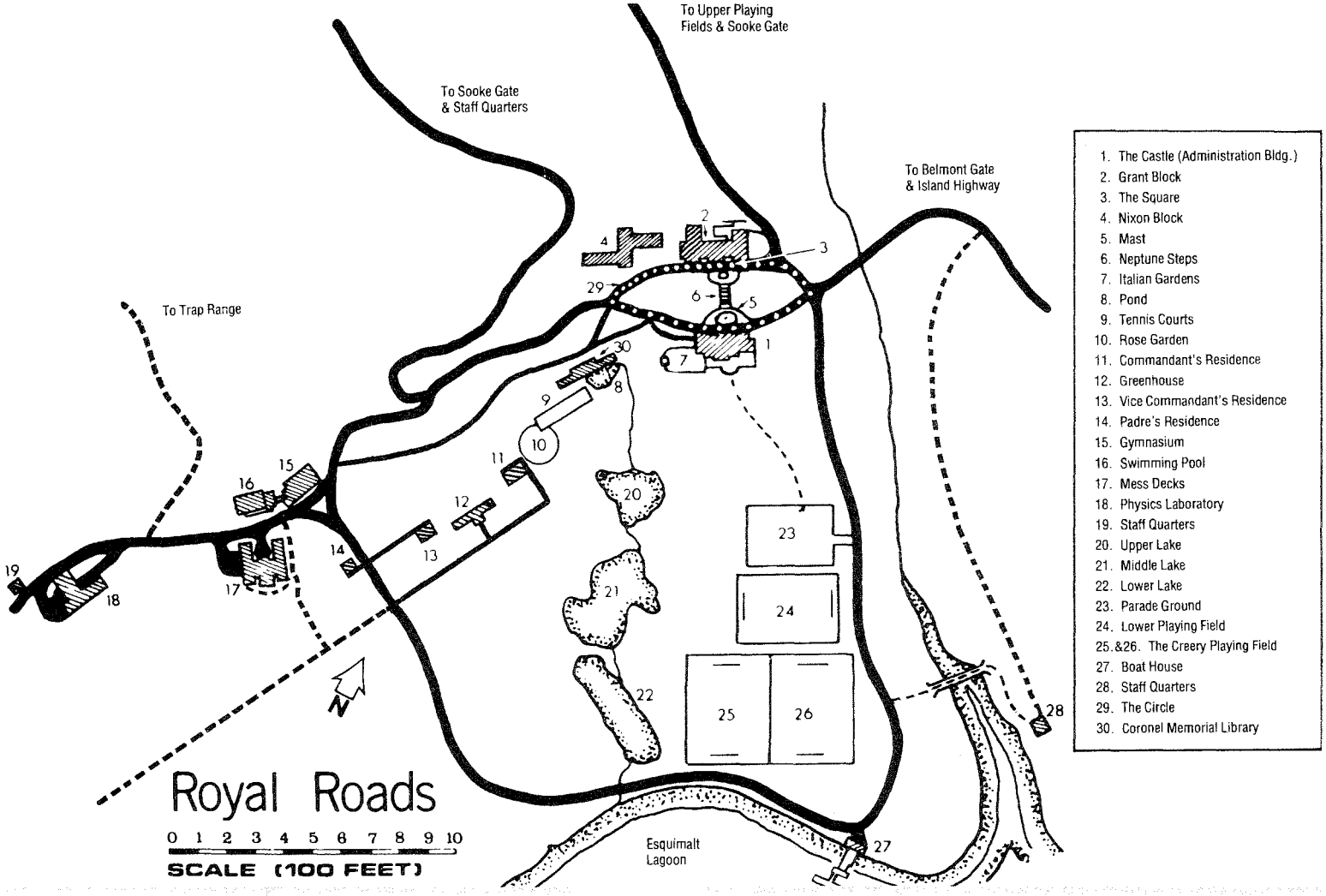
Royal Roads Military College

Calendar 1986-87

Victoria, B.C.


To Upper Playing Fields & Sooke Gate
To Sooke Gate & Staff Quarters
To Belmont Gate & Island Highway
To Trap Range
1. The Castle (Administration Bldg.)
2. Grant Block
3. The Square
4. Nixon Block
5. Mast
6. Neptune Steps
7. Italian Gardens
8. Pond
9. Tennis Courts
10. Rose Garden
11. Commandant's Residence
12. Greenhouse
13. Vice Commandant's Residence
14. Padre's Residence
15. Gymnasium
16. Swimming Pool
17. Mess Decks
18. Physics Laboratory
19. Staff Quarters
20. Upper Lake
21. Middle Lake
22. Lower Lake
23. Parade Ground
24. Lower Playing Field
25.&26. The Creery Playing Field
27. Boat House
28. Staff Quarters
29. The Circle
30. Coronel Memorial Library
N
Royal Roads
0 1 2 3 4 5 6 7 8 9 10
SCALE (100 FEET)
Esquimalt Lagoon

JANUARY

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1987

JANUARY

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OCTOBER

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CALENDAR OF EVENTS — 1986-87

First Semester– 1986-87

Aug 18	Cadet Officers return
Aug 22	BOTC Graduation/Recruits arrive
Aug 23-Sept 1	Administration
Sept 2	Classes start
Oct 8	Honours Day
Oct 10-13	Thanksgiving Stand-down (no classes)
Oct 27	Mid-semester academic reports due
Nov 11	Remembrance Day (no classes)
Dec 4	Classes end
Dec 5	Exams start
Dec 16	Exams end
Dec 18	0900 — Results due Registrar
Dec 19	1000 — Faculty Board/Faculty Council
Dec 19	Christmas Ball
Dec 20-Jan 4	Christmas Leave

Second Semester – 1986-87

Jan 5-11	Military Training
Jan 8-9	Supplemental Examinations
Jan 12	Classes start
Feb 27-Mar 2	Stand-down (no classes)
Mar 3	Mid-semester academic reports due
Apr 14	Classes end
Apr 16-30	Second semester examinations
May 1-4	Stand-down
May 4	0900 — Results due Registrar
May 5	1000 — Faculty Board/Faculty Council
May 11-13	First Year supplemental exams
May 15	Convocation, Sunset Ceremony
May 16	Graduation Parade and Ball
May 17	Successful cadets to summer duties

First Semester– 1987-88

Aug 17	Cadet Officers return
Aug 21	BOTC Graduation/Recruits arrive
Aug 22-30	Administration
Aug. 31	Classes start
Oct 9-12	Thanksgiving Stand-down (no classes)
Oct 23	Mid-semester academic reports due
Nov 11	Remembrance Day (no classes)
Dec 3	Classes end
Dec 4	Exams start
Dec 15	Exams end
Dec 17	0900 — Results due Registrar
Dec 18	1300 — Faculty Board/Faculty Council
Dec 18	Christmas Ball
Dec 19-Jan 3	Christmas Leave

CANADIAN MILITARY COLLEGES

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M.M. Soule, rmc, BA, LLB
Colonel (Retired) J.E. Terry, CD, BEng, BEd, PEng

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Deputy Minister of National Defence
Chief of the Defence Staff
Vice Chief of the Defence Staff
Assistant Deputy Minister (Personnel)
Chief Research and Development

SECRETARY

Major D.B. Evans, CD, psc, BA, MBA

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VICE-COMMANDANT — Lieutenant-Colonel W.J. Anderson, CD, pcsc, BA (RMC)*

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DEAN OF ARTS — W. Rodney, DFC and Bar, BA (Alberta), MA (Cantab), PhD (London), FRGS, FRHistS — Professor of History

REGISTRAR — Wing Commander (Ret'd) M.D. Thom, CD, rmc, pfsc, pcsc, aws, BASc (BritCol)*, AdeC

ASSISTANT REGISTRAR — Captain R.J. Beardmore, CD, plsc, BEng (RMC)*

CHIEF ADMINISTRATIVE OFFICER — Major B.W. Bezanson, CD, BSc (Acadia)

PERSONNEL ADMINISTRATIVE OFFICER — Captain A.D. Mackenzie, CD

COMPTROLLER AND LOGISTICS OFFICER — Captain T.M. Ross, BA (RMC)*

STAFF OFFICER CADETS AND MILITARY TRAINING — Major A.J. Lavoie, CD, plsc, BEd (Alberta)

SQUADRON COMMANDERS —
Lieutenant (N) P.J. MacAuley, BSc (RMC)*
Captain M.K. Overton, BSc (RMC)*
Captain J.D. Guerin, BAdm, (CMR)
Lieutenant (N) M.B.L. Tremblay, BBA (UQAC)

DIRECTOR OF ATHLETICS — Captain H.G.W. Pronk, CD, BSc (Acadia)

PHYSICAL EDUCATION OFFICER — Captain R.E. Kinnee, CD, BSc (Brigham Young)

CHAPLAINS —
Chaplain (P) — Lieutenant (N) G.L. Zimmerman, CD, BSc (McMaster), MDiv (Knox)
Chaplain (RC) — Major J.G.C. Verreault, pfsc, BTh (Montreal)

UNIVERSITY LIAISON OFFICERS —
Captain K. Hur, CD, asc, BSc (McGill)
Captain R.F. Mitchell, CD, BA (Manitoba)

DENTAL OFFICER — Captain D.L. Raynor, BSF (Brit Col), DDS (Western)

*Graduate Royal Roads

EMERITI

C.S. Burchill, BA, MA, BSc, Emeritus Professor of History (1971)

J.M.C. Meiklejohn, MBE, BSc, Registrar Emeritus (1972)

A.E. Carlsen, BA, MA, PhD, Emeritus Professor of Economics (1974)

H.R. Grigg, BSc, MSc, PhD, Emeritus Professor of Physics (1978)

