

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

(c) One elective course.

(d) One elective course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc with Major in Physics and Minor in Mathematics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
FLS 302	(3)	—	(3)	—	—	—	(a) (b)
FLS 312	—	—	—	(3)	—	(3)	(a) (b)
MAT 321 Differential Equations I	3	1	4	—	—	—	
MAT 322 Differential Equations II	—	—	—	3	1	4	
MAT 422 Methods of Mathematical Physics	—	—	—	3	1	4	
PHY 311 Classical Mechanics I	3	1	4	—	—	—	
PHY 316 Mechanics of Continuous Media	—	—	—	(3)	—	(3)	(c)
PHY 321 Electronics I	2	—	2	—	—	—	
PHY 322 Electronics II	—	—	—	2	—	2	
PHY 331 Physical Optics	3	—	3	—	—	—	(d)
PHY 341 Statistical Physics	3	—	3	—	—	—	
PHY 391 Experimental Physics	—	3	3	—	—	—	
PHY 392 Experimental Physics	—	—	—	—	3	3	
PHY 423 Electromagnetic Waves and Applications	—	—	—	3	—	3	(d)
PHY 426 Logic Circuits Design	—	—	—	2	2	4	(c)
PHY 342 Quantum Statistics	—	—	—	(3)	—	(3)	(c)
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(e)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(e)
Number of periods per week*	17-20	8	25-28	16-19	10	26-29	

(a) Students who have not attained the "integral" level in French second language (FSL) take this course.

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

(c) One elective course.

(d) These courses may be given at one term or the other to comply with the constraints of the Physics Department.

(e) One elective course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc — General (1)

Courses		Periods per week						Notes
		First Term			Second Term			
		Lect.	Lab.	Total	Lect.	Lab.	Total	
PART A								
* Physical Education		—	2	2	—	2	2	
* Drill		—	1	1	—	1	1	
* MLM 341 Management: A Psychological Approach		3	—	3	—	—	—	
* FLS 302		(3)	—	(3)	—	—	—	(a) (d)
* FLS 312		—	—	—	(3)	—	(3)	(a) (d)
MAT 212 Linear Algebra		(4)	—	(4)	—	—	—	(b)
MAT 251 Probability and Statistics		—	—	—	(3)	—	(3)	(b)
MAT 326 Differential Equations I		3	—	3	—	—	—	
MAT 327 Differential Equations II		—	—	—	3	—	3	
PHY 314 Intermediate Mechanics I		(3)	—	(3)	3	—	3	(c)
PHY 323 Experimental Electronics I		2	2	4	—	—	—	
PHY 324 Experimental Electronics II		—	—	—	2	2	4	
* SCH 327 Initiation to Military Strategy		—	—	—	(3)	—	(3)	(e)
MLM 322 Organizational Psychology		—	—	—	3	—	3	(e)
PART B								
INF 351 Computer Science in Administration		3	—	3	—	—	—	
MLM 322 Organizational Psychology		—	—	—	3	—	3	
ADM 231 Accounting I		3	—	3	—	—	—	
ADM 332 Management Accounting		—	—	—	3	—	3	
PART C								
CHM 252 Physical Chemistry Laboratory		—	—	—	—	(3)	(3)	(b)
CHM 261 Analytical Chemistry		1	2	3	—	—	—	
CHM 321 Organic Chemistry		2	2	4	—	—	—	
CHM 322 Organic Chemistry		—	—	—	2	2	4	
CHM 341 Physical Chemistry		2	2	4	—	—	—	
CHM 342 Physical Chemistry		—	—	—	2	2	4	
Number of periods per week **	A + B	14-24	5	19-29	14-23	5	19-28	
	A + C	13-23	11	24-34	12-21	9-12	21-33	

(1) A BSc (General) may normally be obtained by combining either parts A and B or parts A and C. With the authorization of the Faculty Council, it is also possible to get a BSc (General) by replacing, timetable permitting, one or more courses of the selected program by equivalent or more demanding courses offered by the departments of the Science division. [An asterisk indicates a course that cannot be replaced.]

(a) Students who have not attained the integral level in French second language take this course.

(b) For students who have not taken this course in second year.

(c) May be given either term.

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

(e) One elective course.

** The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc (Computing Science)
Concentration: systems

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
INF 352 Structured Programming	3	—	3	—	—	—	
INF 361 Computer Architecture and Assembler Programming	3	—	3	—	—	—	(e)
INF 362 Mini-computer Systems	—	—	—	3	—	3	(e)
INF 442 Data and File Systems	—	—	—	3	—	3	
PHY 334 Signal Processing	—	—	—	3	1	4	
PHY 381 Electronics and Applications I	2	4	6	—	—	—	
PHY 382 Electronics and Applications II	—	—	—	2	4	6	
PHY 481 Logic Circuit Design and Application	—	—	—	3	3	6	
MAT 321 Differential Equations I	4	—	4	—	—	—	
MAT 328 Analysis I	3	—	3	—	—	—	
MAT 413 Applied Algebra	—	—	—	3	—	3	(f)
MAT 461 Numerical Analysis	3	—	3	—	—	—	
FLS 302 — FLS 312	(3)	—	(3)	(3)	—	(3)	(a) (b)
One elective course	—	—	—	3 or 4	—	3 or 4	(c)
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(d)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(d)
Number of periods per week*	21-24	7	28-31	17-21	10	27-31	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) MAT 322 Differential Equations II (4, —, 4); MAT 475 Simulation (3, —, 3); this choice is normally wide in 4th year but it can be in 3rd year if the total number of periods per week is smaller than 30.

(d) One elective course.

(e) For students who have not taken this course in 2nd year.

(f) This course is normally taken in 4th year, but it may be taken in 3rd year if the total number of periods in a week is smaller than 30.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc (Computing Science)
Concentration: management

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
MAT 381 Structured Programming	3	—	3	—	—	—	
MAT 461 Numerical Analysis	3	—	3	—	—	—	
MAT 475 System Simulation	—	—	—	3	—	3	
INF 361 Computer Architecture and Assembler Programming	3	—	3	—	—	—	(d)
INF 362 Mini-computer Systems	—	—	—	3	—	3	(d)
INF 442 Data and File Structures	—	—	—	3	—	3	
ADM 231 Accounting I	3	—	3	—	—	—	
ADM 332 Management Accounting	—	—	—	3	—	3	
ADM 341 Applied Statistics	—	—	—	3	—	3	
PHY 481 Logic Circuit Design and Applications	—	—	—	3	3	6	
FLS 302 — FLS 312	(3)	—	(3)	(3)	—	(3)	(a) (b)
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(c)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(c)
Number of periods per week*	18-21	3	21-24	21-24	6	27-30	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) One elective course.

(d) For students who have not taken this course in 2nd year.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc (Computing Science)
Concentration: mathematics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
INF 352 Structured Programming	3	—	3	—	—	—	
INF 361 Computer Architecture and Assembler Programming	3	—	3	—	—	—	(e)
INF 362 Mini-computer Systems	—	—	—	3	—	3	(e)
INF 442 Data and File Structures	—	—	—	3	—	3	
MAT 321 Differential Equations I	4	—	4	—	—	—	
MAT 328 Analysis I	3	—	3	—	—	—	
MAT 351 Mathematical Statistics I	—	—	—	3	—	3	
MAT 461 Numerical Analysis	3	—	3	—	—	—	
MAT 463 Advanced Discrete Mathematics	—	—	—	3	—	3	(f)
MAT 471 Operations Research	—	—	—	3	—	3	
PHY 481 Logic Circuits Design and Applications	—	—	—	3	3	6	
FLS 302 — FLS 312	(3)	—	(3)	(3)	—	(3)	(a) (b)
One elective course	(3)	—	(3)	(3)	—	(3)	(c)
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(d)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(d)
Number of periods per week *	21-25	3-7	28	22-25	6	28-31	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) The student selects only one course amongst the four following:

First term
ADM 341 Applied Statistics (3, —, 3)
PHY 381 Electronics and Applications I (2, 4, 6)

Second term
MAT 312 Numerical Methods in Linear Algebra (3, —, 3)
MAT 322 Differential Equations (4, —, 4)
PHY 334 Signal Processing

(d) One elective course.

(e) For the students who have not taken this course in 2nd year.

(f) This course is normally taken in 4th year, but it may be taken in 3rd year if the total number of periods in a week is smaller than 30.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BSc (Computing Science)
Concentration: physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 341 Management: A Psychological Approach	3	—	3	—	—	—	
INF 361 Structured System Analysis	3	—	3	—	—	—	
INF 362 Mini-computer Systems	—	—	—	3	—	3	
INF 442 Data and File Structures	—	—	—	3	—	3	
MAT 321 Differential Equations I	4	—	4	—	—	—	
MAT 322 Differential Equations II	—	—	—	4	—	4	
MAT 328 Analysis I	3	—	3	—	—	—	
MAT 381 Structured Programming	3	—	3	—	—	—	
PHY 381 Electronics and Application I	2	4	6	—	—	—	
PHY 382 Electronics and Application II	—	—	—	2	4	6	
PHY 481 Logic Circuits Design and Applications	—	—	—	3	3	6	
FLS 302 — FLS 312	(3)	—	(3)	(3)	—	(3)	(a) (b)
One elective course	3	—	3	—	—	—	(c)
SCH 327 Initiation to Military Strategy	—	—	—	(3)	—	(3)	(d)
MLM 322 Organizational Psychology	—	—	—	3	—	3	(d)
Number of periods per week *	21-24	7	28-31	18-21	10	28-31	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) **First term**
PHY 311 Classical Methods (3, —, 3)
PHY 341 Statistical Physics (3, —, 3)
Timetable and personnel permitting.

(d) One elective course.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — Administration

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
Second Language	(3)	(3)	
FLS 302	(3)	—	(a)
FLS 312	—	(3)	(a)
ADM 314 Operations Management	3	—	
ADM 323 Introduction to Civil and Military Law	—	3	
ADM 331 Finance I	3	—	
ADM 332 Management Accounting I	—	3	
ADM 341 Applied Statistics	—	3	
ADM 342 Operations Research I	3	—	
ADM 343 Research Methods	3	—	
ADM 350 Information Systems Analysis	3	—	
ADM 352 Marketing	—	3	
MLM 322 Organizational Psychology	—	3	
SCH 313 Macroeconomics Analysis	3	—	
SCH 314 Microeconomics Analysis	—	3	(c)
SCH 327 Initiation to Military Strategy	—	3	(c)
Seminars, Symposia and Industrial Visits	3	3	
Number of periods per week	24-30	24-30	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) If not taken in Second Year.

Third Year — BA (Canadian Studies and Administration)

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
FLS 302	(3)	—	(a) (f)
FLS 312	—	(3)	(a) (f)
ADM 321 Personnel Management	3	—	(b) (i)
ADM 323 Introduction to Civil and Military Law	—	3	
ADM 331 Finance I	3	—	
ADM 463 Industrial Relations	—	3	
ENG 401 Canadian Literature in English III	(3)	—	(j)
ENG 402 Canadian Literature in English IV	—	(3)	(j)
FRA 301 Littérature québécoise I	(3)	—	(d)
FRA 302 Littérature québécoise II	—	(3)	(d)
SCH 232 Military History of Canada	—	(3)	(e)
SCH 254 Canadian Society	—	(3)	(d)
SCH 311 Economic History in a Social Context	3	—	
SCH 312 Canadian Economic History	—	3	
SCH 327 Initiation to Military Strategy OR	—	3	
MLM 322 Organizational Psychology	—	3	
SCH 452 Canadian Civilization	3	—	(g)
One elective course	3	—	(h)
Seminars, visits & meetings	3	3	
Number of periods per week*	21-30	21-36	

(a) Students who have not attained the integral level in French second language take this course.

(b) This course is given in English at the first term and in French at the second term.

(c) This course is given in French at the first term and in English at the second term.

(d) This course will be offered every two years from 1982-1983.

(e) For those students who did not take this course in 2nd year.

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

(g) This course will be offered every two years from 1985-1986.

(h) SCH 313: Macroeconomics; ADM 332 Management Accounting.

(i) Students who have not taken ADM 251 must take this course.

(j) This course will be offered every two years from 1986-87.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BA with Honours in Military and Strategic Studies

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
MAT 335 Game Theory	3	—	
MLM 341 Management A Psychological Approach	3	—	
SCH 360 International Relations I	3	—	
SCH 317 Defence Economics	3	—	
ADM 325 Introduction to International Public Law	3	—	(c)
ADM 425 War and Law	3	—	(d)
SCH 318 Soviet Defence Policy	—	3	
SCH 319 Great Battles	—	3	
PHY/CHM 399 Technology of Weapons	—	3	
SCH 319 Great Battles	—	3	
SCH 323 Contemporary Military Figures	3	—	
FLS 302	(3)	—	(a) (b)
FLS 312	—	(3)	(a) (b)
SCH 326 Nuclear Strategy	—	3	(b)
Number of periods per week*	21-27	18-24	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) This course will be offered every two years from 1984-1985.

(d) This course will be offered every two years from 1985-1986.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Third Year — BA (Military and Strategic Studies)

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
MLM 341 Management: A Psychological Approach	3	—	
SCH 360 International Relations I	3	—	
SCH 318 Soviet Defence Policy	—	3	
SCH 323 Contemporary Military Figures	3	—	
FLS 302	(3)	—	(a) (b)
FLS 312	—	(3)	(a) (b)
SCH 326 Nuclear Strategy	—	3	(b)
Two elective courses	6	—	(c)
Two elective courses	—	6	(c)
Number of periods per week*	18-24	18-24	

(a) Students who have not attained the integral level in French second language take this course.

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

(c) 1. **First term:**
ADM 325 Introduction to International Public Law or ADM 425 War and Law.
FRA 310 Guerre et Littérature. (Not offered)
MAT 335 Introduction to Game Theory.
SCH 317 Defence Economics.
SCH 311 Economic History in a Social Context.
SCH 313 Macroeconomic Analysis.

2. **Second term:**
ADM 332 Management Accounting.
ENG 310 Military Readings. (Not offered)
PHY/CHM 399 Technology of Weapons.
SCH 312 Canadian Economic History.
SCH 319 Great Battles.

3. Timetable and personnel permitting.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc with Honours in Physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in Military Setting	—	—	—	3	—	3	
FLS 402	(3)	—	(3)	—	—	—	(a) (b)
FLS 412	—	—	—	(3)	—	(3)	(a) (b)
MAT 330 Methods of Optimization	(3)	—	(3)	—	—	—	(c)
MAT 351 Probability	—	—	—	3	—	3	(d)
MAT 411 Numeric Linear Algebra	—	—	—	(3)	—	(3)	(d)
MAT 471 Operations Research	—	—	—	(3)	—	(3)	(d)
PHY 316 Mechanics of Continuous Media	—	—	—	(3)	—	(3)	(e)
PHY 334 Signal Analysis	—	—	—	(3)	(1)	(4)	(e)
PHY 361 Atomic and Nuclear Physics I	3	1	4	—	—	—	
PHY 362 Atomic and Nuclear Physics II	—	—	—	3	—	3	
PHY 412 Classical Mechanics II	3	—	3	—	—	—	(f)
PHY 422 Electrodynamics II	3	—	3	—	—	—	(f)
PHY 426 Logic Circuits Design	—	—	—	(2)	(2)	(4)	(e)
PHY 427 Microprocessor System Design	(3)	—	(3)	—	—	—	(f)
PHY 451 Quantum Mechanics	—	—	—	3	—	3	(e)
PHY 471 Solid State Physics I	3	—	3	—	—	—	
PHY 472 Solid State Physics II	—	—	—	3	—	3	
PHY 491 Experimental Physics and PROJECT	—	6	6	—	—	—	
PHY 492 Experimental Physics and PROJECT	—	—	—	—	6	6	
Seminars	—	1	1	—	1	1	
Number of periods per week*	15-21	11	26-32	15-18	10-12	25-30	

(a) Students who have not attained the "integral" level in French second language take this course.

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

(c) This course may be replaced by any other course of the same level (or higher) of the Mathematics Department.

(d) One elective course.

(e) One elective course.

(f) Two elective courses.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc with Major in Physics and Minor in Mathematics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Training	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in Military Setting	—	—	—	3	—	3	
FLS 402	(3)	—	(3)	—	—	—	(a) (b)
FLS 412	—	—	—	(3)	—	(3)	(a) (b)
MAT 330 Methods of Optimization	3	—	3	—	—	—	(c)
MAT 351 Probability	—	—	—	(3)	—	(3)	(d)
MAT 411 Numeric Linear Algebra	—	—	—	(3)	—	(3)	(d)
MAT 461 Numerical Analysis	3	—	3	—	—	—	(c)
MAT 471 Operations Research	—	—	—	3	—	3	(d)
PHY 316 Mechanics of Continuous Media	—	—	—	(3)	—	(3)	(e)
PHY 334 Signal Analysis	—	—	—	(3)	(1)	(4)	(e)
PHY 361 Atomic and Nuclear Physics I	3	1	4	—	—	—	
PHY 362 Atomic and Nuclear Physics II	3	—	3	—	—	—	(e)
PHY 426 Logic Circuits Design	—	—	—	(2)	(2)	(4)	(e)
PHY 427 Microprocessor System Design	(2)	(2)	(4)	—	—	—	(c)
PHY 342 Quantum Statistics	—	—	—	3	—	3	(e)
PHY 471 Solid State Physics I	3	—	3	—	—	—	
PHY 472 Solid State Physics II	—	—	—	3	—	3	(e)
PHY 491 Experimental Physics and PROJECT	—	6	6	—	—	—	
PHY 492 Experimental Physics and PROJECT	—	—	—	—	6	6	
Seminars	—	1	1	—	1	1	
Number of periods per week*	11-15	11-13	23-27	14-18	10-12	25-29	

(a) Students who have not attained the "integral" level in French second language take this course.

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

(c) Two elective courses. If PHY 427 is chosen, then two Mathematics courses have to be taken in the second term.

(d) One elective course.

(e) Three elective courses. If PHY 427 was chosen in first term, one of these courses has to be a Mathematics course in (d).

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc — General (1)

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
PART A							
* Physical Education	—	2	2	—	2	2	
* Drill	—	1	1	—	1	1	
* MLM 422 Behaviour in Military Setting	—	—	—	3	—	3	(a)
* FLS 402	(3)	—	(3)	—	—	—	(b)
* FLS 412	—	—	—	(3)	—	(3)	(b)
MAT 351 Probability	—	—	—	3	—	3	
MAT 381 Structured programming	3	—	3	—	—	—	
MAT 461 Numerical Analysis	3	—	3	—	—	—	
MAT 471 Operations Research	—	—	—	3	—	3	
PHY 314 Intermediate Mechanics	(3)	—	(3)	—	—	—	(c)
PHY 331 Physical Optics	3	—	3	—	—	—	
PHY 423 Electromagnetic Waves	—	—	—	(3)	—	(3)	(d)
PHY 491 Experimental Physics	—	6	6	—	—	—	
PHY 492 Experimental Physics	—	—	—	—	6	6	
Seminars	—	1	1	—	1	1	
PART B							
ADM 331 Finance I	3	—	3	—	—	—	
ADM 352 Marketing	—	—	—	3	—	3	
ADM 450 Information Systems Analysis	3	—	3	—	—	—	
ADM 463 Industrial Relations	—	—	—	3	—	3	
PART C							
CHM 421 Organic Chemistry	2	2	4	—	—	—	
CHM 422 Organic Chemistry	—	—	—	2	2	4	
CHM 441 Physical Chemistry	2	2	4	—	—	—	
CHM 442 Physical Chemistry	—	—	—	2	2	4	
Number of periods per week ** A + B	18-24	10	28-34	12-18	10	22-28	
Number of periods per week ** A + C	13-19	14	27-33	13-19	14	27-33	

(1) A BSc (General) may normally be obtained by combining either parts A and B or Parts A and C. With the authorization of the Faculty Council, it is also possible to get a BSc (General) by replacing, timetable permitting, one or more courses of the selected programme by equivalent or more demanding courses offered by the departments of the Science division. [An asterisk indicates a course that cannot be replaced.]

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

(b) Students who have not attained the integral level in French second language take this course.

(c) For students who have not taken this course in Third Year.

(d) Optional.

** The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc (Computing Science)
Concentration: Systems

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in a Military Setting	—	—	—	3	—	3	(a)
PHY 482 Microprocessor System Design and Applications	3	3	6	—	—	—	
INF 351 Computer Science in Administration	3	—	3	—	—	—	
INF 363 Structured System Analysis	3	—	3	—	—	—	
INF 441 Compiler	—	—	—	3	—	3	
INF 443 Data Base Management Systems (DBMS)	3	—	3	—	—	—	
INF 461 Operating Systems	3	—	3	—	—	—	
INF 471 Computer Graphics	—	—	—	3	—	3	
INF 371 Teleprocessing	—	—	—	3	—	3	
INF 493 Project	—	2	2	—	3	3	
MAT 413 Applied Algebra	—	—	—	3	—	3	(c)
One elective course	—	—	—	3 or 4	—	3 or 4	(d)
FLS 402 — FLS 412	(3)	—	(3)	(3)	—	(3)	(b)
Number of periods per week*	18-21	8	26-29	18-21	7	25-28	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) If not taken in 3rd year.