G.F. Dalsin, BSc, MA, Emeritus Professor of Mathematics (1978)

W.G. McIntosh, BSc, PEng, Emeritus Professor of Engineering (1978)

A.G. Bricknell, BSc, MSc, PhD, ARCS, FCIC, FRIC, Emeritus Dean of Science (1979)

J.A. Izard, BEng, MASc, PEng, Emeritus Professor of Engineering (1979)

D.W. Hone, BA, PhD, Emeritus Professor of Physics (1981)

J.K. Kinnear, BA, MA, Emeritus Professor of Physics (1981)

H. Montgomery, BA, MA, PhD, FCIC, Emeritus Professor of Chemistry (1982)

E.S. Graham, BSc, MSc, PhD, FCS, FOAS, Emeritus Principal (1984)

G. Morgan, BA, MA, PhD, MNI, CMMC, Emeritus Professor of Literature and Philosophy (1985)

OFFICERS OF INSTRUCTION

A. Allard, BA (Brit Col), MA (Berkley), Language Teacher

N. Arnold, BA, DipEd (Victoria), Language Teacher

M.R. Barr, BSc, MSc, PhD (Brit Col), MCIC, Associate Professor and Head of the Department of Chemistry

G.M. Barrow, BASc, MASc (Brit Col), PhD (Berkley), Associate Professor of Chemistry

J.A. Bayer, BA (Brit Col), MA (Carleton), PhD (London), Associate Professor of Political Science (on leave of absence 1986-87)

J.A. Boutilier, BA (Dalhousie), MA (McMaster), PhD (London), Associate Professor and Head of the Department of History and Political Economy

E.R. Chappell, rmc, BSc (Queen's), MASc (Brit Col), MEIC, MCSCE, MCASI, PEng, Associate Professor and Head of the Department of Engineering*

Captain D.L. Christensen, BSc (RMC), Special Lecturer in Mathematics*

J.S. Collins, BSc (Dalhousie), BEng, MEng (NSTechColl), PhD (Washington), MIEEE, MEIC, MCSEE, PEng, Associate Professor of Engineering

M. Connor, BA (Victoria), Language Teacher

A.C. Cutler, BA (UBC), MSc (London), BLaws (McGill), Special Lecturer in Political Science

H.J. Duffus, ndc, BA, BASc (Brit Col), DPhil (Oxon), PEng, Professor of Physics and Dean of Science and Engineering

P.J.S. Dunnett, BSc (Bradford), MA, PhD, (SFU), Associate Professor of Economics

J.M. Gilliland, BSc, MA (Brit Col), PhD (Alberta), Assistant Professor of Physics

Lieutenant (N) W.R. Glover, CD, BA (Queen's), MA (London), Special Lecturer in History and Political Science

A. Hadley, BA (Brit Col), DipEd (Victoria), Senior Teacher and Head of Department of Second Language Training

L. Hof, BA (Sherbrooke), BSc, MA, MEd (Ottawa), Language Teacher

T.B. Killip, BA, MA (SFU), Special Lecturer in Economics

D.P. Krauel, ndc, BSc (McMaster), MSc (Dalhousie), PhD (Liverpool), Associate Professor and Head of the Department of Physics

J.L. LaCombe, BSc, MSc (Waterloo), PhD (SFU), Special Lecturer in Computer Science

G.M. Lancaster, BSc (Liverpool), PhD (Sask), Professor and Head of the Department of Mathematics

W.T. MacFarlane, BA (Sask), MSc (Alberta), PhD (Oregon State), Associate Professor of Physics

J.W. Madill, CD, BSc (CE) (Manitoba), MSc (CE) (Queen's), EdD, (WVU), MEIC, MCGS, PEng, Associate Professor of Engineering

M.S. Madoff, AB (Michigan), PhD (Brit Col), Associate Professor and Head of the Department of Literature and Philosophy (on leave of absence 1986-87)

W. Magnusson, BA, PhD (Oxford), Special Lecturer in Political Science

Major A.T. Malcolm, CD, pcsc, asc, BA, MA, PhD (Manitoba), Assistant Professor in Military Leadership and Applied Psychology

W.T. Mann, BComm (Brit Col), FCGA, Special Lecturer in Accounting

R.F. Marsden, BSc (RMC), PhD (Brit Col), Assistant Professor of Physics

A.G. Martel, BA (SFU), MA (Fletcher), PhD (Toronto), Associate Professor of History

F. Milinazzo, BSc, PhD (Brit Col), Associate Professor of Mathematics

F. Nantais, BA, BacEd (Montreal), Language Teacher

P.G. Nixon, BA (Carleton), BEd, MA, PhD (Western), Special Lecturer in Political Science

Major G.J. Ousey, CD, BSc (RMC), MSc (York), Special Lecturer in Physics

M.J. Press, BSc, MSc, (McG), PhD (SFU), Associate Professor of Physics

C.N. Ramkeesoon, BA (U of Wales), MA (Dalhousie), PhD (Western), Assistant Professor of Literature

K.J. Reimer, BSc, MSc (Calgary), PhD (Western), MCIC, Associate Professor of Chemistry

Major G.D. Resch, CD, BA (Brandon), MA (Sask), Assistance Professor and Head of the Department of Military Leadership and Applied Psychology

J. Robichaud, BA (Edmunston), BAEd (Montreal), Licence théologie (Laval), Language Teacher

M.G. Robinson, BSc, PhD (Durham), Professor of Chemistry

W. Rodney, DFC and Bar, BA (Alberta), MA (Cantab), PhD (London), FRGS, FRHistS, Professor of History and Dean of Arts

M. Savard, BA, MA (Ottawa), Language Teacher

P.J. Schurer, BSc, MSc, PhD (Groningen), Associate Professor of Physics

P. Smart, BEd, BSc (Alberta), MEd (Brit Col), MPA (Victoria), PhD (Walden), Assistant Professor of Mathematics

A. Tétreault, BA (Montreal), Language Teacher

M.D. Thom, CD, rmc, pfsc, pcsc, aws, BASc (Brit Col), Associate Professor of Engineering and Registrar*

J. van Campen, BA, BSW (Laval), MA Linguistics (SFU), Language Teacher

R.B.J. Walker, BA (Wales), MA (Queens), Special Lecturer in Political Science

M.J. Wilmut, ndc, BSc (Sir George Williams), MA, PhD (Queen's), Associate Professor of Mathematics

W.W. Wolfe, BSc (Brandon), MSc, PhD (Queen's), Associate Professor of Mathematics

S.D. Wray, BSc (Adelaide), BSc (Hons), MSc, PhD (Flinders), Associate Professor of Mathematics

CORONEL MEMORIAL LIBRARY STAFF

CHIEF LIBRARIAN — S.E. Day, BA (Queen's), MLS (Toronto)
HEAD, TECHNICAL SERVICES — J.C. Inkster, BA (Brit Col), BA (Hons) Carleton), BLS, MLS (Toronto)

COMPUTER SERVICES STAFF

DIRECTOR — J.L. Dorscher, BSc (Calgary)
APPLICATIONS PROGRAMMER/ANALYST — S.L. Lang, BSc (Victoria)
SYSTEMS PROGRAMMER/ANALYST — D.M. Pettyjohn
HONEYWELL STAFF —
System Manager — B. Staff
Operators/Programmers — W.M. MacPhail
— M. Chan, BSc (Victoria)

* Graduate Royal Roads

SENATE

The Minister of National Defence (Chancellor of the College and President of the Canadian Military Colleges), the Commandant (Vice-Chancellor and *Chairman*), the Principal and Director of Studies, the Dean of Science and Engineering, the Dean of Arts, the Registrar *(Secretary),* Dr. J.A. Boutilier (term expires May 31, 1987), Dr. W.T. MacFarlane (term expires May 31, 1988), Dr. G.M. Lancaster (term expires May 31, 1989).

The Director of the RRMC Regional Sub-Committee of the Canadian Military Colleges Advisory Board and the Vice-Commandant of the College may attend meetings of the Senate.

COLLEGE COUNCIL

The Commandant *(Chairman),* the Principal and Director of Studies, the Vice-Commandant, the Dean of Science and Engineering, the Dean of Arts, the Registrar *(Secretary),* the Head of the Department of Engineering, the Staff Officer Cadets and Military Training, and the Chief Administrative Officer.

FACULTY COUNCIL

The Principal and Director of Studies *(Chairman),* the Vice-Commandant, the Dean of Science and Engineering, the Dean of Arts, the Staff Officer Cadets and Military Training, the Heads of the departments of Chemistry, Engineering, History and Political Economy, Literature and Philosophy, Mathematics, Military Leadership and Applied Psychology, Physics, as well as the Chief Librarian, the Director of Computer Services, the Registrar *(Secretary)* and the Head of the Second Language Training Department (Associate Member).

FACULTY BOARD

The Principal and Director of Studies *(Chairman),* the Vice-Commandant, faculty members of the rank of lecturer, and above, Lanaguage Arts Teachers, the officers of the military wing, the Chief Librarian, the Chief Administrative Officer, the Registrar *(Secretary),* and other members of the Senior Staff designated by the Chairman.