(d) MAT 322 — Differential Equations II (4, —, 4);
MAT 475 — System Simulation (3, —, 3); for students who have not taken this choice in 3rd year.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc (Computing Science)
Concentration: management

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in a Military Setting	—	—	—	3	—	3	
INF 351 Computer Science in Administration	3	—	3	—	—	—	
INF 363 Structured System Analysis	3	—	3	—	—	—	
INF 443 Data Base Management Systems (DBMS)	3	—	3	—	—	—	
INF 461 Operating Systems	3	—	3	—	—	—	
INF 471 Computer Graphics	—	—	—	3	—		
ADM 331 Finance	3	—	3	—	—	—	
ADM 414 Operations Management	3	—	3	—	—	—	
ADM 493 Project	—	2	2	—	3	3	
FLS 402-FLS 412	(3)	—	(3)	(3)	—	(3)	(a) (b)
One elective course	—	—	—	3	—	3	(c)
One elective course	3	—	3	—	—	—	(c)
Number of periods per week*	18-21	5-8	23-29	15-18	6	21-24	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) 1. **First term**
PHY 482 Microprocessor System Design and Application (3, 3, 6)
ADM 331 Finance (3, —, 3)

2. **Second term**
INF 371 Teleprocessing (3, —, 3)
ADM 441 Operational Research II (3, —, 3))

3. Timetable and personnel permitting.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc (Computing Science)
Concentration: mathematics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in a Military Setting	—	—	—	3	—	3	
INF 351 Computer Science in Administration	3	—	3	—	—	—	
INF 461 Operating Systems	3	—	3	—	—	—	
MAT 330 Methods of optimization	3	—	3	—	—	—	
MAT 414 Introduction to Applied Algebra	3	—	3	—	—	—	(d)
MAT 421 Graphs and Networks	3	—	3	—	—	—	
MAT 423 Mathematical Statistics II	—	—	—	3	—	3	
MAT 475 System Simulation	—	—	—	3	—	3	
MAT 493 Project	—	2	2	—	3	3	
FLS 402 — FLS 412	(3)	—	(3)	(3)	—	(3)	(a) (b)
Two elective courses	(6)	—	(6)	(6)	—	(6)	(c)
Number of periods per week*	21-24	5-8	26-32	18-21	6-7	24-28	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) The student must select two courses amongst the following:

First term
ADM 341 Applied Statistics (3, —, 3)
ADM 441 Operational Research II (3, —, 3)
INF 363 Structured System Analysis (3, —, 3)
PHY 482 Microprocesso System Design and Applications (3, 3, 6)

Second term
INF 471 Computer Graphics (3, —, 3)
MAT 463 Discrete Mathematical Structures (3, —, 3)
PHY 334 Signal Analysis (3, 1, 4)
INF 371 Teleprocessing (3, —, 3)
MAT 312 Numerical Methods in Linear Algebra (3, —, 3)

Timetable and personnel permitting.

(d) If not taken in 3rd year.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BSc (Computing Science)
Concentration: physics

Courses	Periods per week						Notes
	First Term			Second Term			
	Lect.	Lab.	Total	Lect.	Lab.	Total	
Physical Education	—	2	2	—	2	2	
Drill	—	1	1	—	1	1	
MLM 422 Behaviour in a Military Setting	—	—	—	3	—	3	(a)
INF 371 Teleprocessing	—	—	—	3	—	3	
INF 461 Operating Systems	3	—	3	—	—	—	
INF 471 Computer Graphics	3	—	3	—	—	—	
MAT 461 Numerical Analysis	3	—	3	—	—	—	
MAT 475 System Simulation	—	—	—	3	—	3	
PHY 334 Signal Analysis	—	—	—	3	1	4	
PHY 361 Atomic and Nuclear Physics	3	—	3	—	—	—	
PHY 482 Microprocessor System Design and Applications	3	3	6	—	—	—	
PHY 493 Project	—	2	2	—	3	3	
FLS 402 — FLS 412	(3)	—	(3)	(3)	—	(3)	(b)
One elective course	3	—	3	—	—	—	(c)
Number of periods per week *	18-21	8-9	26-30	12-15	7	19-22	

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

(b) Students who have not attained the functional level in French second language take this course.

(c) **First term**
PHY 331 Physical Optics (3, 1, 4)
PHY 471 Solid State Physics (3, —, 3)

Timetable and personnel Permitting.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — Administration

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
MLM 412 Job Adjustment and Personality	—	(3)	(a)
MLM 422 Behaviour in Military Setting	—	3	(b)
FLS 402	(3)	—	(c)
FLS 412	—	(3)	(c)
ADM 412 Strategic Management	—	4	
ADM 414 Operations Management	3	—	
ADM 450 Information Systems Analysis	3	—	
ADM 452 Marketing	3	—	
ADM 460 Project in Administration	1½	1½	
ADM 463 Industrial Relations	—	3	
SCH 412 Managerial Economics	3	—	
SCH 421 International Relations II	—	3	
Seminars, Symposia & Industrial Visits	3	3	
Two elective courses	3	3	(d)
Number of periods per week *	22½-25½	23½-29½	

(a) Optional course.

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

(c) Students who have not attained the functional level in French second language take this course.

(d) 1. **First term**
ADM 413 Organization Theory
ADM 433 Introduction to Income Tax

Second term
ADM 431 Operational Auditing
ADM 441 Operations Research II

2. Timetable and personnel permitting.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

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

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
MLM 422 Behaviour in Military Setting	—	3	(a)
FLS 402	(3)	—	(b)
FLS 412	—	(3)	(b)
SCH 232 Military History of Canada	—	3	
SCH 254 Canadian Society	—	(3)	(c)
SCH 415 Canadian Defence Policy	3	—	
SCH 421 International Relations II	—	3	
SCH 424 The Canadian Identity	—	3	
SCH 452 Canadian Civilization	—	3	(f)
FRA 401 Littérature québécoise	3	—	(d)
FRA 402 Littérature québécoise	—	3	(d)
ENG 301 Canadian Literature in English I	3	—	(g)
ENG 302 Canadian Literature in English II	—	3	(g)
CMR 401 Essay	3	3	(e)
ADM 452 Marketing	3	—	
Seminars, Visits & Meetings	3	3	
Number of periods per week *	21-24	27-30	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) This course will be offered from 1985-86, every two years to those who have not already taken it in the second or third year.

(d) This course will be offered every two years from 1981-1982.

(e) This Essay will be 50 pages minimum in length and must be approved by a teaching member of Canadian Studies and Administration Program. It will be written under his supervision and in accordance with an approved schedule of work.

(f) This course will be offered every two years from 1985-1986.

(g) This course will be offered every two years from 1987-1988.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BA with Honours in Military and Strategic Studies

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
MLM 415 Sociology of Warfare	3	—	
SCH 415 Canadian Defence Policy	3	—	
SCH 428 American Defence Policy	3	—	
SCH 417 Strategic Resources	3	—	
ADM 325 Introduction to International Public Law	3	—	(c)
ADM 411 Decision Making	3	—	
ADM 425 War and Law	3	—	(d)
MAT 476 War Games	—	3	
MLM 422 Behaviour in Military Setting	—	3	(a)
SCH 426 Comparative Defence Policies	—	3	
SCH 419 Current Strategic Problems	—	3	
SCH 440 Arms Control	—	3	
SCH 450 Third World	3	—	
SCH 460 Research paper in Military and Strategic Studies	3	3	
FLS 402	(3)	—	(b)
FLS 412	—	(3)	(b)
Number of periods per week *	27-33	21-27	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) This course will be offered every two years from 1985-1986.

(d) This course will be offered every two years from 1984-1985.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

Fourth Year — BA (Military and Strategic Studies)

Courses	Periods per week		Notes
	First Term	Second Term	
Physical Education	2	2	
Drill	1	1	
SCH 415 Canadian Defence Policy	3	—	
SCH 428 American Defence Policy	3	—	
SCH 417 Strategic Resources	3	—	
MLM 422 Behaviour in Military Setting	—	3	(a)
SCH 419 Current Strategic Problems	—	3	
SCH 440 Arms Control	—	3	
FLS 402	(3)	—	(b)
FLS 412	—	(3)	(b)
Two elective courses	6	—	(c)
Two elective courses	—	6	(c)
Number of periods per week*	18-24	18-24	

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

(b) Students who have not attained the integral level in French second language take this course.

(c) 1. **First term:**
ADM 411 Decision Making.
ADM 413 Management Control in Non-Profit Organization — ADM 334 prerequisite.
ADM 425 War and the Law OR ADM 325 Introduction to International Law
ADM 463 Industrial Relations
ENG 405 Great Books of the Western World ((Not offered).

2. **Second term:**
FRA 410 Les Idées du XX^{e} siècle (Not offered).
MAT 476 War Games — MAT 335 prerequisite.
MLM 412 Job Adjustment and Personality.
SCH 426 Comparative Defence Policy.
SCH 350 Third World.

3. Timetable and Personnel permitting.

* The first number indicates a minimum of periods. The second number indicates a maximum of periods.

PREREQUISITES

In the description of courses, PA, PR and CR mean: absolute prerequisite, relative prerequisite and co-requisite.

The absolute prerequisite (PA)	is a course which without exception must be passed before a student can register for the next course.
The relative prerequisite (PR)	is a course which normally must be passed but which in any case must have been taken before a student can register for the next course.
The co-requisite (CR)	is a course that is taken before or concurrently with the course in question.

ADMINISTRATIVE SCIENCES

DEPARTMENT OF ADMINISTRATIVE SCIENCES

Head of Department	Lieutenant Commander Allister Thorne, CD, BEng, MBA
Associate Professors	Paul Boisclair, BA, BCom, MBA Armand St-Pierre, BSc, BCom, BSc Compt., RIA., CGA, MBA
Assistant Professors	Mokhtar Amami, Lic. Sc. Eco., PhD, Ing Jocelyn Gagné, CD, BCom, MBA Guy Lizotte, BCom, MBA, Dip. en informatique (MIT) Major Réal Tremblay, CD, BCom, MBA, Adm.A
Lecturers	Captain Jean-Pierre Autotte, CD, B.Sp.Adm, CA Lieutenant (N) Roch Guénette, CD, BCom, MBA
Part-time Lecturers	Lieutenant Colonel Bruno Champagne, CD, LL.L. Major Dominic McAlea, LL.B.

410-102 **Introduction to Administration** 3-0-6

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

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

ADM 201 **Management** 3-0-6

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

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

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

ADM 232 **Accounting II** 3-0-6
PA ADM 231

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

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

ADM 242 **Probability and Statistics** 3-0-6
PR 201-213 or 201-203

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. Emphasis is placed on interpretation of results from statistical analysis.

The main subjects will be: Introduction and object of probability and statistics. Descriptive statistics. Probabilities and their laws. Conditional probabilities and Baye's theorem. Random variables. Discrete probability distribution models: discrete uniform, binomial, hypergeometric and Poisson. Continuous probability distribution models; continuous uniform, normal and exponential. The central limit theorem. Sampling distributions. Point and interval estimation.

ADM 243 **Applied Statistics** 3-0-6
PA ADM 242

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

The following subjects will be taught: Hypothesis testing: one and two populations. Variance Analysis. Simple and multiple linear regression. Index numbers. Time series analysis and forecasting. Non parametric tests: chi-square test and Kolmogorov-Smirnov.

ADMINISTRATIVE SCIENCES

ADM 251 **Communication and Writing Skills** 3-0-6

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

ADM 314 **Operations Management** 3-0-6
PA ADM 243

The aim of this course is to familiarize the student with the role of the production function in manufacturing and service industries. Emphasis will be placed on the relationships existing among the different topics (Systematic approach). Equal emphasis is given to quantitative methods and qualitative concepts of management.

The main subjects discussed are: Definition and role. Systems theory. Design of the product and the process. Forecasting techniques. Capacity and location. Layout. Quality control system. Job design and work measurement. Production planning and scheduling. Inventory system using material requirements planning. Project management. Maintenance. Productivity.

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

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 with some treatment of military law.

Subjects covered are: The meaning and sources of law and administration of justice. Extensive treatment of contracts and obligations. Bankruptcy, matrimonial law, civil responsibility (torts) and consumer protection law.

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

ADM 325 **Introduction to Public International Law** 3-0-6

The aim of this course is to provide students with accurate basis concepts of Public International Law which should allow them to better understand the role and the consequences of military interventions. The course also provides a general knowledge of NATO Treatises and of Canada's involvement in NATO.

ADM 331 **Finance** 3-2-4
PA ADM 231

The objective of this course is to introduce the student to the principles of the financial function of an enterprise. Having defined the function and described its operational context the course addresses the

specifics of financial management. It deals with financial management techniques and principles. The course is both a theoretical and practical introduction to financial administration.

The course includes a computerized simulation utilizing 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 322 **Management Accounting** 3-0-6
PA ADM 231

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

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

ADM 341 **Applied Statistics** 3-0-6
PA ADM 242

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: Hypothesis testing: one and two populations. Variance Analysis. Simple and multiple linear regression. Index numbers. Time series analysis and forecasting. Non parametric tests: chi-square test and Kolmogorov-Smirnov.

ADM 342 **Operations Research I** 3-0-6
PA INF 251

The objective of this course is to give the student a broad introduction to Operations Research. On completion of the course the student should be familiar with several of the most commonly used operational research models and their underlying assumptions.

The first section of the course will cover simple decision theory, decision trees, utility theory, revised probabilities. Next, linear programming (LP) will be covered in some depth: graphical solutions, the simplex method, matrix notation, degeneracy, unbounded solutions, duality, sensitivity analysis, practical applications, etc. The student will also be asked to solve LP problems using the computer software packages available. Finally, the student will be introduced to PERT, Inventory control, Queuing theory and Simulation.

ADM 343 **Research Methods** 3-0-6

The objectives of this course are to help the student to define and better formulate his research problems, to become familiar with the necessary tools available for gathering data, to use different scientific statistical methods in analyzing data gathered, and to teach the writing of good, factual, timely, concise and toneless report.

The course will cover a review of statistical concepts, the problems of project formulation and research design, data collection methods and questionnaire design, the theory of measurement, attitude measurement, scaling, reliability and validity, sampling theory design, investigations, association and functional relationship on data analysis, structure, grouping and classification of data analysis, and reporting (communication).

ADM 350 **Information Systems Analysis** 3-0-6
PA INF 251

The first objective of this course is to provide students with a knowledge of management information system (MIS). The emphasis will be on the purpose and development of these systems and the means by which they are controlled.

A second objective is to give students an understanding of MIS and how to generate information for business and non-profit organizations. Broad areas of study will include: conceptual foundation of accounting information systems (AIS), information technology and AIS or MIS applications. Overview; hardware, software; information systems technology; data collection and storage coding; technique and file processing; files and data base systems, data processing systems; A/R systems and control and AIS; internal control; computer controls and auditing the computer; systems analysis and development; systems design and evaluation; systems implementation; AIS applications.

ADM 352 **Marketing** 3-0-6

The course includes: the methods used to analyze marketing problems and the variables that affect the decision model of the manager.

Concepts of marketing and terminology, the marketing managers working environment and tools available to him; evaluation and criticism of the different decision models, establishment of decision models, integration of controllable variables.

ADM 411 **Decision making process** 3-0-6
(not offered in English)

The main objective of this course is to teach the student how to recognize and identify the basic elements of the most complex problems.

To meet this objective we will teach the technique of using "models" to make accurate decisions, explain why it is that knowing the cause of a problem is not always essential to finding a solution; explain

how to use problem-solving tools such as decision tree, break-even point analysis, Delphi method, PERT, operational research methods, creativity, brainstorming, etc. Assistance will be given to improve problem-solving abilities.

ADM 412 **Strategic Management** 3-0-6
PA ADM 331, ADM 452, MLM 322

The objective of this course is to develop the ability of future manager 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 student 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

The objective of this course is to develop the ability of future managers to understand how organizations operate and to function effectively within them. To this end various theories of organization will be studied and the student will be required to apply these theories to real-world situations.

ADM 414 **Operations Management** 3-0-6
PA ADM 341, ADM 342

The aim of this course is to familiarize the student with the role of the production function in manufacturing and service industries. Emphasis will be placed on the relationships existing among the different topics (Systematic approach). Equal emphasis is given to quantitative methods and qualitative concepts of management.

The main subjects discussed are: Definition and role. Systems theory. Design of the product and the process. Forecasting techniques. Capacity and location. Layout. Quality control system. Job design and work measurement. Production planning and scheduling. Inventory system using material requirements planning. Project management. Maintenance. Productivity.

ADMINISTRATIVE SCIENCES

ADM 421 **Personnel Management** 3-0-6
PR MLM 221, MLM 322
(not offered in 1986-87)

The aim of this course is to expose the students to the practice of personnel management in a modern context. Classes will be conducted in such a way as to maximize participation of students, using cases, games, simulations, exercises, etc.

Included in the course are: a study of the various theories and practices in the field of personnel management and recent concepts of human resources management and manpower planning. A study of basic personnel management areas of responsibility such as recruiting, selecting, training, remuneration, discipline, evaluation, promotion, transfers, morale, grievance, compensation and retention of personnel. Emphasis is put on basic factors which determine policies rather than on techniques.

ADM 424 **Public Administration** 3-0-6
(not offered in 1986-87)
PR SCH 222

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

ADM 431 **Operational Auditing** 3-0-6

The objectives of this course are: to introduce the student 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 433 **Introduction to Income Tax** 3-0-6
PA ADM 242

The objective of this course is to familiarize the student with income tax and its impact on business operations and individuals. Through case studies, the student will be given an understanding of the significance of income tax factors in business, and on individual investor's decisions.

ADM 441 **Operations Research II** 3-0-6
PA ADM 342

The aim of the course is to round out the student's 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 and network theory 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, the transportation problem, the minimum spanning tree problem, the shortest-route problem, the maximum flow problem. Specific applications will be studied through the use of cases and problems.

ADM 450 **Information Systems Analysis** 3-0-6
PA INF 251

The first objective of this course is to provide students with a knowledge of management information system (MIS). The emphasis will be on the purpose and development of these systems and the means by which they are controlled.

A second objective is to give students an understanding of MIS and how to generate information for business and non-profit organizations. Broad areas of study will include: conceptual foundation of accounting information systems (AIS), information technology and AIS or MIS applications. Overview; hardware, software; information systems technology; data collection and storage coding; technique and file processing; files and data base systems, data processing systems; A/R systems and control and AIS; internal control; computer controls and auditing the computer; systems analysis and development; systems design and evaluation; systems implementation; AIS applications.

ADM 452 **Marketing** 3-0-6

The course includes: the methods used to analyze marketing problems and the variables that affect the decision model of the manager.

Concepts of marketing and terminology, the marketing managers working environment and tools available to him; evaluation and criticism of the different decision models, establishment of decision models, integration of controllable variables.

ADM 460 **Project in Administration** 1-0-8

SHORT DESCRIPTION

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 studies 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.

OBJECTIVE OF THE COURSE

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

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

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

ADM 463 **Industrial Relations** 3-0-6

This course introduces the students to the concepts and processes of certification of bargaining units and agents, preparation, negociation, conciliation, arbitration, strike, mediation and day to day administration of collective agreements, especially the administration and adjudication of grievances.

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

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

ADM 493 **Computing Science Project** 0-5-5

For Fourth Year students of the Computing Science option, in the Management orientation.

A computer related project, typically a programming effort in a particular area of Computing Science related to the Management orientation. Two periods are reserved on the schedule at the first session for this project and three at the second session. A report and an oral presentation must be given at the end of the year.

Seminars 0-3-6

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

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

CHEMISTRY

DEPARTMENT OF CHEMISTRY

Head of the Department	Joseph Zauhar, BSc, MSc, DSc, PChem
Professors	Robert Lavigne, BSc, MSc, PhD, PChem
	James L. Thompson, BA, MA, PhD, PChem
Associate Professors	Sreenivas Ashtakala, BSc, BChE, MASc, PhD
	Fernand Bissonnette, BSc, MSc, PhD, PChem
	Jean-Louis Ferron, BSc, MSc, PhD
Assistant Professors	Gilles Caron, BSc, MSc, PhD, PChem
	Pierre Smith, BSc, PhD

201-111 **General Chemistry** 3-2-4

For students who have completed only one full year course in chemistry at the secondary school level.

The course is intended to provide the student with the elements of chemistry with the intention of preparing him for the more advanced general chemistry course 202-101.

Matter: Atoms and molecules, atomic theory, symbols and formulas, atomic and molecular masses. Laws of chemistry, the mole concept. Atomic structure and isotopes. Classification of the elements. The gaseous phase and the laws of gases: ideal gases, partial pressures and diffusion. Formation of compounds: transfer and sharing of electrons, the octet rule, ionic and covalent bonds, nomenclature, empirical and molecular formulas. Chemical reactions: definition, equations and balancing of equations, types of reactions, interpretation of an equation and stoichiometric calculations. Energy of a reaction: endothermic and exothermic reactions, enthalpy, heats of formation, combustion, fusion, and solution. Solutions: definition, qualitative and quantitative expressions for concentrations.

Experiments on the basic principles of chemistry acquired in the lectures allow the student to become acquainted with the use of simple laboratory apparatus.

Textbooks:

Krimsley, Introductory Chemistry
O'Connor, Davis, Haenisch, MacNab et McClellan, La Chimie: Expériences et principes

202-101 **General Chemistry** 3-2-4

PA 202-111 or a second full year course at the secondary level

For students of the Preparatory year who have completed two full year courses in chemistry at the secondary level, or who have completed Chemistry 202-111.

The purpose of this course is to expand the student's basic knowledge of chemistry. Together with Chemistry 202-201 it prepares him for studies in engineering, science, and related fields.

The theme of the course is the structure of matter.

Modern atomic theory: the wave-mechanical atom, quantum numbers, atomic and molecular orbitals. The periodic table: electronic structures of the elements, the aufbau principle, the Pauli's principle, Hund's rule. Chemical bonds: ionic, covalent, and metallic. Bond polarity. Hydrogen bonding, and van der Waals forces. Stereochemistry. Chemical bonding and chemical properties. States of matter: the gas laws, crystal lattices, liquids, and phase changes.

The laboratory work illustrates the lecture material. Emphasis is placed on the precision of measurements and logical deduction.

Textbooks:

Russell, General Chemistry
Tournier, Chimie générale
Roight, Chimie sur mesure

202-201 **Solution Chemistry** 3-2-4
PA 202-101

For students following the science and engineering programmes.

This course provides the student with a sound knowledge in: solutions, chemical equilibria and other related properties and to introduce concepts on chemical kinetics and electrochemistry.

Solutions. Colloidal state. Chemical kinetics. Chemical equilibrium. Electrochemistry and Faraday's law. Ionic equilibrium: pH, buffer solutions. Oxidation-reduction.

Laboratory work includes experiments in volumetric analysis, pH, colligative properties and calorimetry during which the student learns the use of modern analytical equipment.

Textbooks:

Russell, General Chemistry
Rosenburg, College Chemistry

203-927 **Physical Sciences** 3-0-3
PA 202-101

For students in the Administration Sciences or Humanities programmes.

The purpose of the course is to complete the science education of officer cadets registered in the non-scientific options. It is designed to help the students understand the nature of science, and to provide them with useful and practical knowledge of both chemistry and physics.

CHEMISTRY

Chemistry of the atmospheric environment: principal types of pollutants: CO_x, SO_y, C_xH_y, N_xO_y, particulates. The automobile as a source of pollutants.

Chemistry of the water environment. Source of pollution, and classes of pollutants. Eutrophication. B.O.D. Procuring potable water. Treatment of waste waters. Pesticides. Mercury in the environment. (Complementary course in physics: see physics department, course 203-927.)

Textbooks:

Jones et al, Chemistry, Man & Society
Piché, Chimie de l'environnement

CHM 241 **Physical Chemistry** 3-0-6
PA 202-201

Ideal gas laws. Kinetic theory of ideal gases. Deduction of the empirical gas laws. Applicability of the ideal gas laws and the van der Waals equation. Specific heats of gases. Critical phenomena of liquids. Andrews isotherms. van der Waals constants. First and second laws of thermodynamics. Thermochemistry and its applications.

Textbook:

Maron and Lando, Fundamentals of Physical Chemistry

CHM 242 **Physical Chemistry** 3-0-6

Carnot cycle. Thermodynamic efficiency. Second law of thermodynamics. Entropy and free energy. Activity concept. Phase equilibrium. Heterogeneous systems. Phase rule. Colligative properties. Electrochemistry. Electromotive force and thermodynamics. Thermochemical cells. Corrosion of metals and corrosion protection.

Textbooks:

Maron and Lando, Fundamentals of Physical Chemistry
Evans, An Introduction to Metallic Corrosion
Upadhyaya and Dube, Problems in Metallurgical Thermodynamics and Kinetics

CHM 252 **Physical Chemistry Laboratory** 0-3-6
PR CHM 241

Determination of the molar mass and the density of a gas or a vapour. Temperature dependence of vapour pressure. Heat of vaporization. Heat of reaction. Transition point. The phase diagram of a binary system. Ternary diagrams. Electrode potential. Electrochemical cells. Concentration cells. Thermodynamics of cells. Potentiometric titrations.

CHM 261 **Inorganic Analytical Chemistry** 1-2-6
PA 202-201

Review of basic concepts. Complex compounds: nomenclature, structure of complexes, stability. Solubility product, effect of pH on precipitation. Elements of oxidation-reduction reactions. Scheme for qualitative analysis.

Semimicro qualitative analysis. Scheme for cations. Tests for anions.

Textbook:

Sorum, Introduction to Semimicro Qualitative Analysis

CHM 321 **Organic Chemistry** 2-2-5
PR CHM 241, CHM 242, CHM 252, CHM 261

Properties of organic compounds. Functional groups and nomenclature. Stereochemistry: molecular conformation, positional, functional, geometric and optical isomerism, stereochemistry of cycloalkanes.

Identification of different functional groups by semi micro-analysis.

Textbooks:

Morrison, Boyd, Organic Chemistry
Owen, Characterization of Organic Compounds

CHM 322 **Organic Chemistry** 2-2-5
PR CHM 241, CHM 242, CHM 252, CHM 261

Structural effects in organic molecules. Acids and bases. Energy profiles of organic reactions. Reaction intermediates. Types of reagents. Fundamental types of organic reactions: addition, substitution, elimination reactions. Organic functional groups.

Experiments in organic synthesis: cyclohexene, adipic acid, n-butyl bromide, nitrobenzene, aniline, sulphanilic acid, etc.

Textbooks:

Kemp, Practical Organic Chemistry
Morrison, Boyd, Organic Chemistry

CHM 341 **Physical Chemistry** 2-2-5
PA CHM 241, CHM 242, CHM 252

Review of fundamental concepts. Electrical units. Mechanism of electrolysis. Faraday's laws. Ionization theory. Conductivity. Transference number. Ionic mobilities. Thermodynamic properties of ionic solutions. Solubility. Theories on ionic conductivity. Ionic and thermodynamic equilibria. Activity and fugacity.

Experiments on conductivity of electrolytic solutions, transference number (Hittorf's method), transference number (moving boundary method), potentiometric and conductometric titrations.

Textbooks:

Moore, Physical Chemistry
Souchay, Thermodynamique chimique

CHM 342 **Physical Chemistry** 2-2-5
PA CHM 341

Electrochemical cells. Electrode potentials. Thermodynamics of cells with transference and without transference. EMF and the activity coefficient. Classification of cells. Polarization. Overvoltage. Order of a reaction. Activation energy. The Arrhenius equation. Collision theory. Homogeneous catalysis.

Experimental work on coulometry, electrode potentials, thermodynamics of cells, equilibrium constant, first and second order reactions.

Textbooks:

Moore, Physical Chemistry
Souchay, Thermodynamique chimique

PHY/CHM 399 **Technology of Weapons** 3-0-6
PR 203-927

History. Use of chemicals in war. Modern arsenal of chemical weapons. Use of chemical weapons. Toxicity of chemicals on man and plants. Biological and chemical action of gases and toxins on living organisms. Future of chemical weapons. Chemical industry of a country and its potential for producing chemical weapons. Strategic materials: elements and chemical compounds essential to waging war, vulnerability of a country with respect to these strategic materials.

CHM 421 **Organic Chemistry** 2-2-5
PA CHM 321, CHM 322

Chemistry of organometallic compounds. Chromatography. Infrared spectroscopy.

Organic syntheses illustrating the following reactions: acylation, elimination, ether formation and identification of organic compounds by chromatography and i.r. spectroscopy.

Textbooks:

Coates, Organometallic Compounds
March, Organic Chemistry (3rd Ed)
Pavia, Lampman and Kriz, Introduction to Spectroscopy
Swinehart, Organic Chemistry — An Experimental Approach

CHM 422 **Organic Chemistry** 2-2-5
PA CHM 321, CHM 322

Elements of macromolecular chemistry. Ultraviolet-visible and nuclear magnetic resonance spectroscopy.

Laboratory work on Grignard reactions, free radical reactions. Kinetics of displacement reactions, diels-Alder reaction and identification of organic compounds by i.r., u.v., n.m.r. and chromatography.

Textbooks:

Champetier et Monnerie, Chimie macromoléculaire
Pavia, Lampman and Kriz, Introduction to Spectroscopy
Pastro and Johnson, Organic Structure Determination
Swinehart, Organic Chemistry — An Experimental Approach

CHM 441 **Physical Chemistry** 2-2-5
PA CHM 241, CHM 242

Review of the principal thermodynamic relations applicable to closed systems. Applications to real systems. Open systems. Partial molar quantities. Activity and fugacity concepts with application to solutions. Apparent molar quantities. Methods of measurement. Thermodynamics of open systems. Heterogeneous systems.

Selected experiments on calorimetry, measurement of the heat of solution, fractionating columns, colligative properties of solutions, ebullioscopy and cryoscopy, measurement of solute activity, polarography, surface tension. I.r. and u.v. spectroscopy and spectrophotometry.

Textbooks:

Moore, Physical Chemistry
Souchay, Thermodynamique chimique

CHM 442 **Physical Chemistry** 2-2-5
PA CHM 341, CHM 342, CHM 442

Homogeneous kinetics. The phase rule and its applications. Heterogeneous kinetics. Introduction to statistical thermodynamics.

Laboratory work consists of experiments on mass spectrometry, differential thermal microcalorimetry, polarimetry, absorption, determination of the partial molar quantities of solutions, osmotic pressure of polymeric solutions, intrinsic viscosity of polymeric solutions and monomolecular films.

Textbooks:

Moore, Physical Chemistry
Souchay, Thermodynamique chimique

CHEMISTRY

Tutorials

The department of chemistry offers tutorials to students who have either failed an examination or have shown insufficient progress during an academic session. Students following such tutorials obtain supplementary explanations and do additional exercises so as to attain an acceptable level of proficiency. Preparatory and First year students are obliged to attend tutorials, while for those in more advances classes, the decision to attend rests with the professor.

Seminars

Within the framework of the seminars organized by the Science and Engineering division, the department of chemistry invites professors and researchers from the College and from outside to speak on topics related to their own speciality. These seminars, often of military interest, are an essential complement to the students' regular courses and thus contribute substantially to their university education.

Research

Scientific research in the department of chemistry is directed mainly in four areas: photolytic organic synthesis, thermodynamics of bi-and trimetallic alloys, study and control 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 physics and chemistry professors from CMR and l'Université de Sherbrooke. Students in the Fourth year of the general B.Sc. programme may, if they so desire, select a term research project in any of the above mentioned fields. The work is done under supervision of a member of the department and upon termination, each student must prepare a dissertation and give an oral presentation of his results.

DEPARTMENT OF COMPUTER SCIENCES AND ENGINEERING

Head of the Department	Robert Gervais, BA, BSc, MSc, PhD(Math), MSc(Info)
Associate Professor	Didier Chong, BSc, PhD
Assistant Professors	Bernard Mongeau, BSc, MScA, DScA, Ing (part time)
	Charilaos Fakiris, BSc, MSc
	Major André Gauthier, CD1, BEng
	Captain Guimond Vachon, CD, BEng, MEng, Ing
Lecturers	Captain Gilles Brisson, CD, BSc
	Jocelyn Desbiens, BSc, MSc
	Captain Pierre Jean, BEng
	Denis Valois, BSc

420-911 **Structured Programming with FORTRAN-77** 2-1-3

For First Year students who select Sciences or Engineering.

Introduction to scientific problem solving and structured programming using FORTRAN-77.

The course introduces the student to the top-down problem solving method. Covered subjects are: computer organization, input/output, control structures, arrays and sub-programs.

Textbook:

Etter, D.M., Problem Solving with Structured FORTRAN 77

420-919 **Introduction to computer programming** 3-0-6

For First Year students who select the Administrative Sciences and Arts.

Introduction to basic concepts of computers and to good programming habits.

This course gives a systematic approach to problem solving techniques and to structured programming using the PASCAL language.

201-408 **Computer Programming and Numerical Methods** 2-1-3

PA 201-103, 201-105, 420-911

For First Year students who select Sciences or Engineering.

Introduction to mathematical problem solving using the computer.

The course covers topics such as: solution of linear systems, interpolation and approximation, solutions of non-linear equations, numerical integration and other topics.

Textbook:

Johnston, R.L., Numerical Methods

ING 210 **Engineering Graphics I** 1-2-3

For the Second Year students who select Engineering or Science (Applied).

This course is designed to acquaint the student with the use of Engineering Drawing as a means of communication.

The course covers use of instruments; sketching, orthographic views; geometric constructions; use of scales, lettering; auxiliary views; sections; pictorials; tolerances and dimensioning; production drawings. It also includes a practical design project where the student must apply graphics as well as the fundamental steps of the design process.

Textbook:

French, T.E., and Vierck, C.J., Fundamentals of Engineering Drawing and Graphic Technology

ING 220 **Engineering Graphics II** 1-2-3
PA ING 210

For the Second Year students of the Engineering option.

This course deals with graphical methods of solving three-dimensional or space problems.

This course covers points and lines: true length, parallel, perpendicular and intersecting lines, bearing and slope; plane surface, strike and dip, shortest distances, true sizes and angle relationship of lines and planes, perpendicular lines and planes; revolution; single curved, double curved and warped surfaces; intersections of planes and polyhedrons; development. At all times emphasis is given to solution of practical engineering project.

Textbook:

Wellman, B.L., Technical Descriptive Geometry

ING 230 **Strength of Materials** 3-1-5
PA 201-103, 201-105, 203-101

For the Second Year students who select Engineering.

Introduction to basic concepts of strength of material in order to find dimensions of simple elements.

Review of statics; mechanical properties of materials, stress and strain in axially loaded members; axial force, shear and bending moment diagrams; elastic and inelastic 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 experiments include tension, torsion and flexture tests.

Textbook:

Popov, Introduction to Mechanics of Solids

INF 251 **Introduction to Business Data Processing** 3-0-6

For Second Year students of the Administration, Canadian Studies, and Military and Strategic Studies options.

Introduction to basic concepts of computer and application in business.

This course gives a systematic approach to problem solving in management and to structured programming using PASCAL. The emphasis is on applications and concepts related to the courses in Administration.

Textbook:

Schneider, G.M., Weingart, S.W., Perlman, D.M., An Introduction to Programming and Problem Solving with PASCAL

INF 351 **Computer Science in Administration** 3-0-6
PA 201-408 or INF 251

For Third Year students of the Administration option and Fourth Year students of the Computing Science option.

Familiarize the student with intermediate concepts of business data processing and with the solution of appropriate related problems in structured COBOL.

Concepts of operation of a computerized system: record classification, transaction validation and updating of sequential and indexed files. Introduction to data base techniques with an overview of some management information systems. This course is essentially based on the use of the computer through practical exercices written in structured COBOL.

Textbook:

Stern, N., Stern, R.A., Structured COBOL Programming

INF 352 **Structured Programming** 3-0-6

For Third Year students of the Computing Science option and Fourth Year students in general sciences.

This course is an introduction to the characteristics of a good programming language, to the techniques of structured programming and to the design of good algorithms.

Amongst the concepts which are studied we have: structured scalar types, control statements, bloc procedure structures, value parameters and variables, local variables, global variables, recursion; pointers and dynamic allocation; records and files.

Textbook:

Schneider, G,M,, Weingart, S.W., Perlman, D.M., An Introduction to Programming and Problem Solving with PASCAL

INF 361 **Computer Architecture and Assembler Programming** 3-0-6

For Third Year students of the Computing Science option.

Introduction to small computer and assembly language programming.

Organization and architecture of small computers. Programming in assembly language including subroutine, linkages and macro-assembler. Addressing techniques, input and output programming. Simple data structures.

Textbook:

Leventhal, L., 68000 Assembly Language Programming

INF 362 **Mini-Computer Systems** 3-0-6
PA INF 361

For Third Year students of the Computing Science option.

The course presents a functional description of computer hardware concepts and current technology.

A study of hardware and software structures. Processor architecture, input/output architecture and operating system components. Interfacing and data capture in real time processor. Cluster, network and multiprocessor designs. Real time executive systems. Hands on access to mini-computer systems using assembler language programming.

Textbook:

Deitel, H.M., An Introduction to Operating Systems

INF 363 **Structured System Analysis** 3-0-6
CR INF 443

For Fourth Year students of the Computing Science option.

The course is designed to familiarize the student with information systems enabling him to modify such systems, to design one from the user's needs and to be able to maintain an implemented system.

Preliminary analysis, feasibility study; modular design, top-down design, information system design; implementation, modification and documentation.

Textbook:

Gane, C., Sarson, T., Structured Systems Analysis: tools and techniques

INF 371 **Teleprocessing** 3-0-6
PA INF 361

For Fourth Year students of the Computing Science option.

Familiarize the student with the principles of the analysis and design of computer networks with emphasis on the ISO model of network architecture.

A study of remote control of computers. Categories of data transmission systems; channel capacities; communication; line characteristics, modems, concentrators and multi-points drops, coding systems, transmission modes, transmission errors and recovery schemes. Network structures. Transmission protocols. Terminal, control units, programmes and software.

Textbook:

Tanenbaum, Computer Networks

INF 441 **Compiler** 3-0-6
PA INF 352

For Fourth Year students of the Computing Science option.

This course familiarizes the student with basic concepts of compiler and its elaboration.

Introduction to the systematic construction of a compiler. Grammar and language-scanners, top-down and bottom-up parsing, runtime organization, symbol tables, syntax trees, semantic routines, storage administration, code generation and optimization. Error detection and recovery.

Textbook:

Aho & Ullman, Principles of Compiler Design

INF 442 **Data and File Structures** 3-0-6
PA INF 352

For Third Year students of the Computing Science option.

The course familiarizes the student with different data and file organization including their manipulation.

Introduction to data and file organization. Concepts of type and structure of information. Study of manipulation in stacks, queues, linked lists and trees. Management of memory space. Internal and external sorting. Hashing storage: packing and unpacking of data; study of file organization.

Textbook:

Horowitz & Sahni, Fundamentals of Data Structures

INF 443 **Data Base Management Systems (DBMS)** 3-0-6
PR INF 442

For Fourth Year students of the Computing Science option.

Introduction to database concepts including the relational, hierarchical and network models of data.

A study of modern database systems and organizations. Analysis of file structures and types; concepts of data models, data language, data security and data integrity. The organization, storage search and retrieval methods associated with hierarchical network and relational data models.

Textbook:

Date, An Introduction to Database Systems

INF 461 **Operating Systems** 3-0-6
PA INF 352, INF 361, INF 362, INF 442

For Fourth Year students of the Computing Science option.

This course presents the principles of operation of the major modules of an operating system in a multiprogramming context.

Comparison between different types of operating systems. Multiprogramming principles; P and V primitives and dispatchers; interrupts and memory management, input/output management, files and jobs management; protection and security.

Textbook:

Deitel, H.M., An Introduction to Operating Systems

INF 471 **Computer Graphics** 3-0-6
PR MAT 212

For Fourth Year students of the Computing Science option.

This course is an introduction to computer graphics and display devices, to raster scanners and storage tube.

Display memory, generation of primitives: points, vectors and texts. Interactive versus passive graphics; input devices like light pen, tablet, etc.; graphic languages, display list, mathematics of two and three dimensional transformations, projections, segmentation and hidden line removal.

Textbook:

Rogers, D.F., Procedural Elements for Computer Graphics

INF 493 **Computing Science Project** 0-5-5

For Fourth Year students of the Computing Science option, in the System orientation.

A computer related project, typically a programming effort in a particular area of Computing Science related to the Systems orientation. Two periods are reserved on the schedule at the first session for this project and three at the second session. A report and an oral presentation must be given at the end of the year.

Seminars

The Department of the Division of Science offer their students a series of conferences. These conferences are given by qualified professors and researchers, 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.

DEPARTMENT OF LITERARY STUDIES

Head of the Department	Gilbert Drolet, BA. MA, PhD
Professors	Peter Aichinger, BA, BA(Hons.), MA, PhD
	Roch Carrier, BA, MA, DU
	Agop Hacikyan, NDC, BA, MA, PhD
	René Labonté, BPéd, BA, MA, PhD
Associate Professors	Adnan Moussally, L ès L, MA, D ès L
	Guy Provost, BA, MA, D ès L
	Mohammad Tajuddin, BA, MA, PhD
	Florent Tremblay, BA, BEd, MA, PhD
Lecturers	Edward Franchuk, BA, MA
	Luc Légaré, B ès A, BA, MA

603-110 3-0-6

The course consists of a review of the fundamentals of composition and an introduction to the methods of research, as well as a study of selected literary works. Students are required to write a series of short papers during the term.