CADET ACADEMIC ADVISORS

a. First Year Cadets, P. Smart (Champlain Flight), W.T. MacFarlane (MacKenzie Flight), P.S. Sri (LaSalle Flight), F. Milinazzo (Fraser Flight), K.J. Reimer (Hudson Flight), J.S. Mothersill (Cartier Flight), M.J. Wilmut (First Year UTPM).

b. Second Year Cadets, M.R. Barr (General Science), G.M. Lancaster and D.P. Krauel (Honours Science), J.A. Boutilier and W. Rodney (Arts), E.R. Chappell and J.W. Madill (Engineering)

c. Third Year Cadet, M.J. Press (Oceanography), R.C. Snell (Computing Science), A.G. Martel (Arts).

d. Fourth Year Cadets, R.F. Marsden (Oceanography), S.D. Wray (Computing Science), A.J.S. Dunnett (Arts)

COMMITTEES

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COMPUTER USERS COMMITTEE

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The Principal and Director of Studies *(Chairman),* the Dean of Arts, the Dean of Science and Engineering, the heads of the academic departments, the Registrar, the Cadet Wing Academic Officer *(Secretary),* the Flight Proctors, a UTPM cadet, one third year cadet, and one fourth year cadet (to be appointed).

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The Principal and Director of Studies *(Chairman),* the Dean of Arts, the Dean of Science and Engineering, M.S. Madoff, G.M. Lancaster.

TRAINING AND RESEARCH AIDS COMMITTEE

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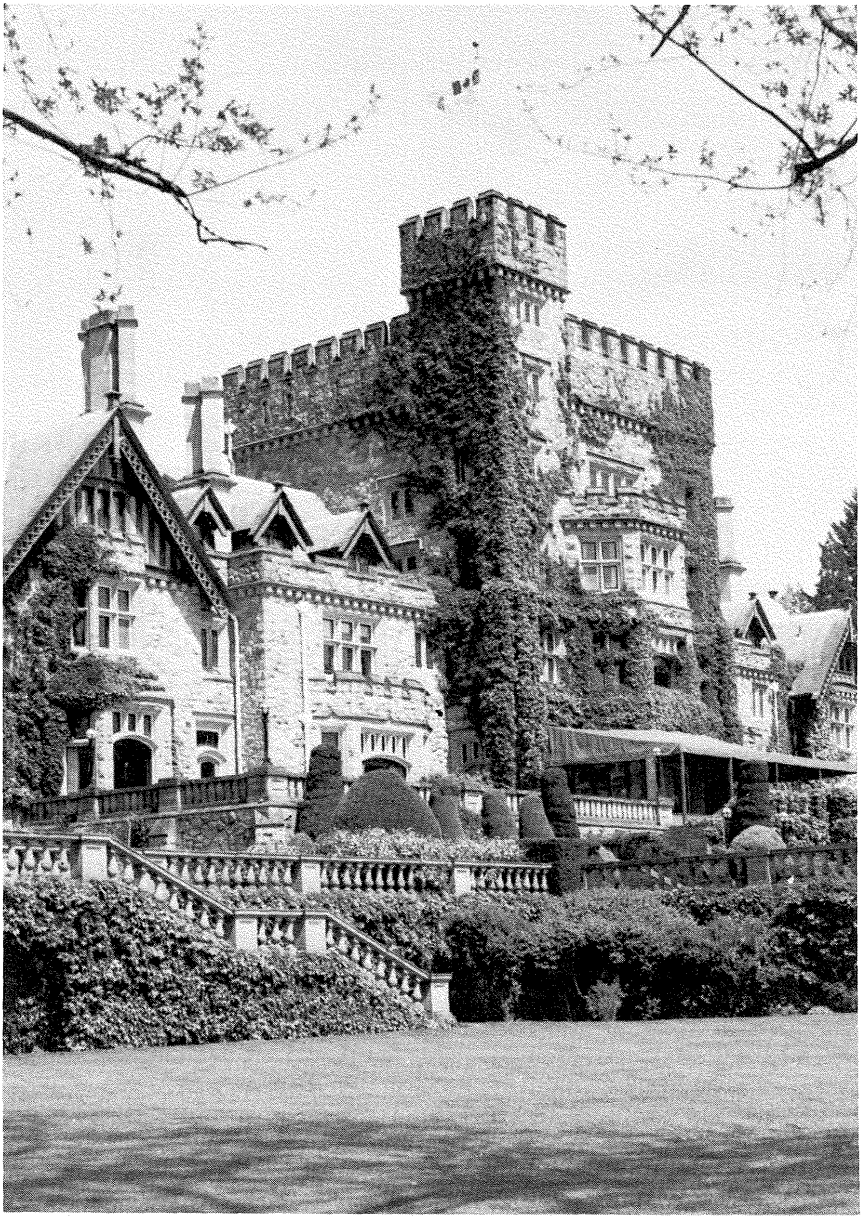


HATLEY CASTLE

THE CANADIAN MILITARY COLLEGES

There are three Canadian Military Colleges:

Royal Roads Military College, Victoria, B.C.
Royal Military College of Canada, Kingston, Ontario
Le Collège militaire royal de Saint-Jean, Saint-Jean, Québec

ROLE

The role of the Canadian Military Colleges is to educate and train officer cadets and commissioned officers for a career of effective service in the Canadian Forces.

OBJECTIVES

The objectives of the Canadian Military Colleges are:

a. to prepare and motivate officer cadets 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 to understand the principles of biculturalism;

   (4) developing a high standard of personal physical fitness;

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

b. to improve the educational background of commissioned officers in the Canadian Forces by providing undergraduate and post-graduate courses in appropriate fields.

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

ROYAL ROADS MILITARY COLLEGE

HISTORICAL SKETCH

The story of Hatley Park — rechristened Royal Roads from the offshore anchorage in the Straits of Juan de Fuca — has its beginnings in the singleness of purpose and dogged determination of one man. No history of the estate would be complete without some mention of the man in whose mind Hatley Park was conceived and through whose efforts it was brought to birth.

The Honourable James Dunsmuir was born at Fort Vancouver, Washington on 8 July 1851, the oldest son of Robert Dunsmuir, a Scottish miner who, at the time of his son's birth, was on his way from Ayrshire to "Vancouver's Island" to prospect for coal. It was not until 1869, however, when James was eighteen years old, that Robert, prospecting on his own, finally struck the rich seam of coal at Wellington, near Nanaimo, B.C. He raised sufficient capital, acquired 2,000 acres of land, and started operations which proved so successful that before long he had bought out the other three partners in the venture to become the sole owner. During this time, James himself had worked

through all the stages of mining and had risen to the position of manager in his father's business. Under his management, the daily output of coal quickly rose from 30 tons to 1,500 tons. After his father's death in 1889, James devoted himself to the development of the collieries at Wellington and Cumberland, laid out the townsite of Ladysmith, and initiated the Ladysmith-Vancouver ferry service.

It was only natural that his prominence in business should lead him into politics. He was elected to the Legislature in 1898 and became Premier in 1900; but, having no taste for public life, he resigned in 1902. He later served as Lieutenant-Governor of the Province.

It was during the early years of this century that he purchased the Hatley Park estate comprising about 650 acres. The original Hatley Park house stood on the site that is now the parade ground. This house had been completely destroyed by fire while its owner was in England. Having amassed a huge fortune, James now turned his attention to the building and planning of the new estate to which he intended to retire.

He commissioned Samuel Maclure, a Victorian architect, to design the "Castle", and Messrs Brett and Hall, landscape artists of Boston, Massachusetts, to plan the gardens and surroundings. Local stone, trimmed with Valdez and Saturna Island sandstone, was used in the building's construction. Its impressive exterior is matched only by the lavishness of the interior appointments — oak and rosewood panelled rooms, baronial fireplace, teak floors, and specially made lighting fixtures. James is quoted as saying: "Money doesn't matter — just build what I want." The building is 200 feet long and 86 feet wide; the turret is 82 feet high. The wall surrounding the estate, also built of local stone, cost over $75,000; the Conservatory, costing a like amount, was at one time filled with white orchids imported from India; a large banana tree grew in the centre under the dome. The rooms of the house were filled with flowers from the Conservatory throughout the year. Six miles of road interlaced the estate, and a hundred men were employed in the gardens. There were a number of other buildings on the estate to provide for the needs of the large household, but many of these have now been demolished — the vast refrigeration plant; the cow stables; the slaughter house and smoke house; the three silos, each of 100 ton capacity; the reserve water tank to the south of Belmont Drive; the old stable near the bridge to the east of the present fields; to say nothing of the Chinatown to accommodate 80 to 120 gardeners. There remain, however, the model dairy and the stables, which were of solid brick and concrete construction. The "Castle" was completed in 1908, and the Dunsmuir family took up residence in that year.

Early in 1910, James sold his collieries, his coal rights in the Esquimalt and Nanaimo Railway belt, and all his business connections therewith to Messrs. MacKenzie and Mann, railway promoters, for $11,000,000. He thus separated himself from all former business with which the name of Dunsmuir had been associated. He then retired to enjoy his beautiful home, his yacht "Dolaura", his shooting, fishing, golf, etc. He died in May 1920, at the age of 69. His wife, formerly Laura Surles of Georgia, lived on at Hatley Park with her daughter Eleanor until she died in August, 1937. Eleanor died six months later.

For the next three years, the estate was left in the hands of a caretaker. In November 1940, it was purchased by the Dominion Government for $75,000 to begin its

career as a Naval Training Establishment. No time was lost; on 13 December 1940, HMCS "Royal Roads" was commissioned as an Officer Training Establishment for short-term probationary RCNVR sub-lieutenants and operated as such until October 1942.

During this time, some 600 officers underwent training. On 21 October 1942, after a lapse of 20 years, the training of naval cadets was re-established in Canada, and the spirit of the old Royal Naval College of Canada was reborn with the establishment of the Royal Canadian Naval College at Royal Roads.

After a brief history of five years, the Royal Canadian Naval College became, in 1947, the RCN-RCAF Joint Services College. The following year, with the admission of army cadets, Royal Roads became a tri-service college; the Canadian Services College Royal Roads. In 1968, the name of the college was changed to Royal Roads Military College.