603-210 3-0-6

The course consists of an introduction to poetry and the study of selected literary works including one Shakespeare play and two novels. Students write a term paper as well as several short essays.

603-310 3-0-6

A study of selected works of modern literature including two novels, one or two plays, short stories and poems. A term paper and short essay are required.

603-410 3-0-6

The course includes at least one Shakespeare play, two novels and a selection of shorter literary works. Students write a term paper and several short essays.

ENG 211 2-0-4

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

LITERARY STUDIES

ENG 212 3-0-6

The course is the last part of a five-part survey of English, American and Canadian literature. While it consists mainly of novels, some time is also devoted to the study of poetry and the short story.

ENG 251 **Communication and Writing Skills** 3-0-6

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

ENG 301 **Canadian Literature in English I: The novel** 3-0-6

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

ENG 302 **Canadian Literature in English II: The short story** 3-0-6

This course examines the story as a genre in its particular Canadian context. It traces the chronological development of this form in Canada, but the thematic and comparative aspects are also emphasized.

ENG 401 **Canadian Literature in English III: Poetry** 3-0-6

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

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

This course concentrates upon the themes treated by the principal Canadian playwrights and directors working in English. Attendance at theatre and film productions in the Montreal region is part of the course. Where possible, local directors and writers will be invited to participate in seminars.

601-102 **Poésie** 3-0-6

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

601-902 **Éléments de linguistique** 3-0-6

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

601-911 **Français écrit** 3-0-6

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

601-302 **Roman** 3-0-6

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

601-402 **Essai** 3-0-6

Ce cours, axé sur la pratique de la langue et sur des habiletés à acquérir, vise à développer la compétence à communiquer surtout par l'écrit. L'étudiant doit lire et comprendre des discours de type informatif, explicatif, argumentatif et critique. Il doit aussi produire des textes exprimant surtout des idées: dissertation, compte-rendu et analyse de texte.

FRA 206 **Littérature québécoise** 2-0-4

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

LITERARY STUDIES

FRA 208 **Littérature québécoise** 3-0-6

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

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

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

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

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

FRA 301-302-401-402 **Littérature québécoise** 3-0-6

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

FRA 310 **Guerre et littérature** 3-0-6

Ce cours sert d'introduction à plusieurs grands auteurs du monde qui ont traité de la guerre dans leurs oeuvres. L'étude se portera sur des ouvrages des grandes traditions françaises, britanniques, russes et allemandes entre autres Camus, Malraux, Shaw, Waugh, Tolstoï, Rilke et Remarque.

ENG 310 **Military Readings** 3-0-6

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

FRA 411 **Les idées du XX^{e} siècle** 3-0-6

Ce cours se penche sur les livres politiques et philosophiques qui ont dominé la littérature de notre siècle. Comme introduction aux idées clés du siècle on étudie des oeuvres sur le nationalisme, l'impérialisme, le socialisme, le marxisme-léninisme, le fascisme, l'anti-colonialisme, l'existentialisme et le pacifisme. Ceci comprend des oeuvres de Machiavelli, Marx, Thoreau, Maurras, Hitler, Thomas Paine, Sartre et Russell entre autres.

ENG 405 **Dominant Ideas of the 20th Century** 3-0-6

This course deals with philosophical and essentially political books which have dominated the 20th century. To introduce the key ideas of this period, students concentrate upon works on nationalism, imperialism, socialism, marxism-leninism, fascism, anti-colonialism, existentialism and pacifism. This includes selections from Machiavelli, Marx, Thoreau, Maurras, Hitler, Thomas Paine, Sartre and Russell among others.

DEPARTMENT OF MATHEMATICS

Head of the Department	Marcel Labbé, BA, MA, PhD
Professors	Michel Jean, BA, BSc, MA, PhD, N.D.C.
	Philip J. Laufer, BSc, MSc, PhD
Associate Professors	François Dubeau, BSc, BScA, MScA, PhD
	Jacques Gélinas, BA, BSc, MSc, PhD
	Robert Gervais, BA, BSc, MSc, PhD, MSc(Comp. Sci.) (Part-time)
	Gheorghe Isac, LSc, PhD
	Jean-Claude Ladouceur, BSc, MSc
	Pierre Laviolette, BSc, MSc, PhD
	Fernand Ledoyen, BA, BSc, DSc (Part-time)
	Gérard Normand, LSc, BSc, MSc
	Jean-Paul Rivet, BSc, MA
Assistant Professors	Paul Flanagan, BScA, MA
	Pierre Gravel, BMat, MMat, PhD
	Daniel Hennequin, BSc, MSc, PhD
	Sylvie Mainville, BSc, MSc, PhD
	Patrice Marcotte, BSc, MSc, PhD
	Jean Savoie, BSc, MSc, PhD
Lecturers	Jocelyn Desbiens, BSc, MSc (Part-time)
	Major Paul Veillet, BSc, MSc

201-101 **Introduction to Applied Mathematics** 2-1-3

For officer cadets of the Preparatory Year.

The objective of this course is to provide the student with the necessary background to use the principal concepts of algebra, trigonometry and geometry efficiently. These basic concepts are prerequisites for subsequent courses in applied mathematics.

Methods of proof. Mathematical induction. Logarithmic and exponential functions. Permutations and combinations. Binomial theorem. Trigonometric functions. Polynomials.

Textbooks:

Delgrande & Egsgard, Relations (Gage Publishing)
Durbin, College Algebra and Trigonometry (W. Ley)

MATHEMATICS

201-103 **Differential and Integral Calculus I** 2-1-3

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

The objective of this course is to introduce the student to the fundamental concepts of differential and integral calculus: limits, derivatives and antiderivatives.

First semester 2-1-3

Conics. Limits: definition and theorems. One-sided limits. Continuity. Slopes and tangents. The derivative and its properties. Derivative of composite functions. Applications: tangents, normals, implicit differentiation. Derivatives and antiderivatives of polynomials, trigonometric, logarithmic and exponential functions.

Second semester 2-1-3

Differentiation of inverse functions. Applications: velocity, acceleration, related rates, study of curves, optimization. Differentials. Change of variables. Definition of the integral as a Riemann sum. Fundamental theorem of calculus. Computation of areas using the integral.

Textbooks:

Delgrande & Duff, Calculus (Gage Publishing)
M.R. Spiegel (Schaum's Outline Series), Mathematical Handbook of Formulas and Tables (McGraw-Hill/Ryerson)

201-105 **Introduction to Linear Algebra**

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

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

First semester 2-1-3

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

Second semester 2-1-3

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

Textbook:

H. Anton, Elementary Linear Algebra (2^{nd} Edition) (Wiley)

201-203 **Differential and Integral Calculus II (Sciences)**
PA 201-203

For first year students taking the Science, Engineering and Computer Science options: this course is given over two semesters.

This course is a complement to integral calculus. The objective is to prepare the student to use the concepts of integration, sequences and series as well as differential equations as tools for subsequent courses of a quantitative nature.

First semester 2-1-3

Definite integral. Calculation of definite integrals using the Fundamental Theorem and the change of variable theorem. Inverse trigonometric functions. Graphs, derivatives and integrals. Arc lenght of a curve. Review of integration by substitution. Trigonometric substitution. Other methods of integration. Volume of solids of revolution. Improper integrals. Application of arc lengths.

Second semester 3-2-4

Centre of mass. Theorems of Pappus. Indeterminate forms and L'Hôpital's rule. Convergence. Power series. Taylor series. Remainder. Differentiation and integration of power series. Binomial series. Applications to the evaluation of definite integrals. Operations on power series. Applications to series expansions. Differential equations. Graphs in polar coordinates. Hyperbolic functions and their inverses. Quadric surfaces and translation of axes. Cylindrical coordinates and spherical coordinates.

Textbooks:

Protter & Morrey, Calculus with Analytic Geometry. A First Course (3rd Edition) (Addison-Wesley)
Protter & Morrey, Modern Mathematical Analysis (Addison-Wesley)

201-213 **Differential and Integral Calculus II** 3-2-4
PR 201-103 **(Administration)**

For students taking the Administration and Arts option.

This course in differential and integral calculus prepares officer cadets to work on practical problems in the world of business and economics using the power of calculus as a basic tool.

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

MATHEMATICS

Textbook:

Louis Leithold, ESSENTIALS OF CALCULUS for business, economics, life sciences, social sciences (Harper & Row, New York)

MAT 212 **Linear Algebra** 3-1-5
PA 201-105

For students taking the Science, Engineering and Computer Science options.

Review of Gauss-Jordan and the inverse of a matrix. Vector spaces and subspaces. Linear independence, basis and dimension. Rank of a matrix, algorithm for finding bases. Scalar product. Orthogonal bases. Coordinates, change of basis. Linear transformations. Properties, kernel, image of a linear transformation. Matrix representation. Similar matrices. Eigenvalues and eigenvectors. Diagonalization. Quadratic forms.

Textbook:

H. Anton, Elementary Linear Algebra (3rd Edition) (Wiley)

MAT 221 **Differential and Integral Calculus III** 3-0-6
PA 201-203

For students taking the Science, Engineering and Computer Science options.

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. Line integrals, independence of path and work.

Textbooks:

Protter & Morrey, Modern Mathematical Analysis (Addison-Wesley)
Protter & Morrey, Calculus with Analytic Geometry. A First Course (3rd Edition) (Addison-Wesley)

MAT 222 **Differential and Integral Calculus IV** 3-0-6
PA MAT 221

For students taking the Science, Engineering and Computer Science options.

Double integral: definition, properties, evaluation, volumes, surface, mass, evaluation using polar coordinates. Triple integral: definition, evaluation, volumes, masses, evaluation using cylindrical or

spherical coordinates. Surface integrals. Green's theorem. The divergence theorem. Stokes' theorem.

Textbooks:

Protter & Morrey, Modern Mathematical Analysis (Addison-Wesley)
Spiegel, Advanced Calculus (Schaum's Outline Series) (Schaum Publishing)

MAT 223 **Differential and Integral Calculus V** 3-0-6
PA MAT 221

Optional course. The course is recommended for admission to Honours Physics at CMR or to the Honours BSc at RMC in Mathematics and Physics.

Periodic functions, Fourier series. Fourier integral. Laplace transforms. Application to ordinary differential equations. Vector fields, divergence and curl. Green's theorem. Representation of surfaces. Surface integral. Gauss' and Stokes' theorems. Path independence in a line integral.

Textbooks:

Marsden & Tromba, Vector Calculus (Freeman, Ed.)
Spiegel, Advanced Calculus (Schaum's Outline Series) (McGraw-Hill)

MAT 251 **Probability and Statistics** 3-0-6
PA MAT 221

For students taking the Science, Engineering or Computer Science options.

Definition and purpose of mathematical statistics. Graphical and tabular representation of samples. Sample mean and variance. Random experiments, events. Probability. Permutations, combinations. Random variables. Discrete and continuous distributions. Mathematical expectation and variance. Binomial distribution, Poisson and Hypergeometric distributions. Normal distribution. Distribution of several random variables. Random samples and random numbers. Estimation of parameters. Confidence intervals. Tests of hypotheses. Quality control.

Textbook:

P.L. Meyer, Introductory Probability and Statistical Applications (2^{nd} Edition) (Addison-Wesley)

MAT 312 **Numerical Methods in Linear Algebra** 3-0-6
MAT 411 **Modern Algebra I** 3-0-6
PA MAT 212

For students taking the Science and Computer Science options.

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

Direct methods of 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 of solving linear system: 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 vector space. Applications.

Textbooks:

R.L. Johnston, NUMERICAL METHODS: A Software Approach (John Wiley & Sons)
Course notes

MAT 321 **Differential Equations I** 3-1-5
PA MAT 222

For students taking the Science and Computer Science options.

Ordinary differential equations. Mathematical models. First order differential equations. Linear equations. Nonlinear equations with separable variables. Homogeneous equations. Bernoulli and Riccati equations. Equations with total differentials. Integrating factor. Clairaut and Lagrange equations. Applications in physics, technology, biology, economics. Existence, uniqueness and continuity theorems.

Second order differential equations. Special forms of nonlinear equations. Linear equations. Fundamental solutions to homogeneous equations. Linear independence (the Wronskian). Equations with constant coefficients. Nonhomogeneous equations. The method of variation of parameters. The method of undetermined coefficients. Reduction of order. Higher order equations with constant coefficients. Applications.

Euler-Cauchy equations. Series solutions at ordinary points. The method of Frobenius at regular singular points. The case of the point at infinity. Legendre's equation. Γ-function. Bessel's equation. Qualitative analysis of differential equations. Sturm separation and comparison theorems.

Trigonometric integrals on $[-\pi, \pi]$. Periodic functions. Fourier series of periodic functions. Even and odd functions. Periodic extension. Expansion in a Fourier series of a function defined on an interval. Function space. Convergence in the quadratic mean. Complete set of orthogonal functions. The Dirichlet kernel. Convergence theorems. Complex Fourier series. Application to electrical circuits.

Textbooks:

Tyn Myint-U, Ordinary Differential Equations (North-Holland, New York)
M. Braun, Differential Equations and their Applications (2nd Edition (Springer)
Murray Protter & C.B. Morrey, Jr., Modern Mathematical Analysis (Addison-Wesley)

MAT 322 **Differential Equations II** 3-1-5
PA MAT 321

For students taking the Science and Computer Science options with concentration in Mathematics.

Two-point boundary value problems. Green's function. Self-adjoint problems. Sturm-Liouville systems. Eigenvalues and eigenfunctions. Eigenfunction expansibns. Sturm-Liouville singular systems.

Orthogonal polynomials. Construction and properties of classical orthogonal polynomials. Differential equation of orthogonal polynomials.

Partial differential equations in classical physics. Boundary value problems: two-point, rectangular, circular or cylindrical boundaries. Equations for the harmonic oscillator and hydrogen atom in atomic physics.

Laplace transform. Transform of usual functions. Existence and properties. Dirac function. Convolution. Application to differential equations, equations with partial derivatives and electrical circuits.

Textbooks:

Tyn Myint-U, Ordinary Differential Equations (North-Holland, New York)
Albert Rabenstein, Introduction to Ordinary Differential Equations (2nd Edition) (Academic Press)
M. Braun, Differential Equations and their Applications (2nd Edition (Springer)

MAT 326 **Differential Equations I** 3-0-6
PA MAT 222

For students taking the general BSc program.

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

MAT 327 **Differential Equations II** 3-0-6
PA MAT 326

For students taking the general BSc program.

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

MAT 328 **Analysis I** 3-0-6
PA MAT 221

For students taking the Science and Computer Science options.

Complex numbers. Operations and properties. Continuity of a function of two variables. Topology of the complex plane. Complex functions. Limit and continuity. Derivative of a complex function and Cauchy-Riemann conditions. Harmonic functions. Elementary functions: e^z, cos z, sin z. Definite integrals. Line integrals. Cauchy-Goursat theorem. Indefinite integrals. Cauchy's integral formula and derivatives. Taylor series. Laurent series. Uniform convergence. Poles, residues, applications to integrals.

Textbook:

Churchill, Brown & Verhey, Complex Variables and Applications (3^{rd} Edition) (McGrw-Hill)

MAT 329 **Analysis II** 3-0-6
PA MAT 328 **(Mathematics of the Theory of Signals)**

For students taking the Honours Physics or Computer Science programs.

Trigonometric polynomials. Approximation in the quadratic mean. Fourier series. Fourier transform. Linear systems and continuous filters. Discontinuous signals. Z-transform. Difference equations. Linear systems and discontinuous filters. Simulation and sampling theorems. Introduction to the fast Fourier transform. Applications.

Textbooks:

Course notes
A. Papoulis, Signal Analysis (McGraw-Hill)

MAT 330 **Methods of Optimization** 3-0-6
PA MAT 328

For students taking the Science or Computer Science options.

Introduction to the theory of nonlinear mathematical programming. Convex programming. Optimization with or without constraints. Kuhn-Tucker theorem. Quadratic programming. Minimax problems. Numerical optimization methods. Minimization of functions without constraints: gradient methods. Newton-type methods, Davidon-Fletcher-Powell method, conjugate direction method, direct methods. Methods for solving problems with constraints: gradient projection method, penalization methods. Minimax calculation. Directed array method. Numerical methods for quadratic programming. Applications.

Textbooks:

M.S. Bazaraa & C.M. Shetty, Nonlinear Programming (John Wiley & Sons, New York)
S.S. Rao, Optimization Theory and Applications (John Wiley & Sons, New York, Toronto)

MAT 335 **Elements of Game Theory** 3-0-6
PA 201-101; 201-105

For students taking the Military and Strategic Studies option.

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.

Textbook:

Hamburger, Games as Models of Social Phenomena (Freeman)

MAT 351 **Mathematical Statistics I** 3-0-6
PA MAT 251

For students taking the Computer Science option with concentration in Mathematics.

Sampling and asymptotic laws. Estimation, properties of estimators and confidence intervals. Hypothesis testing: parametric tests with small samples and large samples, chi-square tests and independence tests using contingency tables.

Textbook:

Hogg and Tanis, Probability and Statistical Inference (MacMillan).
Statistical Software packages

MAT 412 **Modern Algebra II** 3-0-6
MAT 413 **Applied Algebra** 3-0-6
PA MAT 212

For students taking the Honours Physics and Computer Science programs, with concentration in Mathematics or Systems.

MAT 412 and MAT 413 have the same description and are given by the same professor, though they are intended for students enrolled in different programs. Assignments and examinations will be adapted to the specific content of the program, and applications used in the two courses will not be the same.

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

Textbooks:

Peterson & Wildon, Error-Correcting Codes (The MIT Press, Cambridge, Mass.)
Course notes

MAT 415 **Applied Modern Algebra** 3-0-6
PA 201-408

For students taking the Computer Science option.

Algorithmic programming language. Network analysis including PERT. Boolean algebra, Boolean functions and optimization problems. Error correcting codes.

Textbook:

Course notes

MAT 421 **Graphs and Networks** 3-0-6
PA MAT 471

For students taking the Computer Science option with concentration in Mathematics.

Graphs and networks. Eulerian graphs. Trees and directed trees. König-Egervary theorem. Links with linear programming: max-flow min-cut-theorem. Shortest spanning trees: Prim and Kruskal algorithm. Shortest path algorithms: Ford and Dijkstra algorithm. Maximum flow. Minimum cost flow: simplex algorithm, out-of-kilter algorithm. Edge coloring. Bipartite and nonbipartite matching: Edmond's algorithm. PERT and CPM. Convex-cost flow problems.

Textbooks:

Minieka, Optimization Algorithms for Networks and Graphs (Marcel Dekker)
Lawler, Combinatorial Optimization: Networks and Matroids (Holt, Rinehart and Winston)

MAT 422 **Methods of Applied Mathematics II** 4-0-6
PA MAT 321; MAT 322

For students taking Major in Physics with a Minor in Mathematics.

Review of complex numbers and geometrical representation, De Moivre's theorem. Elementary functions of one complex variable. Multiple-valued functions and their Riemann surfaces. Analytic functions. Cauchy's integral formulas. Taylor and Laurent series. Singularities. Calculus of residues. Laplace transform in the complex plane. Heaviside's theorems. Mellin inversion theorem.

The Dirac delta function. The delta series and delta calculus. Representation of the delta function using a series or an integral. Test functions. Weak convergence. Distributions. Series and distribution series.

Fourier transform of a function. Properties. Fourier's integral theorem. Fourier transform of a distribution. Sine and cosine transforms. Applications.

Textbook:

Eugene Buktov, Mathematical Physics (Addison-Wesley)

MAT 423 **Mathematical Statistics II** 3-0-6
PA MAT 351

For students taking the Computer Science option with concentration in Mathematics.

Theory of hypothesis testing: choice of a best test, Neyman-Pearson lemma, maximum likelihood test. Nonparametric methods: order statistics, rank test of Wilcoxon-Mann-Whitney, runs tests, Kolmogorov-Smirnov test. Linear models: simple and multiple linear regression. Analysis of variance: one-way and two-way classification. Analysis of covariance.

Textbooks:

Hogg and Tanis, Probability and Statistical Inference (MacMillan)
Draper and Smith, Applied Regression Analysis (Wiley)

MAT 461 **Numerical Analysis** 3-0-6
PA MAT 212; MAT 222; INF 201-408

For students taking the Science and Computer Science options.

Floating-point arithmetic. Polynomial interpolation. Solution of nonlinear equations. Solution of linear equations: direct and iterative methods. Numerical differentiation and integration. Initial value problems for ordinary differential equations. Computer programming and applications.

Textbooks:

Conte & DeBoor, Elementary Numerical Analysis (3rd Edition) (MacGraw-Hill)
Johnston, R.L., Numerical Methods (Wiley)

MAT 463 **Advanced Discrete Mathematics** 3-0-6
PA MAT 212; MAT 328

For students taking the Science and Computer Science options, with concentration in Mathematics and systems.

Review of combinatorics and logic including mathematical logic. Complexity of algorithms. Recurrence relations and their application to the analysis of algorythms. Automata. Minimization of automata. Construction and decomposition of automata. Turing machines and computational complexity. Grammars, formal languages and regular sets. Nondeterministic automata. Minimization of nondeterministic automata.