FACILITIES

The Castle

The Castle was completed in 1908. From 1941 until 1943 when Grant Block was completed, the Castle served as dormitory and mess hall for cadets and staff officers. It is now the administrative centre of the college. It houses the Commandant, Principal, Vice-Commandant, Registrar and staff, Chief Administrative Officer, Comptroller and Logistics Officer, Personnel Administrative Officer, Staff Officer Cadets, and the University Liaison Officers.

Coronel Memorial Library

The library building was officially opened 1 November 1974 by the late Honourable Walter S. Owen, QC, LLD, former Lieutenant-Governor of British Columbia, and was dedicated to the memory of four members of the first class of the Royal Naval College of Canada who were lost in action at the Battle of Coronel on 1 November 1914.

Planned by Robert Harrison Associates of Vancouver, B.C., the building was designed to harmonize with its park-like setting, and to be adjacent to Nixon Block, the cadet dormitory. The library comprises 20,600 square feet, has a capacity of 80,000 volumes and includes faculty offices, a conference room and audio visual facilities for cadets.

The current library collection includes 75,000 bound volumes, a subscription list of over 550 periodicals, and a growing collection of microfilms, recordings, films, and slide transparencies.

Grant Block

Grant Block, completed in 1943, is the major centre of academic instruction. It was named after Captain J.M. Grant, first Commanding Officer of HMCS "Royal Roads".

This building houses a large general chemistry laboratory, capable of accommodating 48 students, and smaller laboratories used for advanced chemistry and chemi-

cal or biological oceanography experiments. The computer systems, a Coastal Marine Science Laboratory, an Applied Fluid Dynamics Laboratory, a Dental Clinic, a Medical Inspection and Treatment Area, and the cadets' dining facilities are also located in this building.

Computer Systems

The main computer facility for teaching, research and administration at the college is based on a Honeywell DPS 8/52C mainframe with 18 megabytes of memory and 2.3 billion bytes of disc storage. The peripherals include video and graphics terminals, a Calcomp 1015 plotter and a mix of high and low speed printers. Software includes PASCAL, FORTRAN 77, BASIC, LISP, APL, IMSL, COBOL, PLOT 10, IGL, SPSS, ARES Data Base, etc.

The college has a variety of microcomputer-based systems for use in computer science laboratories and laboratories of other teaching disciplines (Apple II, Apple III, Commodore Super Pet, HP85, HP87, Superbrain, IBM PC, and Micro Vax II).

Physics Building

Extensive alterations to two of the original buildings of the Dunsmuir estate have transformed them into the physics laboratories and little remains to betray their humble beginnings as the Tudor-style dairy and cattle barns. The buildings have been divided into a number of large rooms to accommodate each of the laboratory courses and a number of smaller rooms with special facilities for physical oceanography and computer science. Third and fourth year students also have opportunities to participate in projects in the research laboratories located in the Physics Building and Grant Block.

The teaching and research laboratories are well equipped with modern apparatus to demonstrate principles and conduct experiments in the fields of classical and modern physics, electronics, physical oceanography, and computer science. The laboratories have a number of terminals which are hardwired into the college computer and many of the experiments are based on microcomputers which are also used to acquire and analyze the experimental data.

Nixon Block

Nixon Block is the accommodation building. It contains 145 rooms, lounges, a dry canteen and four French classrooms. Squadron Commanders' offices are also located in Nixon Block.

This fine building was officially opened by Her Royal Highness, Princess Mary, the Princess Royal, on 17 October 1955. It bears the name of Commander E.A.E. Nixon, RCN, who was the Commanding Officer of the Royal Naval College of Canada when it was re-established in Esquimalt in September 1918.

Mess Decks

The Mess Decks originally housed the stables of the estate. It was reconstructed in 1941 and used as accommodation for single members of the ship's company of HMCS "Royal Roads", below commissioned rank. It was also used as classroom space by the cadets before completion of Grant Block.

An indoor rifle range, Non-Commissioned Officers' Mess and the Cadet Gunroom are now located in this building. The Cadet Gunroom consists of a lounge, dance floor and games rooms. In addition, there is also a smaller separate lounge which is used as a "clubhouse" by college sports teams. On Friday nights, the Cadet Gunroom serves as a movie theatre while on Saturday evenings dances are frequently scheduled. The Cadet Gunroom is the centre for cadet social functions at the college.

Gymnasium

The physical training centre, built in 1942, is of frame construction. The floor is marked to include basketball (one regulation and two lesser size courts), badminton (four courts), volleyball (two courts), and European team hand ball. A recent addition provides space for a wrestling/combative room and a weight training room.

Swimming Pool

The pool, built in 1957, measures 23 metres long, 10 metres wide, and 3⅓ metres at the deep end where there are one-metre and three-metre diving boards. The water circulates through a closed filter system and the temperature is maintained at 28°C.

Tennis Courts

There are five tennis courts for use by officer cadets during recreational training and on weekends.

Squash Courts

Two squash courts are housed within the pool building; both are marked for American rules of play.

Sports Fields

Within the scenic setting of the college grounds there are three soccer pitches, one rugger field, two ball diamonds, a ¼ mile (400 metres) track, a 6.1 kilometre cross country course and a 10 kilometre Harrier course.

Boat House

The boat house and jetty are situated on Esquimalt Lagoon and are the centre of all boat pulling, canoeing, windsurfing and sailing activities. Special orders are published for the use of all boats at the boat house.

OFFICER CADET ORGANIZATION

The officer cadets are organized into a wing of four squadrons. This organization controls cadet life at the college, within certain limits laid down by the Commandant. Officer cadets of the second, third, and fourth years hold appointments from Cadet Section Commander to Cadet Wing Commander, and receive practical training in leadership by being responsible, under the guidance of Regular Force officers, for the discipline, progress, and efficiency of the groups under their command. To give as many officer cadets as possible an opportunity of receiving this valuable training, the slate of cadet officers is changed during the academic year at the discretion of the Commandant.

Most committees at the college dealing with cadets have strong cadet representation. This gives the representatives an insight into the problems of administering activities related to academics, administration, sports and entertainment, including the budgeting of funds.

RECREATION CLUBS AND REPRESENTATIVE TEAMS

While all officer cadets take part in compulsory physical education and tramural sports programs, they are also encouraged to participate on one of the College representative teams that either participate in local civilian leagues, military interdivision competition and/or the Totem Conference. Totem Conference participation varies from year to year and is based on the availability of RRMC players that can manifest teams to compete in a variety of sports. For example, the College Rugby team plays in the Lower Vancouver Island Tier 3 league; the male and female Volleyball teams play in Totem Conference and in the local Lower Vancouver Island league; and the sailing and cross-country teams are in the Northwest Collegiate (B.C., Washington State, Oregon) and the Vancouver Island series respectively.

Royal Roads has a variety of recreational clubs which are supervised by the College Recreational Council chaired by the Staff Officer Cadets and Military Training (SOC & MT). Each club has an officer cadet president who reports to the SOC & MT through the Director of Athletics. College recreational clubs include:

Alpine Outdoors
Auto
Cycling
Flying
Karate
Pistol & Rifle Shooting
Skiing
Windsurfing
Camera
Golf
Magic Club
Scuba
War Gaming

Royal Roads also has a college yearbook, the "LOG", and a college newspaper, the "TRICORN", which are published by a committee of officer cadets under the supervision of a Senior Staff advisor.

ROYAL ROADS BAND

The Royal Roads band serves two purposes. It serves as a recreational outlet for the musically inclined cadets and also lends itself to performance of a military parade function. Under the direction of a professional musician from the Canadian Forces, the band provides an excellent opportunity for those cadets with musical ability to continue their training. Although some musical experience is desirable, many cadets have joined with little knowledge of music and have learned to play an instrument well. The musical facilities and music library at Royal Roads enable the cadet band to perform at parades, mess dinners, and concerts. Off-shoots of the band include a stage band, a rock band, and a 15-piece pipe band. Any cadet with musical training is strongly encouraged to join this group.

CANADIAN FORCES COUNSELLING

The staffs of the three colleges include officers from the Canadian Forces who are responsible for career counselling and arranging for military training programs for all officer cadets. These officers are available to the cadets at all times to answer inquiries on military matters and to offer advice on military careers.

SUMMER TRAINING

A major part of an RRMC cadet's military development takes place during the summer. Every summer, all officer cadets participate in up to 12 weeks of military training designed to prepare them to assume specific duties as officers of the Canadian Forces after graduation from the military colleges. While summer training is not the responsibility of the military colleges, the results are closely monitored and form part of a cadet's college training record.

A QUEEN'S COMMISSION

AND A UNIVERSITY DEGREE

ADMISSION TO ROYAL ROADS MILITARY COLLEGE

CATEGORIES OF STUDENTS

Three different categories of students may attend RRMC. These are:

a. Officer Cadets — Officer cadets are admitted into the first year at RRMC under the Regular Officer Training Plan (ROTP), the Reserve Entry Training Plan (RETP), or the University Training Plan — Men (UTPM), as full time students. Officer cadets complete their first two years of training at RRMC and then proceed to RMC or CMR to complete the final two years of their degree program, unless pursuing a Bachelor of Arts or Bachelor of Science degree program at RRMC.

b. Officers — Students attending RRMC under the University Training Plan — Officers (UTPO).

c. Special Students — Other members of the Canadian Forces taking one or more courses at RRMC on a part-time basis.

GENERAL REQUIREMENTS

Applicants for admission to RRMC as officer cadets under the ROTP or RETP:

a. must be Canadian citizens:

b. must have reached their sixteenth, but preferably not their twenty-first birthday by 1 January of the year of entrance;

c. must be single;

d. must meet the appropriate medical standards for the Canadian Forces; and

e. must possess the academic qualifications as set forth below.

UTPM candidates should consult CFAO 9-13 while UTPO candidates should consult CFAO 9-40.

ACADEMIC REQUIREMENTS

General

In the first year, Royal Roads Military College offers programs of study for either Arts or Science/Engineering applicants.

All candidates should be aware that the course requirements at Royal Roads are considerably more diversified than at a civilian university, and include two years of Mathematics and Science at the university level for an Arts degree, and two years of English and other Arts courses for a Science or Engineering degree.

It should also be noted that all programs of study at the Canadian Military Colleges are of four years duration beyond the normal secondary school level required for university admission, except for candidates entering the preparatory year at le Collège militaire royal de Saint Jean, where a five-year program is required. Candidates enter the preparatory year after completion of their penultimate year of high school.

An applicant for admission to either the Arts or the Science/Engineering program at Royal Roads Military College must have completed a matriculant year, at a level satisfactory to the college, with credits acceptable for admission to the appropriate Faculty at a university in the province in which he has completed his secondary education. These levels at present are:

British Columbia	Grade 12	
Alberta	Grade 12	
Saskatchewan	Grade 12	
Manitoba	Grade 12	
Ontario	Grade 13	Note 1
Quebec	CEGEP 1 or equivalent	
New Brunswick	Grade 12	Note 2
Nova Scotia	Grade 12	
Prince Edward Island	Grade 12	
Newfoundland	1st year university or equivalent	

Note 1: Information currently available from the Ministry of Education of Ontario implies that the level of preparation on students completing the new Secondary School Program will be the equal of that of the current Grade 13 graduate. On this assumption, the following guidelines are announced:

a. those who have completed secondary school in September 1986 and thereafter should present the Ontario Secondary School Diploma (OSSD), with a minimum of six Ontario Academic Courses (OACs);

b. in the period of transition to the new OSSD, the Ontario Secondary School Honour Graduation Diploma (OSSHGD) and the OSSD will normally be given equal credit for admissions purposes:

c. the length of time taken by an applicant to complete the OSSD will not in itself be a determining factor in the admission decision.

Note 2: Specific subjects offered for admission must be at the 121 or 122 level, with 121 level courses preferred.

In addition to meeting the requirements of the last year of school, applicants must show that they have sufficient educational background to undertake work at the College in the following subjects:

English
Mathematics
Physics
Chemistry

This background will normally be provided by completion of the high school curriculum in these subjects; however, consideration will be given to applicants who do not possess standing in these subjects.

Other college and university certificates of academic standing and matriculation certificates of recognized public examining bodies and schools will be assessed and accepted where work of a satisfactory standard and content has been completed.

Science or Engineering

Specific course requirements at the matriculant level include standing in English or French, mathematics, physics and chemistry.

NOTES: 1. In most provinces, one matriculant level course in mathematics is required.
2. In Alberta, Math 30 is required and in addition, Math 31 is preferred.
3. In Ontario, candidates require at least two of the following mathematics courses: algebra, calculus or functions and relations.
4. In Saskatchewan, both Algebra 30 and Geometry/Trigonometry 30 are required.
5. Superior candidates may be admitted lacking one of English, physics or chemistry.

Arts

Specific course requirements at the matriculant level for admission to the Arts program of study at RRMC include credits in English and mathematics and, in addition, in at least two of the following courses:

history, functions and relations, calculus, algebra, geometry/trigonometry, physics, chemistry, geography, economics, social studies, classical studies, biology, Russian, German, Spanish, Italian, or other language.

NOTES: 1. The mathematics requirement is that high school graduation course that is a prerequisite for the study of calculus.
2. In Alberta, where two matriculant level courses are offered, Math 30 is required.
3. In Ontario, where three courses are offered, functions and relations or calculus is required as a minimum.
4. In Saskatchewan, Algebra 30 is required/Trigonometry 30 is preferred.

Candidates for admission to the Royal Military College of Canada or le Collège militaire royal de Saint-Jean should consult the calendar of the appropriate college for full particulars of the admission requirements.

MEDICAL REQUIREMENTS

The fundamental medical requirement is a sound, healthy body with normal mental and muscular co-ordination. Any condition that, as it exists, or owing to possible progression, may limit the candidate's career as a member of the Canadian Forces shall be cause for rejection.

ADMISSION PLANS

THE REGULAR OFFICER TRAINING PLAN (ROTP)

The Regular Officer Training Plan, which was introduced in 1951, gives young Canadians the opportunity of gaining a university education and a permanent commission in the Canadian Forces. Applicants who have been accepted for entry at the Canadian Military Colleges enroll in the Regular component of the Canadian Forces. Some candidates may be offered ROTP support at a civilian university, provided they have been admitted to that university to a program of study that is eligible for ROTP support. On successful completion of their training, officer cadets will be promoted to commissioned rank in the Canadian Forces.

Under this plan, the costs of tuition, uniforms, books and instruments, and other essential fees for the duration of the program of studies are borne by the Department of National Defence. In addition, an officer cadet is paid a monthly salary from which there are deductions for income tax, pension plan, supplementary death benefit contributions, and for rations and quarters charges. Free medical and dental care is provided through the entire training period. Annual leave with full pay is granted according to regulations.

An officer cadet is obliged to maintain a satisfactory academic, military, and physical standard throughout the program. An officer cadet who fails a year may, on the recommendation of the college and the element concerned, be permitted to attend a repeat year at his own expense (see the section on Fees and Allowances) and, if successful, be reinstated to full pay and allowances.

Upon successful completion of the academic and military program, officer cadets are awarded degrees from a Canadian Military College or a civilian university and are granted commissions as officers in the Canadian Forces. Graduates of the ROTP are obliged to serve a period of obligatory service (normally five years) in a Regular component of the Canadian Forces.

An officer cadet who is enrolled under the ROTP may apply for release without obligation between 1 November of the year of entry and up to, but not including, the first day of the second academic year. Thereafter, an ROTP officer cadet who seeks release shall reimburse the Crown for all expenses incurred by reason of attendance at a Canadian Military College or civilian university. If he is unable to pay the costs prior to release, he may sign a promissory note or he may elect to serve, as an officer cadet, a period appropriate to the indebtedness.

Regulations and procedures are established whereby Regular Force Officers may obtain release prior to reaching compulsory release age, unless a state of emergency exists. Former members of the ROTP are subject to the same arrangements, except that, in recognition of the subsidization that has been provided, release prior to completion of the Short Service Engagement will be considered only under special and unforeseen circumstances. Release in such circumstances will be subject to reimbursement of all or part of the cost of subsidization.

THE RESERVE ENTRY TRAINING PLAN (RETP)

The purpose of the RETP is to provide a limited number of vacancies at the Canadian Military Colleges for those young Canadians who would like to have military training along with their education, but who are not prepared to commit themselves to a Service career at the time of entry. Since 1961, provision has been made to have up to 15 percent of the annual ROTP intake at the Canadian Military College accepted as Reserve Entry cadets. Reserve Entry officer cadets receive the same education and training as ROTP officer cadets, but they are required to pay fees to defray the cost of tuition, clothing, books, instruments, laundry, dry cleaning, meals and accommodation during the academic year, according to the scale of fees set out in the section on Fees and Allowances. Reserve Entry cadets may transfer to the ROTP at any time during their college course, in which event they would pay no further fees and would receive the same financial benefits as ROTP cadets. Reserve Entry cadets are committed to serve in a component of the Active Reserve Force upon graduation and commissioning. RETP cadets are required to take summer training with their assigned classification for which they receive pay and allowances at the same rate as a Second Lieutenant on Class B Service (refer to any Canadian Forces Recruiting Centre for the current rate).

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

Attention is drawn to the Royal Military College Club of Canada Foundation Scholarship and other scholarships, which are found in the section on Scholarships, Prizes, and Awards.

THE UNIVERSITY TRAINING PLAN — MEN (UTPM)

Since 1973, provision has been made for serving members of the Canadian Forces who qualify for subsidization under the UTPM to take their degree programs at the Canadian Military Colleges. Approximately 10 UTPM candidates enter Royal Roads Military College each year under this scheme.

Training under the UTPM is limited to serving men and women of the Regular Force. A selected applicant undergoes academic training identical with that under the ROTP, but with a slightly modified military and athletic program while at the college. The summer military training is identical with that of the ROTP. Except for certain differences in pay and terms of service, the policy and procedures for the UTPM are identical with those for the ROTP and are prescribed in CFAO 9-13. The UTPM is therefore a modification of the ROTP and its purpose is the same: to train selected candidates to become career officers in the Regular Force. Like one's counterpart in the ROTP, an officer cadet in the UTPM will be selected to attend a Canadian Military College (CMC) or a civilian university.

THE UNIVERSITY TRAINING PLAN — OFFICERS (UTPO)

The UTPO supplements other means of obtaining career officers with university degrees in the regular force. Serving officers of the regular forces who have sufficient academic background to enable them to obtain a baccalaureate degree in two or less academic years, and who meet the other requirements as specified in CFAO 9-40, are eligible to apply for the UTPO.

Royal Roads currently offers BSc and BA degree programs of study. Science applicants should, as far as possible, have completed math, physics, and chemistry courses equivalent to those listed in the RRMC Calendar for the first two years of a Science or Engineering degree program. Arts applicants should have completed history and political science courses equivalent to those listed in the RRMC Calendar for the first two years of an Arts degree program.

ADMISSION PROCEDURES

INFORMATION

Further information on ROTP or RETP may be obtained from any of the following:

a. Commanding Officer of any Canadian Forces Recruiting Centre;
b. Director of Recruiting and Selection, National Defence Headquarters, Ottawa, Ontario, K1A 0K2;
c. Registrar, Royal Roads Military College, FMO Victoria, British Columbia, V0S 1B0;
d. Registrar, Royal Military College of Canada, Kingston, Ontario K7K 5L0; or
e. Registrar, le Collège militaire royal de Saint-Jean, Quèbec, J0J 1R0.