Textbooks:

Johnsonbaugh, Discrete Mathematics (MacMillan)
Gersting, Mathematical Structures for Computer Science (Freeman)

MAT 471 **Operations Research** 3-0-6
PA MAT 212; INF 201-408

For students taking the Science or Computer Science option, with concentration in Mathematics.

Linear programming. Duality and post-optimality analysis. Dynamic programming and whole number programming. Applications: transportation and assignment problems, problems of shortest path and minimal flow in a network. Replacement of equipment. Analysis of decisions. Production planning.

Textbooks:

F.S. Hillier & G.J. Lieberman, Introduction to Operation Research (3rd Edition) (Holden-Day Inc.)
M. Minoux, PROGRAMMATION MATHÉMATIQUE: théorie et algorithmes (TOME I) (Dunod)

MAT 475 **System Simulation** 3-0-6
PA 201-408; MAT 251 ou ADM 242

For students taking the Science and Computer Science options.

Objectives of simulation. Stages in simulation. A complete example. Random nubmers. Random number generators. Tests on numbers obtained. Generation of discrete distributions. Generation of continuous distributions. Systems and models: concepts, classification and components of a system, modeling principles, flow charts. Introduction to SLAM: event approach, activity approach. Examples of simulation with SLAM: inventory model, repair shop.

Textbooks:

Law & Kelton, Simulation, Modeling and Analysis (MacGraw-Hill)
Pritsker & Pedgen, An Introduction to Simulation and SLAM (System Publishing)
Knuth, Seminumerical Algorithms (Addison-Wesley)

MAT 476 **War Games** 3-0-6
PA MAT 335

For students taking the Military and Strategic Studies option with Honours.

Mathematical combat models and analytical solutions. Lancester equations: quadratic, linear and parabolic laws, computer solutions. Classic and guerilla warfare. Manual and computerized games. Simulation. Detection and tracking problems. Anti-submarine warfare.

Textbook:

Course notes

MAT 493 **Computer Science Project** 0-5-5

For Fourth Year students taking the Computer Science option, concentration in Mathematics.

A computer-related project, typically a programming effort in a particular area of Computer Science involving Mathematics. Two periods are reserved in the first session for this project, and three in the second session. A report and an oral presentation must be given at the end of the year.

Seminars

The Department of Mathematics offers Fourth Year students a series of lectures as part of the Science Division seminar program. Held once a week, the lectures are given by qualified professors and researchers, each of whom will discuss his field of specialization as well as its present state and needs.

The various speakers are chosen from among professors at Collège militaire royal de Saint-Jean who are particularly active in research, and also from those of universities and scientific research institutions. This series of seminars is an essential complement to the regular courses. The program also includes visits to industries and laboratories, which are often of military interest as well.

Research

Research conducted by the Department of Mathematics includes studies in both pure and applied mathematics in the areas of nonlinear analysis, fixed points theory, optimization, finite elements, combinatorial analysis, graph theory, probability and complex variables, partial differential equations and operations research.

Tutorials

For students encountering difficulties, the Department of Mathematics provides tutorial periods once a week in each of the four mathematics courses at the collegiate level.

DEPARTMENT OF MILITARY LEADERSHIP AND MANAGEMENT

Head of the Department	Major C. Hamel, CD, BscSoc, MA
Professor	Jacques Castonguay, BA, BTh, LPh, LTh, DPh
Associate Professors	Léandre Maillet, BA, MAPs, DPs
	Michel Pageau, CD, BA, MPs
Lecturer	Major H. Mendes, CD, BAdm, MAPs
Part-time Lecturer	Captain D. Beaulieu, CD, BAdm

350-101 **Introduction to Psychology I** 3-0-6

The principal objective of this course is to present to the student an overview of the fields of psychology. The main themes covered include: research methods, development, sensation and perception, principles of learning, motivation, emotions and attitudes, intelligence, statistics and psychological tests, and personality.

350-201 **Introduction to Psychology II** 3-0-6
PA 350-101

The principal objective of this course is the in-depth continuation of the introduction to the psychological aspects of human behavior. Some of the main themes covered include: research methods employed in psychology, perspectives on human behavior, psychological development, complex learning and cognition, behavior modification techniques, behavior disorders, problems in society, environmental psychology, specific behaviors: stress and performance, mental health and normality.

MLM 221 **Social Psychology** 3-0-6
PA 350-101

The principal objective of this course is to introduce the students to the basic principles of social psychology and to enable them to analyze and interpret phenomena of social interaction, particularly as they apply to the military context. The main themes are: social communication, social perception and attribution processes, beliefs, attitudes and social values, interviewing and counselling, interpersonal influence, group dynamics, leadership, and sex differences in social behavior.

MLM 232 **Psychology of Aggressive Behaviour** 3-0-6
PA MLM 221

The principal objective of this course is to study the complex phenomena of aggression in man and animals. Topics include: historical and contemporary evidence of human aggression, definitions of aggression, psychological methods employed in the study of aggression, contemporary theories examining the sources of aggressive behaviors, namely: the physiological bases of aggression, instinct theories of aggression, and social-learning theory of aggression. In addition to an

analysis of important indices related to aggressive behavior, we study questions relating to violence and society, legitimate aggression, and methods of control in reducing aggression in contemporary society.

MLM 312 **Applied Military Psychology** 3-0-6
PA MLM 221

This course is intended to provide leaders with a better understanding of the human factor in combat and pre-combat by examining the application of psychology to military problems. Conducted in a seminar format, the course will examine individual, group, and leadership factors affecting combat performance including selection, training, man-weapon interface, cohesion, morale, hostile environments, combat behavior, and psychological warfare.

MLM 322 **Organizational Psychology** 3-0-6
PA MLM 221

The objectives of this course are twofold: to study the organization as a total system in order to understand employees' behaviour, and to demonstrate how the organization's efficiency and effectiveness can be enhanced with knowledge of the interaction of small working groups and the organization. Topics covered include: historical perspectives of management, work and motivation, work group dynamics, morale and group processes, dynamics of conflict, leadership style and organizational design, and organization development.

MLM 341 **Leadership and Management from a Behavioral Science Perspective** 3-0-6
PA MLM 221

The objectives of this course are to develop student awareness of the basic function germane to management and point out the leadership skills required for an effective management of human resources. The course begins by underscoring the leader/manager role in complex organizations. This first objective is achieved by the study and discussion of the generalized activities of management. The following part of the course is devoted to the study of themes more closely related to leadership. Themes selected point out the leadership characteristics required of a leader in order to effectively manage personnel. The study of leadership and management is viewed in the context of complex organizations of which the Canadian Forces is typical. The main themes are: personnel management and leadership; planning, organizing, directing, controlling; differences between leadership and management; effective leadership; leadership and decision-making; leadership and counselling; leadership and stress management; leadership and organizational climate; leadership in complex organizations.

MLM 315 **Sociology of Warfare** 3-0-6
PA MLM 341

This course pursues four main objectives: (1) an introduction to sociological analysis; (2) an elaboration of a conceptual framework on which to develop an understanding of the origin, the evolvement and the consequences of wars from a sociological perspective; (3) an acquisition of empirical knowledge relating to the principal dimensions of wars (incidence, intensity, duration, trends, cycles, stages and types), in order to allow the student to pursue further studies on his own or use the results of such studies to weigh the relative merits of contemporary defence policies, if appropriate; and, (4) to encourage the student to undertake a meaningful evaluation of the role of the military profession and of violence in contemporary society. The focus is placed on the scientific study of wars as social phenomena, which reflect as well as transform the societies which generate them. We try to discover behind the military and political manifestations of war, the social structures responsible for their emergence and sustenance. We concentrate on international wars, but attention is also given to current military conflicts, despite difficulties in obtaining objective information about them, as compared to information available on past conflicts. Some of the main themes covered include: (1) introduction to sociology; (2) conflict, war and peace from a polemological perspective; (3) the empirical study of the social morphology of wars in the evolution of contemporary society; (4) movement from a state of peace to a state of war: the sociological explanation of the origin of wars; (5) war, mobilization and social change: (a) macro-sociological consequences of violent armed conflicts in the world, (b) war and societal cohesion, (c) unit cohesion, morale and efficiency, (d) human behavior under combat stress, (e) leadership and professional conduct in war: war crimes; (6) movement from the state of war to a state of peace: social conditions leading to war termination and post-war strategies; and, (7) military profession, national security and peacekeeping.

MLM 412 **Job Adjustment and Personality** 3-0-6
PA 350-101

The objectives of this course are to study some of the contemporary theories of personality as they relate to military situations. Emphasis will be placed on the human development and maturing of personality, personality conflicts within groups or between individuals, mechanisms of personality adaptation, individual differences and situational analysis. Conduct of this course will be a combination of theoretical and practical approaches. It builds upon previously learned principles in the management of human resources.

MILITARY LEADERSHIP AND MANAGEMENT

MLM 422 **Behaviour in a Military Setting** 3-0-6
PA MLM 341 or ADM 321

The course aims generally at facilitating the student's professional and individual adjustment to the role of commissioned officer in the Canadian Armed Forces. To reach this goal, the student is required to deepen his understanding of some of the concepts and theories developed in the field of military psychology and management, in order to apply these to the analysis of interpersonal relations and individual performance in a military setting. The course takes a proven principle as its point of departure. This principle states that the task of an officer, and that of any efficient supervisor for that matter, consists in developing in a productive way, the close link which exists between the mission to be accomplished, the well-being of the subordinates, and the morale of the group. This principle informs the choice of themes dealt with in the course, as well as the pedagogical approach. The expectation is that the student will acquire knowledge which he can subsequently utilize for himself and for the group placed in his charge. It is hoped that he can learn with a view of being able subsequently to teach what he has learned. In view of this, the emphasis is also placed during the entire course on the ethical dimension of the military profession in modern society. The main themes covered include: establishing a self-awareness inventory; establishing supportive communication; discipline and control; improving group performance through influence and motivation; resolving conflicts between you and your subordinates; resolving comflicts between you and your superiors; performance evaluation and counselling practices; financial difficulties and work; stress and work; orientation, developement and career; group development and growth; the evolution of military values and their impacts on the military profession; posting and first command.

DEPARTMENT OF PHYSICS

Head of the Department	Alessandro S. Biffi, BA, BSc, MSc
Professors	Cheuk Yin Cheung, BSc, MSc, PhD
	Maurice Cormier, BA, BSc, MSc, DSc, N.D.C.
	Roger F. Favreau, BSc, MSc, PhD
	Paul-Émile Girard, BES, BSc, MSc, DSc, N.D.C.
	Gisèle Goulard, LicSc, D 3^{e} cycle, DSc
	Jules Marcoux, BA, BSc, MA, PhD
	Martin M. Perlman, BSc, MSc, PhD, F.Aps, F.IPL
Adjunct Professor	Laurent-G. Caron, BScA, MScA, PhD
Associate Professors	Martin Boloten, BSc, MSc
	André Filion, BSc, MSc, PhD
	Fernand Ledoyen, BA, BSc, DSc
	Sesha Subramanian, BSc, MA, PhD
Assistant Professors	William E. Gravelle, BA, MA, PhD
	Major Claude Laporte, BSc, MSc, MScA
	Bernard Mongeau, BScA, MScA, DScA, Ing.
	Captain Alain Rambo, BSc, MSc, PhD
Lecturer	Major André Gauthier, CDI, BEng

203-101 **Mechanics** 3-2-4
PR 201-101, 201-103

For officer cadets of the Preparatory Year.

The objective of this course is to teach the fundamental laws of motion at the macroscopic scale and also the universal principles of conservation, and to introduce the student to the scientific method.

Vectors, Vector kinetics. Vector dynamics. Inertial and non-inertial reference frames. Conservation principles. Mechanical energy. Conservative and non-conservative forces. Gravity. Optional: Planetary motion. Limits of Classical Mechanics.

Textbook:

Resnick and Halliday, Physics Vol. I

203-201 **Electricity and Magnetism** 3-2-4
PR 201-101, 201-103; CR 201-203, 203-101

For officer cadets taking the Science and Engineering option.

The objective of this course is to study the fundamental laws of electricity and magnetism and the principle of operation of electromagnetic apparatus and instruments.

Charge and matter. Electric field. Electric potential. Capacitance and dielectrics. Direct currents. Magnetic phenomena. Electromagnetic force. Measuring Instruments. Alterning current (introduction). Optional: Magnetic properties of matter. Alternating currents.

Textbook:

Halliday and Resnick, Physics Vol. II

203-301 **Waves and Modern Physics** 3-2-4
PA 203-101, 203-201

For officer cadets taking the Science and Engineering option.

The objective of this course is to study oscillating motion and its application in various physical phenomena.

Waves: Harmonic oscillations. Wave equation. Superposition principle for waves. Interference and diffraction. Stationary waves. Electromagnetic waves (physical optics and electric circuits). Quantum physics: Particle behaviour of waves. Wave behaviour of particles. Bohr atom. Nuclear structure. Electron diffraction. Uncertainty principle. Optional: Structure of nucleus. Natural and artificial radioactivity. Nuclear energy.

Textbook:

Halliday and Resnick, Physics, Vol. I et II

203-902 **Experimental Physics** 1-4-4
PR 203-101, 203-201; CR 203-301

For officer cadets taking the Science and Engineering option.

The object of this course is to introduce the student to experimental techniques and methods, to the analysis of results and the writing of reports.

Lectures on experimental techniques, on the evaluation and calculation of uncertainties, the plotting and interpretation of graphs. Review of the basic elements of geometric optics. 18 experiments on a variety of subjects contained in the course 203-101, 201 and 301.

Textbook:

Experimental Physics, written by a group of professors

203-927 **Physical Sciences** 3-0-3
PR 203-101

For officer cadets taking the Administrative Sciences and Humanities.

The object of this course is to complete the scientific education of students going into non-scientific studies by considering the fundamental aspects of science taken generally through the study of useful and practical applications both in chemistry and in physics.

In physics subjects selected from the following will be studied: electricity and magnetism; electronics; electromagnetic waves; modern physics, the history and evolution of physics; the influence of scientific discoveries on the evolution of society; the presentation of a paper on one of these subjects. (For complementary courses in Chemistry, see the Department of Chemistry under course 203-927.)

Textbooks:

Casper and Noer, Revolution in Physics
Professor's Notes

PHY 211 **Mechanics** 3-1-5
PA 203-101; PR 201-408, 201-203; CR MAT 221

For officer cadets taking the Science options or the Engineering option.

Review of reference frames, vectors. Velocity and acceleration. Newton's laws. Circular motion. Motion of projectiles with and without air resistance. Collisions and conservation laws (in two dimensions). Conservation of angular momentum. Rotation of rigid bodies. Statics.

Textbook:

Kleppner and Kolenkow, An Introduction to Mechanics

PHY 222 **Electromagnetism** 3-1-5
PA 203-201, 201-203; PR MAT 221, 201-408; CR MAT 222

For officer cadets taking the Science options or the Engineering option.

Review of electric and magnetic fields. Laws of Faraday and Lenz. Generators. Self-induction and mutual induction, stored energy. Electric fields in matter, dielectrics. Magnetic fields in matter. Introduction to Maxwell's equations and electromagnetic waves.

Textbook:

Purcell, Electricity and Magnetism (Berkley, Vol. 2)

PHY 231 **Oscillations, Waves and Electric Circuits** 3-1-5
PR 203-301, 201-408, 201-203; CR MAT 221

For officer cadets taking the Science options or the Engineering option.

Periodic motion analyzed using complex exponentials. Superposition of periodic motions. Free oscillations, damped oscillations, forced oscillations and resonance. Application to alternating-current electric circuits (series and parallel). D.C. and A.C. circuit analysis. Theorems of Thevenin and Norton.

The wave equation, standing and travelling waves, wave trains, phase and group velocity.

Textbooks:

French, Vibrations and Waves
Edminster, Electric Circuits

PHY 262 **Modern Physics** 3-1-5
PA 203-301, 201-203; PR 203-201, MAT 221, 201-408; CR MAT 222

For officer cadets taking the Science options or the Engineering option.

Special relativity: the Lorentz transformation, time dilatation, length contraction, velocity addition, mass, momentum, energy. Introduction to quantum mechanics; potential wells, Schroëdinger's equation, the hydrogen atom, spin. Introduction to solid-state physics.

Textbooks:

Young Fundamentals of Waves, Optics and Modern Physics
Kittel, Mechanics

PHY 311 **Classical Mechanics I** 3-1-5
PA PHY 211, PHY 231, MAT 222, CR MAT 321

For officer cadets taking the Honours course in Physics or a major in Physics. Elective for students taking the Computer Science course with concentration in Physics.

Motion of a particle in two and three dimensions, potential energy, stability, central forces. Motion of many particles systems, conservation laws. Accelerated reference systems, Coriolis force. Rotation of rigid bodies, Euler's equation, Euler's angle. Introduction to Lagrangian formulation.

Textbooks:

Symon, Mechanics
Spiegel, Theoretical Mechanics

PHY 314 **Intermediate Mechanics** 3-0-6
PA MAT 221, 203-101; PR PHY 211, MAT 222, MAT 321 or MAT 326

For officer cadets taking one of the courses with a minor in Physics.

Review of Newtonian mechanics. Central forces. Accelerated reference frames, Coriolis force. Systems of particles, rigid bodies.

Textbook:

Fowles, Analytical Mechanics

PHY 316 **Mechanics of Continuous Media** 3-0-6
PA PHY 211; PR 201-408; CR MAT 223, MAT 321 or MAT 326

For officer cadets taking the Honours course in Physics or a Major in Physics.

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 lager theory. Applications: fluid flow, aerodynamics and hydrodynamics, such as flow about an immersed body and lift on air foils.

Textbooks:

Hughes and Brighton, Fluid Dynamics
Fung, Continuous Mechanics
Professor's notes

PHY 321 **Electronics I** 2-0-4
PHY 322 **Electronics II** 2-0-4
PA PHY 222

For officer cadets taking the Honours course or a major in Physics.

Simple electronic components such as the diode, junction transistors, field effect transistors and their equivalent circuits are studied along with the principles of rectification, amplification, commutation and methods of quantitative circuit analysis. Some linear integrated circuits such as operational amplifiers and timers.

Textbooks:

Boylestad and Nashelsky, Electronic Devices and Circuit Theory
Millman and Halkias, Electronic Fundamental and Applications for Engineers and Scientists

PHY 323 **Experimental Electronics I** 2-2-5
PHY 324 **Experimental Electronics II** 2-2-5
PA PHY 222

For officer cadets taking one of the courses with a minor in Physics.

Simple electronic components such as the diode, junction transistors, field effect transistors and their equivalent circuits are studied along with the principles of rectification, amplification, commutation and methods of quantitative circuit analysis. Some linear integrated circuits such as operational amplifiers and timers.

Experimental study of electronic diagnostic tools, electronic components, linear and digital integrated circuits.

Textbooks:

Boylestad and Nashelsky, Electronic Devices and Circuit Theory
Millman and Halkias, Electronic Fundamentals and Applications for Engineers and Scientists
Professor's Notes

PHY 331 **Physical Optics** 3-0-6
PR 203-902, PHY 222, PHY 231; CR MAT 223 or MAT 326

For officer cadets taking the Honours course, a major in physics or one of the courses with a minor in Physics.

Geometrical optics, Maxwell's equations, electromagnetic waves, polarization, Fourier theory, Fresnel and Fraunhofer diffraction, Kirchkoff's integral, interference and gratings, coherence. Optional subjects if time permits.

Textbook:

Hecht and Zajac, Optics

PHY 334 **Signal Processing** 3-1-5

For officer cadets in computer science, concentration in systems or physics.

Continuous signal processing: periodic signals and Fourier series, non-periodic signals and Fourier transform, filtering. Digital signal processing: sampling, aliasing, analogue to digital conversion, fast Fourier transform, digital filters, convolution. Applications: radar, sonar, image processing.

Textbooks:

Rabiner and Gold, Theory and Application of Digital Signal Processing
Brigham, The Fast Fourier Transform
Professor's notes

PHY 341 **Statistical Physics** 3-0-6
PR PHY 211, PHY 222, PHY 262, MAT 251, MAT 222

For officer cadets taking the Honours course or a major in Physics.

Principles of statistical mechanics. Quasistatic thermodynamics: equilibrium, entropy, Kelvin temperature scale. Statistical ensembles and the Boltzmann distribution. Spin systems, ideal gas and specific heat of solids. Maxwell velocity distribution.

Textbooks:

Reif, Statistical Physics, Berkeley Physics Course, Vol. 5
Reif, Statistical and Thermal Physics

PHY 342 **Quantum Statistical Physics** 3-0-6
PA PHY 341

For officer cadets taking the Honours course in Physics.

Statistical distribution of Maxwell-Boltzmann, Bose-Einstein and Fermi-Dirac. Electromagnetic radiation (black body). Conduction electrons in metals. Lattice vibrations and Debye theory for solids. Real gases. Low temperature phenomena. Kinetic transport processes.