APPLICATION

Application for admission under the ROTP or RETP should be made as early as possible in the academic year prior to entry. Applications are normally initiated through the Canadian Forces Recruiting Centre closest to the home of the applicant.

Application must be accompanied by a birth certificate and certificate of educational achievement, as specified in the instructions sent to all applicants.

Serving members interested in the UPTM or the UTPO should refer to CFAO 9-13 or CFAO 9-40 respectively.

Officers or men wishing to enrol as special students at RRMC must apply in writing to the Registrar, giving details of previous education and indicating the course or courses desired. All such candidates will be interviewed personally at the college regarding their course selection, at a time to be set by the Registrar, normally about three weeks before the start of classes each semester.

SELECTION OF CANDIDATES

Officer Cadets

Eligible applicants for the ROTP or RETP will be required to appear, by appointment, at a Canadian Forces Recruiting Centre (CFRC) for a medical examination, testing, and interview, at a convenient time after the date of their application. Within Canada, applicants not resident 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.

Candidates will be advised shortly after their interview as to the status of their application.

The selection of officer cadets is made by the final board of selection appointed by the Minister of National Defence. Candidates will be advised of the decision of the final board of selection and successful candidates shall subsequently be sent the necessary joining instructions.

Final selection is based on academic standing and on the recommendations of the Interview and Medical Boards as to the personal and physical suitability of the candidates.

Selection of applicants to the UTPM is made by military and academic boards convened by NDHQ each year.

Officers

Selection of applicants to the UTPO is made by military and academic boards convened by NDHQ each year.

Special Students

Special students will be selected by the RRMC Admissions Committee. Candidates will be selected not only on their academic potential, but also on the basis of the courses they have selected and the feasibility of these courses being offered in any given semester.

Special students may select courses with the approval of the Registrar, the head of the department concerned, and the Royal Roads Military College Faculty Council.

JOINING INSTRUCTIONS

Each successful ROTP/RETP candidate will attend Basic Officer Training at a designated Canadian Forces Base before arrival at RRMC. A joining instruction for this training will be issued by the Canadian Forces Training System or one of its schools. The reporting date, travel arrangements, clothing and equipment required and other details will be specified.

When a selection of an applicant is made, a letter of welcome will be sent by the Commandant. This letter will include information for new cadets, stating the date of joining, clothing and equipment to bring and miscellaneous details of what to expect at RRMC. Candidates who successfully complete Basic Officer Training will be transported to RRMC under arrangements made by the designated Canadian Forces Base.

FEES AND ALLOWANCES

Regular Officer Training Plan

An officer cadet who is a member of the ROTP shall have his fees paid by the Department of National Defence and shall be entitled to receive pay, allowances, and transportation and travelling expenses as prescribed by the ROTP.

An officer cadet who is a member of the ROTP but who has failed a semester or year and is permitted to repeat that semester or year at his own expense shall be required to pay the amount prescribed in Queen's Regulations and Orders (QR&O). The current annual rates, which are subject to change, are:

a. $1080 in respect of tuition, clothing, books, instruments, drawing materials, dry cleaning, and incidental expenses:
b. a fee of approximately $1,720 each year to defray the costs of meals and accommodation; and
c. an annual Recreation Club fee of $80.

Reserve Entry Training Plan

An officer cadet who is enrolled at the college under the RETP shall pay the following fees on the first day of arrival at RRMC, based on the current prevailing annual rates established by the QR&Os:

a. annual college fee of $1,080 to defray the costs of tuition, clothing, books, instruments, drawing materials, dry cleaning, laundry, and incidental expenses;
b. a fee of approximately $1,720 each year to defray the costs of meals and accommodation;
c. an Annual Recreation Club fee of $80;
d. a book deposit of $100 (refunded at end of academic year).

An optional payment system may be exercised whereby payment may be made in two stages:

a. each year $1,580 on or before the first day a cadet reports to the College, and the balance payable on or before 31 January of the same academic year.

NOTE — These are the current rates, and are subject to change.

University Training Plans — UTPM and UTPO

An officer cadet who is a member of the UTPM or an officer who is a member of the UTPO shall have his fees paid by the Department of National Defence and shall be entitled to receive pay, allowances, and transportation and travelling expenses as prescribed by the applicable plan.

Special Students

Special students taking a course or courses at RRMC will pay no fees but may be responsible for the purchase of their own textbooks and supplies.

Mess Subscriptions

All officer cadets are required to pay a mess subscription, (approximately $150.00) and charges levied for special functions at a rate prescribed by the Mess Constitution. Payment is made on a monthly basis during the academic year.

Transportation

An officer cadet of the Regular Forces proceeding to his home on annual leave, once in each year, for the portion of the journey to his home and return actually made in Canada or between Canadian points, is entitled to transportation allowances at public expense, in accordance with QR&Os.

SCHOLARSHIPS & LOANS

Scholarships

Applicants under the Reserve Entry Training Plan (RETP) may be eligible for a number of scholarships and bursaries available to students at Canadian universities, including the Canada Student Loans Plan, the Foundation Scholarships of the Royal Military College Club of Canada, Dominion Cadetships and the Terry Fox Humanitarian Award.

Officer cadets who are members of the Regular Officer Training Plan (ROTP) are not normally eligible for scholarships. However, scholarships awarded in recognition of academic achievement may be retained.

Foundation Scholarships — Royal Military College Club of Canada

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

The purpose of the scholarship is to attract outstanding candidates to the military colleges who at the time of entry are not prepared to decide upon a Service career but who, nevertheless, are anxious to profit from the disciplined life and excellent educational facilities available at the military colleges. In the awarding of the scholarships, the principle of scholastic excellence will be observed, in keeping with the purpose of the scholarships. Each scholarship has a value of $1,000 per year until graduation providing the holder successfully completes each previous college year. It is the intention of the Club that a scholarship coupled with the service pay received during the summer, would enable a cadet to defray the major portion of the basic financial obligations associated with the Reserve Entry Training Plan (RETP).

Application forms and further information may be obtained from:

The Secretary-Treasurer
RMC Club of Canada
Royal Military College of Canada
Kingston, Ontario
K7K 5L0

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

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 fifteen Dominion Cadetships may be granted in a college year.

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

(1) the Canadian Forces; or

(2) the Canadian Merchant Marine, during hostilities.

d. Application for a Dominion Cadetship shall be made in writing, giving full particulars of the candidate's eligibility under para (c) of this article, and shall normally be forwarded by the first day of March to a Canadian Forces Recruiting Centre or Canadian Forces Recruiting Centre 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 United Services Institute of Vancouver Island Bursary

The Royal United Services Insitute of Vancouver Island (RUSI of VI) has established an annual busary, the purpose of which is to assist in defraying a portion of the tuition costs of a cadet studying at Royal Roads Military College under the Reserve Entry Training Plan (RETP).

The value of the bursary will be determined annually by the RUSI of VI.

The bursary will be awarded to a deserving officer cadet requiring financial assistance who is in good academic standing on entering either the Second, Third or Fourth Year of Study in a degree program at Royal Roads Military College under the Reserve Entry Training Plan (RETP).

Selection of the winner will be by the Commandant of the College on the recommendation of a sub-committee of Faculty Council chaired by the Registrar. Application forms may be obtained from the Registrar and must be submitted to the Registrar by September 1st in the year of application.

For 1986-87, the amount of the bursary will be $500.00. The presentation of the bursary to the winner will normally be made at the autumn Honours Day ceremonies.

Terry Fox Humanitarian Award Program

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

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

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

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

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

Applications may be obtained by writing to:

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

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

Canada Student Loan Plan

This plan, instituted by the Federal Government in 1964, was introduced to provide loans to supplement the resources of a student and/or the parents where in the absence of such aid a student would be unable to pursue a post-secondary education. A student should apply for a loan under this plan for only the funds needed, over and above those from his own resources and/or those of his family, to enable him to continue his studies. The institution to which application is made will determine the amount of loan required in each case.

Borrowers under this plan are required to repay principal and to pay interest, but no payments are required so long as the student is in full-time attendance at an eligible institution and for six months thereafter. Interest charges during this period are paid by the Federal Government, which also guarantees the loan principal. After the interest-free period, repayment of principal and simple interest charges on the outstanding balance are required in regular monthly payments to the bank from the borrower. The maximum amount which may be advanced under this plan to one student is $3,200 in one year.

Application should be made in the first instance to the Registrar. When a loan is approved, the institution will issue a Certificate of Eligibility that authorizes the student to make arrangements for the loan with any branch of any chartered bank of Canada.

Officer cadets receiving the full benefits of the Regular Officer Training Plan normally will not be considered eligible for Canada Student Loans.

MEDALS, AWARDS, PRIZES AND CERTIFICATES

Presentation Ceremonies

There are three major presentation ceremonies during the year. They are as follows:

a. Convocation, conducted in May to confer degrees and present academic medals, awards, prizes and honours certificates to those officer cadets graduating or transferring to RMC or CMR and military awards to deserving officer cadets of all years.

b. Graduation Parade, conducted in May to award Queen's commissions to graduating officer cadets.

c. Honours Day, conducted in September to present academic awards, prizes or honours certificates to the first and third year officer cadets from the previous year.

The following annual awards may be won by officer cadets who meet the requirements as specified:

Medals

The Governor General's Gold Medal, awarded to the officer cadet who obtains the highest academic standing in his fourth year.

The Lieutenant-Governor of British Columbia's Silver Medal, awarded to the officer cadet who obtains the highest academic standing in his third year.

The Governor General's Silver Medal, awarded to the officer cadet who obtains the highest academic standing in his second year.

The Governor General's Bronze Medal, awarded to the officer cadet who obtains the highest academic standing in his first year.

Academic Awards

The D.W. Hone Award in Physics and Oceanography, presented by Professor Emeritus D.W. Hone for the officer cadet who achieves the highest standing in physics and oceanography courses in the third year Science program.

The Honeywell Award in Computer Science, purchased from the annual gift of Honeywell Information Systems Limited for the development of Royal Roads computer science programs and presented for the officer cadets of the third and the fourth year Physics and Computer Science programs who achieve the highest standing in computer science courses in their respective years.

The Armed Forces Communications and Electronics Association (Western Canada Chapter) Award, presented for the best all-round ROTP/RETP officer cadet of the fourth year Physics and Computer Science program.

The G.L. Pickard Award in Oceanography, presented by Dr. G.L. Pickard for the officer cadet who achieves the highest standing in oceanography courses in the fourth year Physics and Oceanography program.

The Clarence C. Cook Award in Physics, presented in memory of Professor Emeritus C.C. Cook for the officer cadet who achieves the highest standing in physics courses in the fourth year Science program.

The Wallis Award in Military and Strategic Studies, presented by Professor Emeritus and Mrs. A.D. Wallis for the officer cadet who submits the best Honours Thesis in Military and Strategic Studies.

The J.M. Grant & Wm. Ogle Award in Military and Strategic Studies, presented by Emeritus Dean of Science A.G. Bricknell for the officer cadet who achieves the highest standing in the third and fourth year of the Military and Strategies Studies program including any chemistry and physics courses taken in undergraduate studies at a CMC. In the event the cadet with the highest standing is also the winner of the Wallis Award, by reversion the Grant-Ogle Award will be awarded to the cadet with the second highest standing.

The Canadian Institute of International Affairs Award, presented for the officer cadet who achieves the highest standing in history, political science and economics courses in the fourth year Military and Strategic Studies program.

Military Awards

The Commandant's Cup, awarded to the outstanding second, third or fourth year officer cadet for athletic ability and sportsmanship.

The Director of Studies' Cup, awarded to the outstanding first year officer cadet for athletic ability and sportsmanship.

The Royal Military College Club of Canada (Toronto Branch) Award, presented by the Toronto Branch of the Royal Military College Club of Canada for the officer cadet who displayed the best performance in drill and physical fitness over the four years of the programme.

The Royal United Services Institute of Vancouver Island Award, presented to the officer cadet of the first year who is judged to be the best all-round officer cadet.

The RMC Club Award, presented to the officer cadet of the second year who has displayed the most improvement in all phases of his military training.

The Military Engineering Association Award, presented to the best second year officer cadet in an engineering classification.

The Royal Canadian Armoured Corp Award, presented to the best second year officer cadet in a land operations classification.

The Navy League of Canada Award, presented to the best second year naval cadet in a sea operations classification.

The RCAF Association Award, presented to the second year officer cadet in an air operations classification with the highest academic and military proficiency.

The H.E. Sellers Award, presented to the officer cadet chosen as the best all-round second year ROTP/RETP cadet.

The RMC Club (Vancouver Island Branch) Award, presented to the best all-round second year UTPM officer cadet.

The LCol F.J. Picking Award, presented to the officer cadet judged to be the best all-round third year cadet.

The Naval Officers Association of Canada (Vancouver Island Branch) Award, presented to the best fourth year naval cadet in a sea operations classification.

Commandant's List, appointments to the Commandant's List are for those officer cadets of any year or entry plan who exhibit superior performance in all aspects of the college program, including military assessment, academic grades, athletic performance, second language training, drill, and summer training.

The Claus Gorgichuk Memorial Award, presented by the Graduating Class of 1979, for the cadet of the graduating class judged by his peers to best exemplify the college motto: Truth, Duty, Valour.

The Sword of Merit, presented by the Department of National Defence for the graduating UTPM cadet who achieves the highest military and academic standing in fourth year.

The Sword of Honour, presented by the Department of National Defence for the best all-round ROTP/RETP cadet of the graduating class.

Additional prizes may also be awarded.

Departmental Prizes

Academic book prizes are awarded annually to officer cadets who achieve the highest standing in the disciplines of science/engineering, French, and humanities / social sciences.

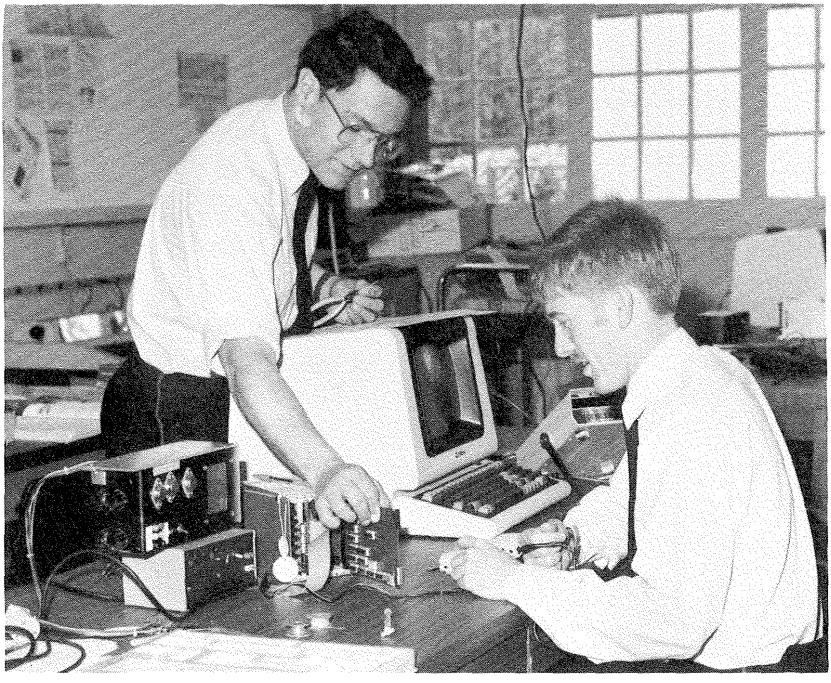
In addition, special book prizes may be awarded for work of unusual merit, when such prizes are recommended by an academic department and approved by Faculty Council.

Certificates

First Class Honours certificates are awarded to officer cadets of the first, second, or third year who obtain an overall A average in their final examinations, with no failures. In addition, second class and pass certificates are awarded to second year officer cadets obtaining an overall B standing (with no failures), or C or D standing, respectively, in their final examinations. A degree certificate will be awarded to those meeting the requirements of the Bachelor of Science or Bachelor of Arts degree at the end of the fourth year.

A student who completes his final year with first class honours standing will have his degree script inscribed "With Distinction".

OCEANOGRAPHIC RESEARCH VESSEL



COMPUTER SCIENCE LAB

CANADIAN MILITARY COLLEGE DEGREE PROGRAMS

The Canadian Military Colleges offer degree programs in Science, in Engineering, in Arts, and in Administration. Officer cadets may begin their degree studies at any one of the three Canadian Military Colleges. Cadets may complete the BSc degree program in Physics and Oceanography, in Physics and Computer Science or in General Science at Royal Roads Military College. Cadets following a BA degree program in Military and Strategic Studies may also complete their program of studies at RRMC. Cadets enrolled in other degree programs would be required to transfer to either the Royal Military College of Canada or le Collège militaire royal de Saint-Jean to complete their degree requirements.

Each of the Canadian Military Colleges is a member of the Association of Universities and Colleges of Canada. The Engineering degree programs meet the standards laid down by the Canadian Council of Professional Engineers.

SELECTION OF PROGRAM OF STUDY

Officer cadets at the Canadian Military Colleges shall select a program of study that is compatible with their own interests and ambitions, the requirements of their element of the Canadian Forces, and the relevant academic regulations. The Canadian Forces reserves the right to limit enrolment in any given program of studies, or to select the location at which a program of studies will be taken.

THE ROYAL ROADS MILITARY COLLEGE ACADEMIC PROGRAM

Degrees are granted by the Royal Roads Military college under the authority of "The Royal Roads Military College Degrees Act", passed by the thirtieth Parliament of the British Columbia Legislative Assembly and given Royal Assent on 26 March 1976.

The academic year at Royal Roads Military College consists of two semesters, each of which consists of 13 weeks of instruction and approximately two weeks of final semester examinations.

In the first two years at Royal Roads Military College, two programs of study are available to officer cadets. One leads either to a degree of Bachelor of Arts or to a degree of Bachelor of Administration. The other program leads to a degree of Bachelor of Science, or to a degree of Bachelor of Engineering.

At the completion of second year, Royal Roads Military College offers, in the third and fourth years, a Bachelor of Science degree in Physics and Oceanography in a "Combined Major" or "Honours (Thesis)" or "Honours (Course)" program of study; a Bachelor of Science degree in Physics and Computer Science in a "Combined Major" or "Honours (Course)" program of study; a Bachelor of Science in General Science and also a Bachelor of Arts degree in Military and Strategic Studies in either an "Honours" or "General" program of study.

Royal Roads Military College also awards the following degrees to those condered worthy of the honour:

a. Doctor of Law, *honoris causa*;
b. Doctor of Science, *honoris causa*; and
c. Doctor of Military Science, *honoris causa*.

ACADEMIC COUNSELLING

Members of the faculty at Royal Roads serve as academic advisors to the cadets. These professors are available to the cadets at regular times to counsel them in their academic progress, to guide them in their choice of programs of study, or to advise them on any non-military matters that the cadets may wish to discuss.