Textbook:

Reif, Statistical and Thermal Physics

PHY 361 **Atomic and Nuclear Physics I** 3-1-5
PA PHY 231, MAT 251, PHY 262, MAT 223; CR MAT 322

For officer cadets taking the Honours course or a major in Physics.

Wave packets, Schrödinger equation, wells and barriers, harmonic oscillator.

Textbooks:

Eisberg and Resnick, Quantum Physics
Saxon, Elementary Quantum Mechanics

PHY 362 **Atomic and Nuclear Physics II** 3-0-6
PA PHY 231, PHY 262, MAT 223; PR PHY 361, MAT 251, MAT 321, MAT 322

For officer cadets taking the Honours course or a major in Physics.

The hydrogen atom, steady-state and time-dependent perturbation theory. Electron spin. Atomic sectra. Nuclear Physics.

PHYSICS

Textbooks:

Eisberg and Resnick, Quantum Mechanics
Saxon, Elementary Quantum Mechanics

PHY 381 **Electronics and Application I** 2-4-6
PHY 382 **Electronics and Application II** 2-4-6
PA PHY 222

For officer cadets in computer science, concentration in systems or physics.

Simple electronic components such as the diode, junction transistors, field effect transistors and their equivalent circuits are studied along with the principles of rectification, amplification, commutation and methods of quantitative circuit analysis. Some linear integrated circuits such as operational amplifiers and timers.

Experimental study of electronic diagnostic tools, electronic components, linear and digital integrated circuits.

Textbooks:

Boylestad and Nashelsky, Electronic Devices and Circuit Theory
Millman and Halkias, Electronic Fundamental and Applications for Engineers and Scientists
Professor's Notes

PHY 391 **Experimental Physics** 0-3-3
PHY 392 0-3-3
PA PHY 222, PHY 231, PHY 262;
CR PHY 321, PHY 322, PHY 361, PHY 331

For officer cadets taking the Honours course or a major in Physics.

Experimental methods and techniques in electronics, atomic physics and nuclear physics. Characteristics of tubes and transistors. Rectifiers, amplifiers, oscillators; circuit analysis, logic circuits. Choice of experiments such as Franck-Hertz, radioactivity, particle detection, vacuum systems, Rutherford's experiment, neutron absorption, atomic spectra. Physical optics.

Textbooks:

Melissinos, Experiments in Modern Physics
Professor's Notes

PHY 399 **Weapon Technology** 3-0-3
PR 203-101

For officer cadets taking Military and Strategic Studies.

The object of this course is to permit students taking the course in Military and Strategic Studies to learn 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 armement.

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.)

Textbook:

Glasstone, The Effects of Nuclear Weapons

PHY 412 **Classical Mechanics II** 3-0-6
PA PHY 311, CR MAT 322

For officer cadets taking the Honours course in Physics.

Matrices, curvilinear coordinates. Calculus of variations. Hamilton's principle, Lagrangian and Hamiltonian dynamics. Relativity. Coupled oscillators. Choice of topics.

Textbooks:

Marion, Classical Dynamics of Particles and Systems
Fetter and Walecka, Theoretical Mechanics of Particles and Continua

PHY 421 **Electrodynamics I** 3-0-6
PHY 422 **Electrodynamics II** 3-0-6
PA PHY 311, PHY 331, MAT 223; PR PHY 421, for PHY 422

For officer cadets taking the Honours course in Physics.

Electrostatics, Boundary value problems (rectangular, spherical and cylindrical coordinates) Green functions. Magnetostatics; Electromagnetic induction, Maxwell's equations, Plane electromagnetic waves, waves in anisotropic media, charge, field interactions, wave guides and resonant cavities, other selected topics.

Textbooks:

Hauser, Introduction to the Principles of Electromagnetism
Jackson, Classical Electrodynamics
Bohr, Introduction to electromagnetic fields and waves

PHYSICS

PHY 423 **Electromagnetic Waves and Applications** 3-0-6
PA PHY 222; PR PHY 311, PHY 331, MAT 223 or MAT 326

For officer cadets taking a Major in Physics.

Orthogonal coordinates, line integral, Maxwell equations (integral form); grad, div, curl, Maxwell equations (differential form); dielectric and conducting media, boundary conditions; reflection and transmission; transmission lines, Smith chart, Poynting vector, waveguides, optional topics.

Textbooks:

Johnk, Engineering electromagnetic fields and Waves
Hayt, Engineering electromagnetics

PHY 426 **Logic circuit Design** 2-2-5
PR PHY 321, PHY 322

For officer cadets taking a major in Physics.

Description of logic families. Combinational logic design. Simplification of Boolean functions. Relay logic. Multivibrators, registers and counters. Number systems, digital codes, code conversion, digital arithmetic. Races. Microprocessor architecture.

Textbooks:

Porat and Barna, Introduction to Digital Techniques
Professor's notes

PHY 427 **Microprocessor System Design** 2-2-5
PR PHY 426

For officer cadets taking a major in Physics.

Microprocessor architecture. Addressing modes. Instruction set, Instruction timing, Status Flags. Stock operation. Interrupts. Parallel and Serial Input/output devices. Analog-to-Digital and Digital to analog conversion Techniques.

Textbooks:

Brey, Microprocessor Hardware, Interfacing and Applications
Professor's Notes

PHY 451 **Quantum Mechanics** 3-0-6
PA PHY 361, PHY 362; PR MAT 322

For officer cadets taking the Honours course in Physics.

Mathematical tools of quantum mechanics. Postulates of quantum mechanics. The harmonic oscillator: creation and annihilation operators. Addition of angular momenta. Diffusion. Applications.

Textbooks:

Cohen-Tannoudji, Diu, Laloë, Mécanique quantique, Vol. 1 and 2
Dirac, Quantum Mechanics

PHY 471 **Solid State Physics I** 3-0-6
PA PHY 222, PHY 262; PR PHY 361, PHY 341; CR PHY 362

For officer cadets taking the Honours course or a major in Physics.

Crystal structure. X-ray diffraction, Brillouin zones. Crystal binding. Lattice vibrations. Thermal properties of insulators.

Textbook:

M. Ali Omar, Elementary Solid State Physics

PHY 472 **Solid State Physics II** 3-0-6
PA PHY 222, PHY 262; PR PHY 471, PHY 361, PHY 362

For officer cadets taking Honours in Physics.

Fermi electron gas. Electric, magnetic and thermal properties of solids. Band theory of metals, insulators and semiconductors; effective mass, holes. Impurity doping in semiconductors.

Textbook:

M. Ali Omar, Elementary Solid State Physics

PHY 481 **Logic Circuit Design and Application** 3-3-6
PR PHY 381

For officer cadets in computer science.

Description of logic families. Combinational logic design. Simplification of Boolean functions. Relay logic. Multivibrators, registers and counters. Number systems, digital codes, code conversion, digital arithmetic.

Textbooks:

Porat and Barna, Introduction to Digital Techniques
Professor's notes

PHY 482 **Microprocessor System Design and Application** 3-3-6
PR PHY 481

For officer cadets in computer science, concentration in systems, physics or management.

Microprocessor architecture. Addressing modes. Instruction set. Instruction timing. Status Flags. Stock operation. Interrupts. Parallel and Serial Input/output devices. Analog-to-Digital and Digital-to-analog conversion Techniques.

PHYSICS

Textbooks:

Brey, Microprocessor Hardware, Interfacing and Applications
Professor's notes

PHY 491 **Experimental Physics** 0-6-3
PHY 492 0-6-3
PA (PHY 321 & PHY 322) or
(PHY 322 & PHY 324), PHY 262; PR PHY 331

For Fourth Year officer cadets taking any science program.

Selected experiments in electromagnetism, atomic physics, nuclear physics and solid state physics, using modern techniques of computer processing and real time data acquisition. This course includes a number of compulsory experiments as well as a research project for each student. This project will include a written thesis and an oral presentation at the end of the year.

Textbooks:

Melissinos, Experiments in Modern Physics
Professor's Notes

PHY 493 **Computer Science Project** 0-5-5

For Fourth Year students of the Computing Science option, in the Physics orientation.

A computer related project, typically a programming effort in a particular area of Computing Science related to the Physics orientation. Two periods are reserved on the schedule at the first session for this project and three at the second session. A report and an oral presentation must be given at the end of the year.

Seminars

The Departments of the Division of Science offer their students a series of conferences, once a week. 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.

Tutorials

Professors may organize special lectures for weak students whenever they wish. Morever special periods to this effect have been included in the timetable for the two years of collegiate studies.

Laboratory and Research

The experimental laboratory courses in Physics are designed to introduce the students to modern experimental techniques and teach them rigorous scientific methods. Some of these courses permit the officer cadets to particularly develop their initiative and ingenuity; furthermore, they complete the student's university training by making it more practical.

The scientific research in the department is concentrated on the physics of semiconductors and dielectrics, the applications of lasers and holography, theoretical physics, the physics of explosives, the application of microprocessors as well as on several other subjects. Three research groups have been set up for this purpose: the Groupe de recherches en semi-conducteurs et diélectriques (GRSD), the Laboratoire-Laser du CMR (LLCMR) and the Laboratoire d'applications des microprocesseurs (LAM).

The GRSD consists of researchers from the Departments of Physics and Chemistry of CMR and Université de Sherbrooke who have a common interest in the fields of semiconductors and dielectrics. Through this group some students are able to take part of their post-graduate studies at CMR.

The LLCMR consists of civilian and military researchers interested in the applications of lasers and holography. Students sponsored by this group are able to pursue their post-graduate studies at Université Laval (LROL).

The LAM consists of civilian and military researchers from the department of physics and of computer sciences and engineering interested in data processing, speech recognition and synthesis.

In support of this work the department has several mini and microcomputers and various types of terminals through which other computing centers may be reached. Furthermore there are terminals for CMR's Honeywell DPS-8 in most laboratories.

DEPARTMENT OF SECOND LANGUAGES

Associate Professor and Head of the Department	Florent Tremblay, BA, BEd, MA, PhD, Ling-Counsel, Off. lang. fr. Qué.
Associate Professors	Michel Ladouceur, BPéd, L ès L, MEd
	Marian Olynyk, BA, MA, PhD (Sabb. Leave)
Senior Teachers	Clarence Paré, BA
	Suzanne Bodner, BA, TESL Cert, MEd
Language Teachers	Normand Arseneault, BA, BPéd
	Rollande Beaudoin, L ès L, L en Péd
	David Gravel, BA, L ès L
	Jennifer Hanna, BA, MA, Dip Ed, TESL Cert, MA TESL
	Marian Holobow, BA, BEd, MAL
	Suzanne Holunga, Ed Dip, BA, TESL Cert
	Anne Kingsbury, BA
	Mary Macdonald, BA Lang & Ling, Lang Cert, BA Lang & Trans, TESL Cert
	Frances Manning, BA TESL
	Richard Pelletier, BA, BPéd, Cert TME Credif
	Robert Plouffe, BPéd, BA, MA
	Gregory Reid, BA, MA, Dip Com
	André Robichaud, B ès Arts, BA Hist
	Lorne Shirinian, BA, MA
	Raymond Thibeault, BPéd
	Joan Thompson, BA, TESL, MA
	Judith Wolfe-Labbé, BA, MA

ENGLISH AS A SECOND LANGUAGE

604-101 **Preparatory Year** (CMR 001) 3-1-5
604-102 (CMR 011) 3-1-5

The basic language structures are presented and practised in communicative activities. Short compositions and written exercises reinforce the acquisition of the material. Reading selections from the Longman's abridged series provide topics for discussions and oral presentations. The emphasis at this level is on understanding and speaking in everyday situations.

SECOND LANGUAGES

604-301 (CMR 002) 3-1-5
604-302 (CMR 012) 3-1-5

The course includes a review of grammar, reinforced and verified through controlled conversations, drills and laboratory exercises. As the year progresses, the emphasis is shifted from grammar and drill to presentations and more open discussions using video, audio and slide presentations, role-playing, informal debates and discussions on specific topics. Students are given various reading assignments from E.S.L. reading texts and are expected to write several short compositions.

604-928 (CMR 003) 3-1-5
604-902 (CMR 013) 3-1-5

The course includes a review of tenses, a study of idiomatic expressions, the reading of first language short stories and novels. In addition, video and audio materials are used for discussion and written assignments. Clear paragraph organization is stressed. As well, library research in the target language is done to encourage the student to use English media.

604-911 (CMR 004) 3-1-5
604-916 (CMR 014) 3-1-5

Novels and short stories as well as newspapers, magazines and radio and television programs will be used to further develop communication abilities. Students are required to complete reading and other assignments outside of class time and to be prepared to present or discuss the material in class.

604-914 (CMR 005) 3-1-5
604-309 (CMR 015) 3-1-5

This course consists of the study of novels, short stories, essays and exposés as well as student presentations based on individual or group research. Audio-visual resources will be used to supplement the written material.

604-103 **First Year** (CMR 101) 3-1-5
604-104 (CMR 111) 3-1-5

The grammar content provides an intensive review and continued practice of the basic tenses. An introduction to more advanced tenses as well as language functions is given. Oral expression is developed through short presentations in class followed by questions. Short texts from newspapers, magazines and literature are discussed. Listening skills are improved by the use of audio tapes to reinforce material taught and expose students to samples of native like speech. Reading skills are enhanced by the use of second language texts assigned for homework. Writing skills are practised by placing emphasis on correct spelling, grammar and sentence construction.

604-901 (CMR 102) 3-1-5
604-907 (CMR 112) 3-1-5

The content of the course includes laboratory work, role-playing activities, video-based activities, idioms, grammar and vocabulary exercises, reading of second language texts, short stories and newspapers, debates and discussions.

604-929 (CMR 103) 3-1-5
604-903 (CMR 113) 3-1-5

The content of the course is selected in order to develop the reading skills (rate and vocabulary-building, reading for information and enjoyment); writing skills (accuracy in spelling, sentence/paragraph structure, dictation/note-taking, summarizing); speaking skills (ability to participate in discussions/debates, to ask for information, to use conversational gambits and social formulae); and listening skills (ability to understand and interact with varieties and levels of spoken English.)

604-912 (CMR 104) 3-1-5
604-308 (CMR 114) 3-1-5

A thematic approach to several topics will allow the student practice in reading, essay writing, debating, and oral presentations. A study of literary texts will form a major part of the course. A study of films will be another important area of course work and will serve as an introduction to cinema studies. A study of vocabulary and idioms will develop the student's fluency.

604-909 (CMR 105) 3-1-5
604-919 (CMR 115) 3-1-5

The course includes an introduction to modern drama, the short story and the novel. Slide and video presentations on language, symbols and modern literature are used to complement the course material and stimulate discussion. Students are required to complete reading and writing assignments which are also discussed in class. The course includes a review of selected issues in advanced grammar and stylistics.

ESL 201 **Second Year** 2-1-6
ESL 211 2-1-6

The course includes a review of basic grammar: verb tenses, modals and idioms. Current affairs, TV programs, newspaper articles and short E.S.L. texts are the basic content of the course.

ESL 202 2-1-6
ESL 212 2-1-6

Speaking and listening skills are developed through classroom exercises and oral activities based on videos, readings, current affairs, audio tapes and other appropriate authentic materials. Written and reading tasks are assigned to consolidate class work.

ESL 203 2-1-6
ESL 213 2-1-6

Expansion of vocabulary and understanding of grammar will be achieved through the reading of literary, technical and scientific texts and through the preparation of out-of-class assignments. Comprehension of English will be improved through a variety of tasks: conversational interaction, class discussions, laboratory drills, viewing of documentaries, note-taking. Speaking skills will be developed through exercises to build vocabulary, to use idioms, to improve pronunciation and to correct remedial grammar problems.

ESL 204 2-1-6
ESL 214 2-1-6

To promote class discussion, a variety of audio-visual material is presented. The students give oral reports on topics from current newspapers and magazines as well as from works of literature. Written work is also required to consolidate the new material.

Third Year

ESL 302 0-3-6
ESL 312 0-3-6

The grammar is dealt with by a review of the basic tenses, and emphasis is put upon written and oral practice in class and in the laboratory. General conversation on directed topics and role-playing situations help to address the problems in putting together the structures. Readings in current magazines and newspapers are used, plus discussion of video material. Written error correction is also used extensively.

ESL 303 0-3-6
ESL 313 0-3-6

This course provides materials and training which develop students' language skills in conversational interaction (knowledge of social formulae, idioms, language levels), and in reading and writing (knowledge of military form and style, accuracy in spelling, vocabulary choice and grammar). A variety of exercises based on topics of general and current interests will be used.

ESL 304 0-3-6
ESL 314 0-3-6

Translation exercises, idioms and grammar work are all used to encourage the acquisition of formal grammar. Formal speeches, role-playing games, and directed conversation topics are used to improve fluency. Topics from current magazines, radio, and T.V. are used to initiate discussions. Formal paragraph writing is also done.

ESL 402 **Fourth Year** 0-3-6
ESL 412 0-3-6

Complex grammar areas are reviewed and emphasis is placed on accurate performance at a high level in all four skills. Samples of authentic native language are used for study. Videos are exploited in vocabulary expansion exercises as well as audio tapes used to sharpen listening exactness.

ESL 403 0-3-6
ESL 413 0-3-6

A study of problem grammar areas will frame the speaking section of this course and be complemented by error analysis techniques in listening and writing. Authentic language materials will be used to promote reading skills and foster thematic discussions in class.

ESL 404 0-3-6
ESL 414 0-3-6

A study of topical concerns through the reading of newspaper and magazine articles, and essays, through the viewing of videos and films, and through listening to taped audio interviews will promote in-class discussions, debates, oral presentations, and written assignments.

FRANÇAIS LANGUE SECONDE

602-102 **L'année préparatoire** (CMR 001) 3-1-5
602-202 (CMR 011) 3-1-5

Le contenu grammatical des premières unités de *Dialogue-Canada* sert de programme de base. Chaque étudiant doit également remplir un programme de lecture simple dont la compréhension est vérifiée par des contrôles réguliers.

602-113 (CMR 002) 3-1-5
602-213 (CMR 012) 3-1-5

Certaines unités de *Dialogue-Canada* et des activités de *Communication plus* serviront de point de départ aux échanges de la classe. Les étudiants participeront également à des activités d'écoute et d'expression au laboratoire de langue. Des lectures en français facile et des exercices de grammaire seront proposés comme travaux personnels.

602-323 (CMR 003) 3-1-5
602-403 (CMR 013) 3-1-5

Afin d'atteindre des objectifs, l'étudiant est appelé à faire des lectures, à travailler en laboratoire, à comprendre et à appliquer des règles essentielles dans des devoirs revus et corrigés. Il doit ensuite appliquer ses nouvelles acquisitions dans la production de dialogues, contrôlés sur bandes vidéos et cassettes audios, ensuite discuter et commenter; dans l'élaboration de jeux linguistiques qui débouchent graduellement vers des jeux de rôles; dans des créations plus personnelles; et finalement dans des discussions en table ronde.

602-433 (CMR 004) 3-1-5
602-901 (CMR 014) 3-1-5

Utilisation fréquente d'activités 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. L'étudiant doit aussi rédiger des textes.

602-911 (CMR 005) 3-1-5
602-934 (CMR 015) 3-1-5

On étudie le roman, le théâtre, la nouvelle, la chanson et la poésie. Ce cours comprend des exposés, des travaux de recherche et des discussions sur les divers aspects culturels du Canada français. Les étudiants présentent en équipes divers projets faisant appel à toutes les ressources audio-visuelles.

602-302 **Première année** (CMR 101) 3-1-5
602-402 (CMR 111) 3-1-5

L'étudiant pourra 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.

602-303 (CMR 102) 3-1-5
602-313 (CMR 112) 3-1-5

L'apprentissage à ce niveau amène l'étudiant à développer la communication orale et écrite afin de s'exprimer convenablement. On y parviendra en utilisant la méthode *Dialogue-Canada* et en faisant 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) 3-1-5
602-423 (CMR 113) 3-1-5

Exercices de compréhension auditive auxquels s'ajoutent des activités d'expression orale soit en classe, soit au laboratoire de langue. Les élèves sont aussi appelés à lire des romans adaptés et à rédiger des résumés de lecture.

602-913 (CMR 104) 3-1-5
602-908 (CMR 114) 3-1-5

Les exercices écrits et oraux, en classe ainsi qu'au laboratoire aident l'étudiant à prendre connaissance des nouveaux points grammaticaux puis à les utiliser dans sa langue seconde. Pour enrichir son vocabulaire, il est appelé à faire des lectures, à analyser des textes, à écouter des cassettes audios et vidéos pour ensuite s'exprimer sur les sujets traités dans ces divers média. L'étudiant doit aussi apprendre à s'exprimer par 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) 3-1-5
602-991 (CMR 115) 3-1-5

L'expression orale et les activités d'écoute découleront de films, de documentaires, d'émissions de radio et de télévision. L'accent sera mis sur l'expression de plus en plus précise de la pensée. Des revues scientifiques et générales serviront aux exercices de lecture et d'écriture.

SECOND LANGUAGES

FLS 201 **Deuxième année** 2-1-6
FLS 211 2-1-6

L'étudiant pourra 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.

FLS 202 2-1-6
FLS 212 2-1-6

L'étudiant pourra se tirer d'affaire en compréhension auditive suffisamment bien pour lui permettre d'apprécier le sens général d'une communication. Il devra pouvoir 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 2-1-6
FLS 213 2-1-6

Approfondissement de la grammaire de base; la concordance des temps: présent, passé composé, imparfait, conditionnel et subjonctif; l'utilisation de tous les pronoms. On utilisera 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 modèles sur un sujet particulier. L'étudiant se familiarisera aussi avec les divers média d'information: nouvelles enregistrées à la radio ou à la télévision, lecture de revues et de journaux.

FLS 204 2-1-6
FLS 214 2-1-6

Des films, des documentaires, des émissions de radio et de télévision serviront de point de départ à l'expression orale. Des journaux, des revues scientifiques et générales seront les générateurs d'activités d'écriture. L'ensemble de ces exercices assure une revue complète de la grammaire française.

FLS 302 **Troisième année** 2-1-6
FLS 312 2-1-6

L'apprentissage à ce niveau amène l'étudiant à développer la communication orale et écrite pour s'exprimer selon les normes des connaissances correspondant à son niveau. On utilisera pour ce faire la méthode *Dialogue-Canada* de même que des exercices oraux faits au laboratoire. L'étudiant aura également à rédiger de courts textes dans le but d'améliorer son expression écrite.

FLS 303 2-1-6
FLS 313 2-1-6

Le programme de base est constitué de l'équivalent grammatical des dix premières leçons de l'*Atelier:* concordance des temps: présent, passé composé, imparfait; mode subjonctif; utilisation de tous les pronoms.

FLS 304 2-1-6
FLS 314 2-1-6

L'étudiant devra 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 démontrera une bonne compréhension des documents authentiques, de natures: générale, technique et abstraite. Il écrira en utilisant un niveau de vocabulaire avancé et des structures complexes.

FLS 402 **Quatrième année** 2-1-6
FLS 412 2-1-6

L'étudiant pourra se tirer d'affaire en compréhension auditive suffisamment bien pour lui permettre d'apprécier le sens général d'une communication. Il devra pouvoir 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 2-1-6
FLS 413 2-1-6

Emploi fréquent et régulier d'exercices de laboratoire, de discussions dirigées et d'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 2-1-6
FLS 414 2-1-6

L'utilisation du conditionnel, des pronoms relatifs et indéfinis, les prépositions et toutes les propositions françaises constituent le programme de base. En expression orale, l'étudiant fera des exposés et défendra ses prises de position; en expression écrite, il rédigera des rapports et fera des résumés d'articles. 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.

DEPARTMENT OF SOCIAL SCIENCES

Head of Department	Captain Jean Gagnon, CD, BA, MA, MBA
Professors	Rosario Bilodeau, BA, L ès L, D ès L Roger Brière, BSc, L ès L, MA. PhD André Dirlik, BA, MA, PhD
Associate Professors	François Gendron, BA, MA, D ès L David D. Ruddy, BSc, MA, PhD
Assistant Professors	Philippe Constantineau, BPh, MPh, PhD Charles David, MA, PhD H.P. Klepak, BA, MA, PhD Paul Létourneau, BspH, MA, DEA, D 3^{e} cycle Pierre Paquette, BCom, MA, PhD
Lecturers	Captain Claude Bergeron, CD, BSc Soc, MA

320-901 **Economic Geography of Canada** 3-0-6

This course establishes the foundations of the economic, social and political life of Canada, in preparation for courses offered in the following years of the curriculum. It deals with the development of natural resources, the problems associated with such development and the regional disparities resulting.

330-901 **History of Western Civilization** 3-0-6

The main objective of this course is to understand the ideas which have nurtured the rise of Western Civilization; to investigate the reactions of the rest of the world towards the West; to understand how a small and relatively unimportant section of the world could have so disproportionate an influence on the world; and to study the withdrawal of the West following the Second World War.

330-924 **Social and Economic History of Canada since 1850** 3-0-6

The objective of this course is to familiarize the students with the main phenomena of Canadian history through the study of the birth and evolution of federalism; economic nationalism and continentalism, from the railroad era to the oil and gas-pipelines era; colonialism and neo-colonialism, that is from the British Empire to the American Empire; industrialization and urbanization, the evolution of political parties, of legislation and of ideologies; Canada on the international scene.

SOCIAL SCIENCES

330-983 **Decolonization and Problems of the Third World** 3-0-6

The purpose of this course is to make the students aware of the problems, the aspirations and the options for development of the Third World.

340-225 **Political and Social Philosophy** 3-0-6

The purpose of this course is to introduce the students to the study and discussion of Western political and social theory which has, from Plato onward, focussed on such questions as: the nature and purpose of the state; the best practicable constitution; the dialectic implied by the notions of common good, self-interest and individual freedoms; the social problems; and the relationship between states.

383-920 **Introduction to Economics I** 3-0-6

The course is concerned with the behaviour of the economy as a whole. Particularly, it deals with the overall functioning of capitalist type economies. It is concerned with the determination of the economy's total output, the price level, the level of employment, interest rates, the balance of payments, and exchange rates. The course has three main objectives: providing the students with a good understanding of the functioning of an economy, an awareness of the main issues currently debated both nationally and internationally, and enabling the students to evaluate and judge contemporary economic events, phenomena and policies. These objectives will be pursued using both a theoretical and a descriptive approach.

383-921 **Introduction to Economics II** 3-0-6

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 212 **Microeconomics Analysis** 3-0-6
PA 383-921; ADM 241

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 216 **Classical Strategy** 3-0-6

This course deals with the development of classical strategic thought from ancient times down to the arrival of the atomic bomb. The great thinkers involved in this development will be studied and will include Thucydides, Sun-Tzu, Jomini, Clausewitz, Marx, Mahan, Liddel-Hart, and Douhet.

SCH 221 **Political Science** 3-0-6

The study of the nature of man in society is the primary objective of this course. This is done through a study of the fundamental nature of man and the purpose of the state, through a study of political science itself and through a comparison of four different political systems.

SCH 222 **Canadian Political Institutions** 3-0-6
CR SCH 221

The objectives of this course are to impart an understanding of the parliamentary system of government, and to understand the procedures by which the people of Canada can achieve their aims through the give and take of parliamentary compromise.

SCH 232 **Military History of Canada I** 3-0-6

A critical study of the major stages of Canada's military history. It stresses our role in the various wars in which we took part.

SCH 254 **Canadian Society** 2-1-6

Canadian Society is today formed of founding peoples, of native peoples and of neo-canadians. This society is presently in the making as a result of bilingual and multicultural policies. Students shall acquaint themselves in this course with the major contemporary social theories. They shall then look into the content of Canadian Society.

SCH 311 **Economic History in a Social Context** 3-0-6

This course is designed to give an overview of economic thought (theory and doctrine) and economic events. Different economic developments are discussed chronologically with respect to their contribution to the present day. The student is thus exposed to the main socioeconomic problems of the modern world, particularly the problems of industrialized versus developing nations.

SOCIAL SCIENCES

SCH 312 **Canadian Economic History** 3-0-6
PR SCH 311

The overall objective of the course is to give students a good understanding of Canadian economic history. The course identifies and examines the evolution of those institutions which played important roles in Canadian economic development, and analyses the historical roots of social, political and economic problems. The course adopts the perspective that the economic and historical development of Canada should best be examined in an international context. It thus begins in Europe on the eve of the ''discoveries'' and gradually proceeds to the post World War II period. The interactions between the Canadian economy and those of other nations on which it was made dependant will thus be closely surveyed.

SCH 313 **Macroeconomic Analysis** 3-0-6
PA 383-920; 383-921

The main objective of the course is that of improving the students understanding of the overall functioning of contemporary economies and of the complexity of the difficulties which they continuously face. The first part of the course will consist of an indepth survey of macroeconomic theory; the Keynesian approach will be emphasized. The second part of the course will examine important contemporary issues: prices and incomes policies, inflation, unemployment, stagflation, monetarism, the economic role of the State.

SCH 317 **Defence Economics** 3-0-6

This course applies 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 318 **The Soviet Union and its Defence Policy** 3-0-6

The purpose of this course is to provide the students with a basic understanding of the USSR, its army, society, economy, political system and major aspects of its foreign policy. It focusses attention on the realities of Soviet defence policy in our era.

SCH 319 **Great Battles** 3-0-6

A study of a number of great battles to highlight how strategic and tactical principles were applied in various circumstances over the course of history.

SCH 323 **Contemporary Military Figures** 3-0-6

The purpose of this course is to introduce to the students several military figures in the context of the strategic and technological conditions in which they worked.

SCH 326 **Nuclear Strategy** 3-0-6

This course studies the principles of contemporary nuclear strategy and of the problems related to it. It includes an analysis of the theoretical concepts of deterrence, détente, escalation and crisis management. It also examines the major strategic doctrines: massive retaliation, graduated deterrence, and mutual assured destruction.

SCH 327 **Introduction to Military Strategy** 3-0-6

This course studies the principles of military strategy and of the problems related to it. It includes an analysis of the best thinking and writing on military strategy of the last three centuries. The course gives great importance to the theoretical concepts of deterrence, détente, escalation, crisis management. It also examines the strategic doctrines of massive retaliation, graduated deterrence, and mutual assured destruction.

SCH 360 **Concepts and Methods in International Relations** 3-0-6

This course aims to teach students the basic concepts as well as the main methods used in the analysis of international relations. Fundamental aspects of the contemporary international system will also be discussed.

SCH 412 **Managerial Economics** 3-0-6
PA SCH 212

The aim of this course is tó 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 415 **Canadian Defence Policy** 3-0-6

This course should allow the student to understand the context of canadian defence policy since 1945. We will review the problems resulting from the safeguarding of our national sovereignty, our participation in North American defence, the carrying out of our commitments towards NATO and our role in peacekeeping operations throughout the world.

SCH 417 **Strategic Resources** 3-0-6

This course will examine the role and the importance of certain strategic resources as regards national security policy. Consideration will be given to the geographic, political and economic dimensions of each case study.

SCH 419 **Current Strategic Problems** 3-0-6

The purpose of this course is to develop the conceptual and analytical abilities of the student in regard to current strategic and military problems either in relation to the evolution of East-West relations or to the North-South opposition. The problems selected for analysis could change each year depending on the evolution of international problems.

SCH 421 **International Relations II** 3-0-6

The purpose of this course is to familiarize the students with the current schools of thought in this field. It focusses attention on international conflicts and their peaceful settlement.

SCH 424 **The Canadian Identity** 3-0-6

This course invites the students to consider what constitutes the basis of a national identity. We draw attention particularly to the efforts of the Canadian government to maintain its political autonomy separate from that of the United States and to the expression of a national will in the country's economy and communications. The following topics are given special attention: the presence of foreign multinational companies and its economic and social consequences in the host country, the influence these companies exert on the national government; the Canadian bourgeoisie and its national consciousness: American imperialism and the Canadian intellectuals; regional concern and the sense of identity; Canadian labor unions and international unions.

SCH 426 **Comparative Defence Policy** 3-0-6

In this course, a comparative analysis is made of the national defence policies of the United Kingdom, France, China, and Sweden from the point of view of each country's geopolitical situation. Analysis deals with organization, personnel, doctrinal and weapons concerns.

SCH 428 **U.S.A. and its Defence Policy** 3-0-6

This course should allow the student to understand the dynamics of the relation between the political factor and the military factor in America, to analyze the strategic doctrines since 1914 and the general organization of American defence as well as the distribution of American force in the world.

SCH 440 **Arms Control and Disarmament** 3-0-6

This course will examine the issues that have motivated arms control and disarmament negotiations since the late-nineteenth century; and it will consider the role that such negotiations and, in certain cases, agreements are said to play as elements of national security policy.

SCH 450 **Third World** 3-0-6

The course attempts to add depth to the student's knowledge of current problems in the Third World particularly in the realm of national security. Two case studies are chosen for elaboration each year.

SCH 452 **Canadian Civilization** 3-0-6

It is through the study of all aspects of the daily experience of Canadians that one can really understand the make-up of the Canadian cultural identity. This is the sole object of the courses of history, sociology, literature, geography, economics and political science. This course will try to deal with areas not already covered by the aforementioned courses and will attempt to integrate and synthesize what has already been dealt with. Particular emphasis will be placed on the arts such as architecture, painting, sculpture, music, cinema and theater. This course will include meetings with Canadian artists as well as visits to various museums and other places allowing direct contacts with social value, standards and beliefs which have been the object of discussion during formal courses. The student will also study the folklore, legends and traditions of various ethnic groups.

SCH 460 **Research Paper in Military and Strategic Studies** 0-2-6

Fourth Year students in the Honours Programme in Military and Strategic Studies (EMS) must write an essay. The research paper requires an effort to synthesize in a particular area of EMS. This research should permit the officer cadet to improve his knowledge as well as to apply rigorous research methods employed in the social sciences.

DRILL

Instructors

Chief Warrant Officer C. Desjardins, MMM, CD
Master Warrant Officer J.J.M. Dessureault, CD
Sergeant J.G. Parent, CD
Sergeant J.R. Galarneau

Aim

The object of Drill is to teach the students to obey instructions instinctively and properly, stimulate the power to command through mutual instruction, and develop leadership qualities through responsible handling of groups of officer cadets.

Contents

Drill includes Riffle, Sword and Foot Drill Elementary, Advanced, and Ceremonial, as prescribed by the Canadian Forces Drill Committee.

References:

CFP 201, Manual of Drill and Ceremonial

901-110	**Drill**	0-1-0
901-201		0-1-0

This course includes all movements in elementary drill.

901-311	**Drill**	0-1-0
901-401		0-1-0

Flight and Squadron Drill, including:

a. voice control;

b. words of command;

c. inspections; and

d. mutual instruction.

XML 200	**Drill**	0-1-0
XML 210		0-1-4

This course is a continuation of Drill 901-110, 901-210, 901-311, and 901-411, plus instructions in Wing Drill.

XML 300	**Drill**	0-1-0
XML 310		0-1-0

XML 400	**Drill**	0-1-0
XML 410		0-1-0

PHYSICAL EDUCATION AND ATHLETICS

Director of Athletics	Major H.R. Helgason, CD, BPE
Assistant Director	Captain R.F. Folkmann, CD, BPE
Physical Education Officer	Captain J.G. Melançon, BPE, CD
Senior Instructor	Master Warrant Officer S. Nadeau, MMM. CD
Training Supervisor	Warrant Officer M. St-Pierre, CD
Instructors	Sergeant J.R.F. Gagnon, CD
	Sergeant R.G. Gervais, CD
	Sergeant J. Kirsten, CD
	Sergeant J.M. Lemay, CD
	Sergeant R.R. O'Neil, CD
	Sergeant J.J. Thériault, CD
	Sergeant J.G. Vachon, CD
	Sergeant J.G.C. Lagarde, CD

Physical Education and Athletic Facilities

CMR offers first class physical education and athletic facilities which include a 400 metre cinder-track, six soccer/football fields, two softball diamonds, eight tennis courts, plus a marina which has sailing craft, sailboards and canoes. Indoor facilities include a double gymnasium, arena, swimming pool, sauna bath and a well-equipped weight-training facility.

The Physical Education and Athletic Program

The aim of the program is:

a. to instill an understanding of the theory and philosophy of physical education;

b. to develop physical fitness, sport skills; and habits necessary for maintaining physical fitness; and

c. to develop leadership qualities and other attributes of an officer.

The aim of the program is achieved through a balanced and progressive schedule of activities composed of the following:

a. Physical Education classes.

b. Intramural Sports Program.

c. Intercollegiate Athletics.

d. Recreation Club Activities.

These four components are complementary and are considered an integral and indispensable part of the whole program.

PHYSICAL EDUCATION

PHYSICAL EDUCATION PROGRAM

The aim of the physical education program is achieved by means of compulsory participation by all officer cadets in 90 minutes of physical education classes each week, which are conducted during the normal academic day.

109-101 **Preparatory Year Physical Education Program — First Term** 0-2-0

Meeting the requirements of the Canadian Forces Military Survival Swim Standard. The development of personal health habits and care in sport and fitness activities. The development of individual sport skills through participation in a variety of selected seasonal sports. Compulsory participation in vigorous physical fitness activities. Participation as minor officials in various leagues and tournaments.

109-201 **Preparatory Year Physical Education Program — Second Term** 0-2-0

An introduction to modern physical fitness training techniques coupled with rigorous participation in a variety of physical fitness activities. A study of health hazards as related to physical fitness and personal well-being. Further development of individual skills and regular participation in selected seasonal sports activities. Participation as minor officials in various leagues and tournaments.

109-301 **First Year Physical Education Program — First Term** 0-2-0

Further development of soccer and aquatic skills/knowledge. Comprehensive development of individual sport skills, plus an introduction to team strategies in selected seasonal sports. Regular participation in sports competitions as both player and minor official. Compulsory participation in demanding physical fitness activities.

109-401 **First Year Physical Education program — Second Term** 0-2-0

Development of knowledge and appreciation of modern physical fitness training techniques, including vigorous participation in wrestling. Development of individual skills with regular participation as a player and official.

EPH-200 **Second Year Physical Education Program — First Term** 0-2-0

Continued emphasis on physical training activities. An introduction to the fundamentals of Soccer, Broomball, Handball, Football and Underwater Hockey.

EPH-210 **Second Year Physical Education Program — Second Term** 0-2-0

Students will select one of the following activities: Water-Polo, Volleyball, Basketball, Hockey or Badminton. Opportunity exists for the development of advanced individual skills and team strategies. University Athletes are encouraged to select a sport other than their speciality.

EPH-300 **Third Year Physical Education Program — First Term** 0-2-0

Third year students continue to participate in vogorous physical fitness programs. Discussion of modern training techniques is continued. Students are exposed to two elective classes in the following sports: Tennis, Broomball, Golf, Indoor Soccer, Canoeing, Handball, and Aquatics.

EPH-310 **Third Year Physical Education Program — Second Term** 0-2-0

During this term, officer cadets again select one of the following activities for indepth study: Aquatics, Volleyball, Hockey, Badminton, Unarmed Combat, Cross-Country Skiing, and Racquetball.

EPH-400 **Fourth Year Physical Education Program — First Term** 0-2-0

The theoretical aspect of the course includes discussion of sports and physical education in the Canadian Forces, the duties of a unit sports officer and planning a personal physical fitness maintenance program. Activities during this term will include Golf, Tennis, Canoeing, Broomball, Handball, Indoor Soccer, and Aquatics.

EPH-410 **Fourth Year Physical Education Program — Second Term** 0-2-0

Officer cadets will look at designing physical fitness programs and activity periods for groups of personnel up to platoon level. An update of theoretical fitness and conditioning information shall be conducted as mini-lectures throughout the term. Students will complete their indepth study of a sport by selecting one of the following: Cross-Country Skiing, Racquetball, Badminton, Unarmed Combat, Volleyball, Hockey, and Aquatics.

INTRAMURAL ATHLETIC PROGRAM

The intramural athletic program contributes to the attainment of the objective as an extension of the physical education program by:

a. providing an opportunity for the development of individual sport skills and applying the principles which were presented in the physical education program;

b. providing further opportunity to develop physical fitness;

c. providing a competitive environment in which the qualities of leadership, competitiveness, aggressiveness, self-discipline, self-sacrifice and esprit-de-corps are required to a greater degree than in the instructional environment of the physical education program;

d. providing the opportunity for the development of poise and the ability to make decisions through experiences of organizing, officiating and coaching in the various intramural programs.

The intramural athletic program is divided into two areas:

a. intramural league play which is compulsory for all officer cadets not participating on university athletic teams; and

b. wing championships and tournaments which include individual and team events. These activities are voluntary and open to the entire cadet wing.

Responsibility for the day to day operation of the intramural athletic program rests with the officer cadets, under the supervision of Athletic Department personnel. Because of this operational approach, officer cadets are presented with the opportunity to develop leadership qualities through participation as activity convenors, officials, managers and coaches as well as players.

In conjunction with the intramural athletic program, speciality clinics for officials and coaches of team sports are offered to those officer cadets who are interested and assigned duties in these areas. As is applicable, appropriate provincial certification is awarded to successful candidates of the clinics.

The core activities of the intramural program include: Soccer, Football, Hockey, Volleyball, Basketball, Handball, Broomball, Water-Polo and Cosom Hockey.

The wing championships are: Track & Field, Cross-Country Swimming, Swimming, Wrestling, Speed Skating, Tennis, Racquetball, and Badminton.

THE INTERCOLLEGIATE ATHLETIC PROGRAM

The intercollegiate athletic program is designed for officer cadets of superior athletic skills and playing ability, and contributes to the achievement of the aim by:

a. providing the opportunity for the individual to participate in highly skilled, competitive, organized athletics;

b. providing the opportunity to achieve a high level of physical fitness;

c. intilling, through the demands of training and competition the desire to excel, developing self-discipline and encouraging self-sacrifice for a coordinated team effort; and

d. creating through the efforts of the College teams, a College esprit-de-corps.

CMR is a member of the Fédération des Associations sportives collégiales du Québec (FASCQ) a 61 member association of provincial CEGEPs. CMR currently competes in nine university sports: Basketball, Cross-Country Running, Football, Handball, Hockey, Soccer, Volleyball (men's and women's) and Water-Polo.

Recent successes of CMR athletic teams include: three undefeated football seasons which culminated in three FASCQ ''Bol d'Or'' Provincial Championships (1976, 1977, and 1983) and Québec University Athletic Championship in Cross-Country Running in 1978 and 1979. In 1985, the male and female teams won their respective category and the team championship of the FASCQ Cross-Country Running.

Physical Education Assessment of Students

Each officer cadet is assessed in five areas covered by the Physical Education and Athletic Program:

a. physical fitness as detailed by the Canadian Military Colleges Physical Performance Tests;

b. swimming requirements as outlined in Canadian Forces Administrative Orders;

c. theoretical knowledge as dictated by the physical education curriculum;

d. sport skill evaluation insofar as participation in the Physical Education Program is concerned; and

e. instructor assessment of desired officer-like qualities as related to the Physical Education and Athletic Programs.

The students who do not attain or maintain the required physical fitness or aquatics standard are obliged to participate in a compulsory remedial program until they can meet the standard.

RECREATION PROGRAM

CMR offers a comprehensive program of recreational and leisure time pursuits which is conducted as part of the Athletic Program under the general supervision of the CMR Recreation Association. Participation in the recreation program is compulsory and a period of time is specifically guarded each week for its operation. The program is so diverse, however, that certain clubs find it necessary to operate outside of the formal club periods in order to meet their specific needs.

The recreation program includes:

a. military oriented activities such as: fencing, flying, parachuting, combat arms, sailing, and shooting clubs;

b. sports oriented activities such as: badminton, alpine/nordic skiing, racquetball, and tennis clubs; and

c. art and hobby clubs such as: art, automobile, dance, debating, music, and photography.

ACADEMIC REGULATIONS*

Definitions

Program of study:

A group of courses constituting a specific program of study.

Subject:

A division of the program of study.

Course:

A series of lectures and/or laboratory periods, designated by a number in the curriculum, required for annual assessment.

Advanced course:

Course normally within his university program of study, but offered at a superior level, that the student can follow in advance. This course is valid for credits and is included in the student's average.

Elective course:

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

Optional course:

In his program of study, a course that a student may select and follow. This course is valid for credits but is not included in the student average.

Extra course:

A course that a student may take, though it is not in his program of study. Such a course carries the appropriate credits but marks obtained are not included in the student's grade average.

Failed-Credit Standing:

Standing granted on the recommendation of the Faculty Board, and with the approval of Faculty Council and the Commandant, in a failed course for the purpose of allowing a student who fails one course to pass the year. The mark will be recorded with the annotation "Failed-Credit" (FC) and remains a failure for the purpose of determining whether or not work prerequisites to other courses has been completed.

* Specified academic regulations concerning the two other colleges may be found in their respective calendars.

Carry a Course:

When it has been recommended by Faculty Council and approved by the Commandant, a student carries a course after failing this course in the previous term by taking the failed course again (or an authorized equivalent) in the first subsequent academic term in which the course is offered (schedule permitting) together with the normal academic workload of that term. The mark of the first attempt will be recorded on the transcript of marks for that term with the annotation against the failed course "Failed, but permitted to carry". That term will not be cleared until the carried course is passed..

Normally a student may not carry more than one course per term, nor can he carry a course in two consecutive terms. Without special permission of the CMC to which the student is transferring, a course may not be carried from one CMC to another.

Credit

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

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

c. For example, a credit corresponds to the following weekly load during a 15 week term:
One period of classroom teaching and
two hours of individual work;
or
one period of classroom teaching,
one period of practical work and
one hour of individual study; etc...

d. Let us take for example:
Course 202-201 **Chemical Solutions** 3-2-4

The three numbers on the right (3-2-4) represent the weighting of this course:
the first: the number of teaching periods per week;
the second: the number of periods of practical exercises per week;
the third: the number of hours devoted to individual work per week.
Hence $3 + 2 + 4 = 9$; $9 \times 15 = 135$; $135/45 = 3$. This course therefore carries three credits.

Duration of the Programs of Study

1. The duration of the programs of study is normally four or five academic years. The years are designated as follows: Preparatory year, First year, Second year, Third year, and Fourth year.

2. Entrance to the Preparatory year requires completion of junior matriculation or its equivalent. Entrance to First year requires completion of a program equivalent to the Preparatory year program of study.

Degrees

3. 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.

Diploma: mentions

4. The mention granted to the CMR university graduates is based on the cumulative average of the last two university years.

Collegial Studies Certificate

5. The College grants a certificate of Collegial Studies to the students who have successfully completed the Preparatory Year and the First Year.

Programs of study

Preparatory Year

6. All students registered in Preparatory year are normally required to take all the courses prescribed.

First Year

7. All First year students are normally required to take the courses prescribed for the program of study in which they are registered.

Second Year

8. All Second year students are required to take the courses prescribed for the program of study in which they are registered.

Third and Fourth Years

9. Programs for Third and Fourth Years are as follows:

a. Students who have successfully completed their Second year in Administration, in Canadian Studies or in Military and Strategic Studies will normally complete their Third and Fourth years in this option at Le Collège militaire royal de Saint-Jean.

b. The remainder of the students may elect to complete their Third and Fourth years as follows:

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

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

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

c. Details of the program 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.

10. Students, who wish to complete their course program at the Faculty of Engineering of RMC, must meet the conditions listed under the section ''Programs of Study'' and subsection ''Conditions for Admission into the third year courses of study at RMC''.

11. 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 percent (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 program.

12. A student in the Third or Fourth Year Honours programs must maintain a minimum combined average of sixty-six per cent (66%) in the Honours courses, and an overall average of at least sixty per cent (60%). Furthermore, he must pass each term at the first attempt without conditions.

13. The Faculty Council may, for cause stated, move a student from an Honour 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.

14. A student who has been advised not to take Arts or Engineering courses by his Canadian Military College on the completion of his second year, may be refused permission to register in these courses in his third year.

Drill and Physical Education

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

Continuity of Studies

16. 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.

17. Interruption of Studies — Under normal circumstances, a student may not postpone a year of study.

18. Change in the program of study:

a. A student may not alter his program of study without the permission of the Faculty Council.

b. Withdrawal from a course:

(1) an elective course.
An elective course which has been selected by a student at registration may be replaced by another course of the same category during the first month of the term in which the course is offered, if the department heads and the dean(s) concerned agree;

(2) advance course.
A student may only withdraw from an advance course forming an integral part of his program of study and which he has chosen at registration, only during the first four (4) weeks following the beginning of the term during which the course is offered;

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

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

19. Normally, a student may not transfer from one program of study to another, without having obtained the full prerequisite standing in the option he wishes to enter. The permission of the Faculty Council is required, except during the first two weeks of each term.

Attendance

20. 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. University level: who has reached the functional level of bilingualism is not required to take second language courses.

c. College level: a student who has reached the required level of bilingualism as determined by the Faculty Council of the College is not required to take second language courses.

Academic Standing

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

a. a minimum overall average of 50 per cent except for a student's first term at CMR;

b. a minimum of 50 per cent in each course exclusing a course passed with failed-credit.

22. An officer cadet must obtain a satisfactory standard in Physical Education, Drill and Second language, and a favourable report in officer-like qualities.

23. Graduation of Academic Standings:

First Class Honours	Grade A — 75-100 per cent
Second Class Honours	Grade B — 66-74 per cent
Third Class Honours	Grade C — 60-65 per cent
Pass Standing	Grade D — 50-59 per cent
Failure	Grade E — less than 50 per cent

For second language, students at the university level will be given credits in the form of a letter grade only.

24. 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.

Final Examinations

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

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

27. 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.

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

    a. in any course involving practical work in a laboratory, if his laboratory work has been unsatisfactory;

    b. in any other course if he fails to meet the requirements with regard to assignments.

Supplemental Examinations

29. 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 this first term at CMR in any year. Furthermore to be allowed to write a supplemental examination, a student must obtain at least 20 per cent in the failed subject.

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

31. No second supplemental examinations will be allowed.

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

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

Revision of examinations

34. 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.

Failure in a Term

35. 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 a course he has been allowed to carry.

Repeating a Term

36. A student:

a. may be permitted to repeat any term, but he may only repeat once in the four/ or five-year program; and

b. may be authorized to repeat a term by NDHQ on the recommendations of the Faculty Council and the Commandant.

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

Withdrawal

38. A student who fails in more than four courses in any term program of study shall normally be required to withdraw.

39. A student who fails a term may be required to withdraw from the College, and a student who fails a term having previously failed a term, must withdraw.

40. 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.

Academic Misconduct

41. PLAGIARISM:

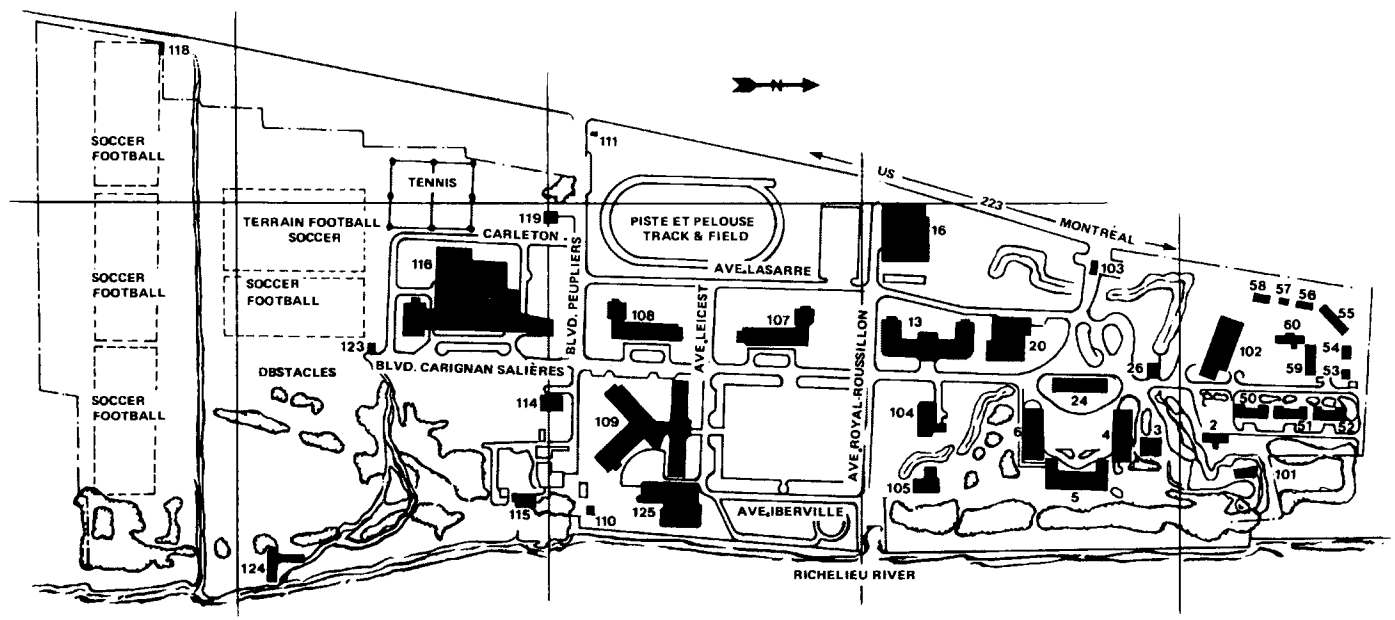
Plagiarism is the presentation or submission of work as one's own which originates from some other, unacknowledge source. In term papers, laboratory assignments and examinations, the verbatim or almost verbatim presentation of someone else's work without attribution constitute plagiarism.

42. 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.

43 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.



LEGEND

2. C.E. STORAGE
3. WO & SERGEANTS MESS
4. MONTCALM BLOCK
5. OFFICERS' MESS
6. LA GALISSONNIÈRE BLOCK
13. MAISONNEUVE BLOCK
15. STORAGE
16. DRILL HALL
20. DINING HALL
24. MASSEY BLOCK
26. MUSEUM
50. P.M.Q. 4-5-6-7
51. P.M.Q. 8-9-10-11
52. P.M.Q. 12-13-14-15
53. P.M.Q. 16
54. P.M.Q. 18-20
55. P.M.Q. 22-24-26-28
56. P.M.Q. 30-32
57. P.M.Q. 33
58. P.M.Q. 34-35
59. P.M.Q. 17-19-21-23
60. P.M.Q. 25-27-29-31
101. GREENHOUSE
102. SERVICE BUILDING
103. GATE HOUSE
104. R.C. CHAPEL
105. PROT CHAPEL
107. CHAMPLAIN BLOCK
108. CARTIER BLOCK
109. DE LERY PAVILION
110. STORM LIFT STATION
111. SAN. LIFT STATION
112. BATHING HOUSE
113. P.M.Q. 1
114. T.M.Q. 1
115. P.M.Q. 2
116. VANIER HALL
118. METEP PIT
119. P.M.Q. 3
122. NORTH FLUO. BLDG.
123. SOUTH FLUO. BLDG.
124. MARINA
125. LAHAIE PAVILION

Figure 1 Map of the Collège militaire royal de Saint-Jean

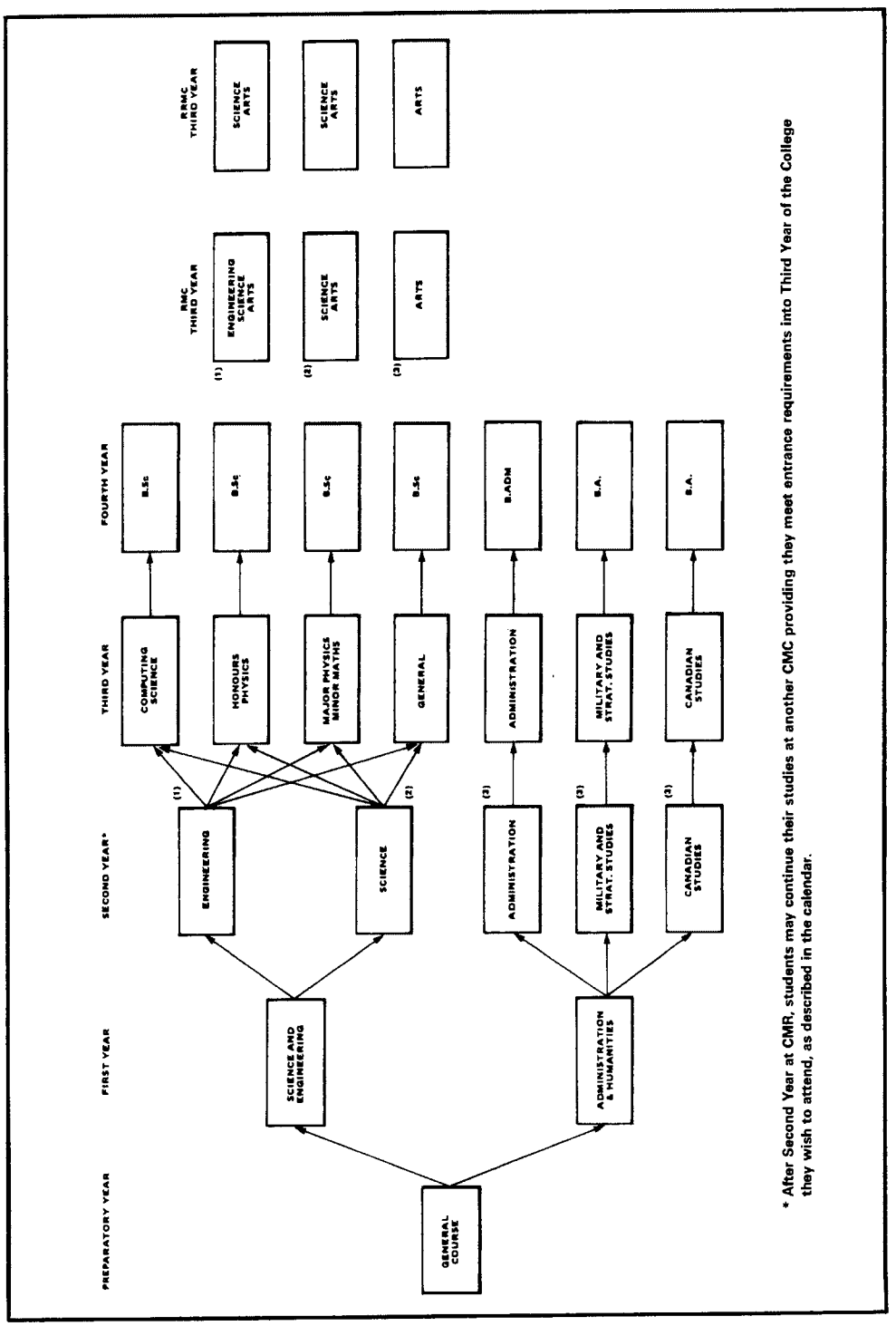


Figure 2 Programs of study at College militaire royal de Saint-Jean

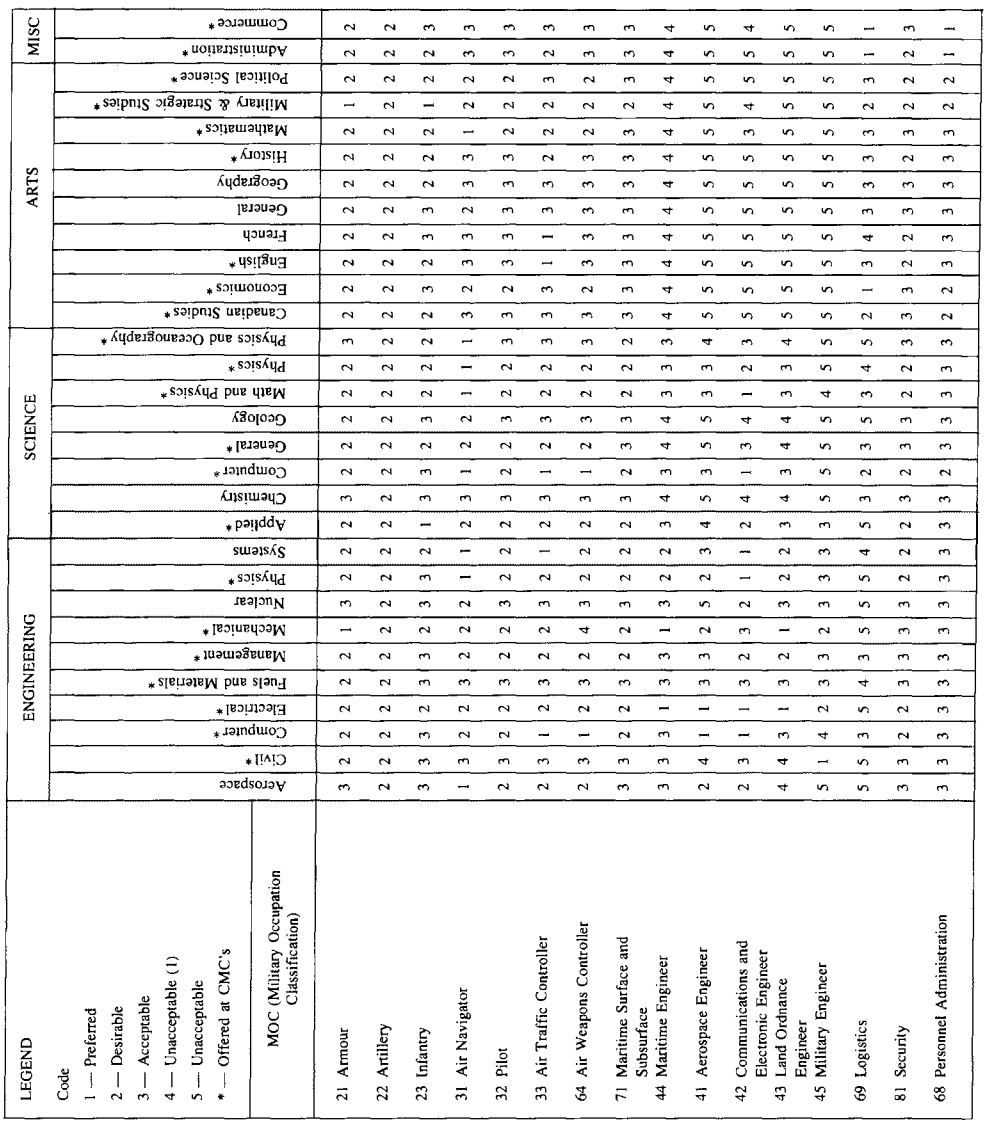


Figure 3 Classifications and Course Patterns for ROTP

(1) Code 4 indicates that the degree program by itself is unacceptable. However, if a candidate has previous work experience and/or training related to the specifications of the classification, the degree program may be acceptable.