BACHELOR OF SCIENCE DEGREES — RRMC

The purpose of the RRMC Science degree programs 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, mathematics and 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. Third year enrolment in any program may be limited in numbers, with preference given on the basis of overall academic and military performance.

BSc in Physics and Oceanography

The purpose of specialization in physics and oceanography is to learn how to apply physical laws and how to use the techniques of the exact sciences to solve problems. The interests of many operational and technical classifications are reflected in the emphasis and choice of topics studied. Attention is paid to the characteristics of the environments in which military forces operate. The student studies the structure of the earth, the ocean bed, the air-sea interface including ice, the atmosphere and space, and especially the water column. Both chemical and biological oceanography are studied, but there is more emphasis upon physical oceanography because it is more closely related to military problems.

Two levels of this degree are offered. There is a "combined major" degree, and exceptional students may be awarded a "combined major degree with honours" upon completion and acceptance of a thesis or on completion of specified additional courses or a project. These programs provide a sound scientific background and specialization in a modern field.

During the first two years much of the material studied is common to all the CMC Science and Engineering degrees, eg. introductory and intermediate level courses in engineering, physics and chemistry, with emphasis upon mathematics and computing science. The specific topics covered in courses may be found in the body of the calendar in the section on Course Descriptions.

In the third and fourth year programs, the mathematics courses emphasize analysis with particular attention to complex variables and differential equations, digital computing, and probability and statistics with applications to communications theory.

Physics courses include applications of mechanics, solid state electronics, electromagnetic wave propagation encountered in communications, navigation, surveillance and control systems, acoustics, atomic physics and nuclear physics. A course on geophysical and geological oceanography deals particularly with the sea bed, as well as with the rest of the earth's structure. An elective course on aeronomy examines air-sea-ice problems, dynamics of the atmosphere and ionosphere, and problems of remote sensing. The important subject area of physical oceanography is covered by courses in descriptive and dynamic oceanography which are broadened by field work.

The Chemistry Department offers courses in modern analytical and oceanographic methods and in chemical and biological oceanography in the third year, and a course in applied thermodynamics in the fourth year.

Following second year courses in engineering graphics and mechanics of materials the Engineering Department gives a courses on fluid dynamics.

Laboratory experiments are augmented by visits to west coast institutions, and by projects which involve making standard oceanographic measurements from the college research launch, the TAYUT, and from larger research ships. Seminars and research projects bring the students up to date in selected areas.

The TAYUT (Chinook Indian dialect meaning Inside-the-Bay) is a nine metre fiberglass hulled vessel of Fraser River gillnetter design suitably equipped to provide the advanced oceanography classes with practical experience in acquiring samples and data for laboratory work and research projects. The boat is powered by a 225-hp Volvo inboard-outboard engine, and the installed research equipment includes a depth sounder, hydraulic winch, radar, mini-range positioning system, digital conductivity temperature/depth probe, side-scan sonar, sub-bottom profiler, magnetometer, bottom coring and sampling devices. Data can be processed with onboard microcomputers or digitally recorded for further processing in the research laboratory.

Consult page 115 for a comprehensive index of oceanography courses.

BSc in Physics and Computer Science

The purpose of specialization in physics and computer science is to learn how to apply physical laws and how to master and stay abreast of developments in computer science and technology. 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. The purpose, therefore is to provide not only a useful knowledge of those parts of current computer technology of particular interest to the military, but also sufficient theoretical background to enable the student to keep up with developments in this growing field.

The physics part of the program is the same as that in the "Combined Major" in Physics and Oceanography and electives are chosen from the science, oceanography and arts courses. The computer science curriculum is based upon the core curricula recom-

mended by committees of the Association of Computing Machinery (ACM) and of the Institute of Electrical and Electronic Engineers (IEEE). The IEEE part of the curriculum places a greater emphasis upon militarily relevant hardware than does that of the ACM.

Two levels of degrees are offered. There is a "Combined Major" degree, and exceptional students may be awarded a "Combined Major Degree with Honours" upon sucessful completion of additional specified courses and a project.

Course descriptions will be found in the appropriate departmental sections of the calendar.

Consult page 87 for a comprehensive index of computer science courses.

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. A minimum of 80 units of credit (excluding SLT) in 300 or 400 level courses must be obtained in third or fourth year as follows: 8 units of credit in Military Leadership and Applied Psychology; a minimum of 12 or maximum of 16 units of credit in Arts electives; 56 or 60 units of credit in Science subjects as well as SLT, Drill and PE. In addition, any prerequisite 100 or 200 level course must be completed.

A student will normally be required to take and pass courses totalling a minimum of 16 units of credit in any semester.

Course descriptions are found in the appropriate departmental sections of the calendar.

RRMC BSc DEGREES ADMISSIONS REQUIREMENTS

Combined Major in Physics and Oceanography

Completion of second year in a CMC Science or Engineering program of study which includes a course in Mathematics RR241 or its equivalents. A weighted grade average in mathematics, science, and engineering subjects of at least 55 percent is normally required. Completion of Engineering RR232 or its equivalent, and Mathematics RR252 or its equivalent are recommended.

Honours Degree in Physics and Oceanography

Completion of third year in the Combined Major program in Physics and Oceanography with a weighted average of at least 66 per cent in science and engineering courses. Students who have achieved less than the required average may be admitted to the Honours program on a probationary basis with Faculty Council approval. Students must normally maintain a weighted average of 66 percent in all courses to remain in the program.

Combined Major in Physics and Computer Science

Completion of second year in a CMC Science or Engineering program of study which includes a course in Mathematics RR241 and Mathematics RR252 or their equivalents. A weighted average of at least 55 percent is normally required in mathematics, science and engineering courses.

Honours Degree in Physics and Computer Science

Completion of third year in the Combined Major program in Physics and Computer Science with a weighted average of at least 66 percent in science and engineering courses. Students who have achieved less than the required average may be admitted on a probationary basis with Faculty Council approval. Students must normally maintain a 66 percent weighted average in all courses to remain in the program.

General Degree in Science

Satisfactory completion of second year in CMC Science or Engineering program of study which includes a course in chemistry

BA IN MILITARY AND STRATEGIC STUDIES — RRMC

The RRMC Military and Strategic Studies program is designed to introduce officer cadets to military history, strategic thought, international relations, and Canadian economic and political issues. It builds upon and develops from the first and second year programs of study at the CMCs. The program is intended as a solid foundation for subsequent officer development through individual study and disciplines relating to war and the military.

In order to familiarize students with research problems and critical analysis, and to enhance their ability in public speaking, class seminars and thesis requirements are mandatory in the fourth year of the Honours program. Students in the Honours program will be required to undertake an honours thesis extending over two semesters. They will discuss their research work in a seminar during the first term, and defend their findings in an oral exam by the end of the second term.

RRMC BA DEGREE ADMISSION REQUIREMENTS

General Degree in Military and Strategic Studies

Satisfactory completion of any CMC second year program of studies - Art, Administration, Science or Engineering.

Honours Degree in Military and Strategic Studies

Completion of third year in the Military and Strategic Studies program with a weighted average of at least 66 percent. Students who have achived less than second class honours may be admitted to the Honours program on a probationary basis with Faculty Council approval.

THE ROYAL MILITARY COLLEGE
ACADEMIC PROGRAM

The Royal Military College of Canada offers degree programs in Engineering, in Science and in the Humanities.

CONDITIONS OF TRANSFER FROM RRMC INTO THIRD YEAR AT RMC

a. General

General conditions for admission to third year programs 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, K7K 5L0.

b. General Requirement for Admission to Third Year at RMC

The general requirement for admission to a third year program course at RMC is that candidates will have the same basic preparation for their program of study 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 percent in the subjects of the Honours program of study. An overall average of at least 60 percent will also normally be required.

In order to meet an RMC requirement for a course in Canadian History, a specified course in this subject may have to be taken in third year at RMC.

c. Entry Requirements for RMC Degrees in Arts (BA)

The general requirement for admission to all third year Arts (BA) programs at RMC is met by successful completion of one of the second year programs of study available at a CMC.

However, specific requirements for honours 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 the Honours or the General programs of study.

d. Entry Requirements for RMC Degree in Science (BSc)

Mathematics and Physics

The following second year programs of study will meet the requirements for admission to third year Mathematics and Physics (General and Honours) at RMC:

Science; or
Engineering.

Entry into the Honours program of study is limited to those who obtain at least 66 percent combined average in mathematics and physics courses in the second year. An overall average of at least 60 percent will normally be required. For entry into the General course of study, the combined average must be at least 55 percent and the overall average at least 50 percent.

Science (Applied)

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

Science; or
Engineering.

e. **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 at least the following minimum considerations:

Engineering Physics: 66 percent combined average in mathematics and physics.
Fuels & Materials Engineering: 55 percent combined average in chemistry, mathematics and physics
Civil Engineering: 55 percent combined average in mathematics and physics.
Computer Engineering: 55 percent combined average in mathematics and physics
Electrical Engineering: 55 percent combined average in mathematics and physics.
Engineering Management: 55 percent combined average in mathematics and physics.
Mechanical Engineering: 55 percent combined average in mathematics and physics.

LE COLLÈGE MILITAIRE ROYAL DE SAINT-JEAN
ACADEMIC PROGRAM

Le Collège militaire royal de Saint-Jean offers degree programs in Administration, in Computing Science, in Physical Sciences, in Canadian Studies, and in Military and Strategic Studies.

PROGRAMS OF STUDY AT CMR AND CONDITIONS OF TRANSFER FROM RRMC INTO THIRD YEAR AT CMR

The following programs of study are available at CMR to students on transfer from second year at RRMC:

a. **Bachelor of Administration — CMR**

The major objective of this program, leading to the degree of Bachelor of Administration, is to provide opportunities for the development of efficient administrators capable of adapting to different types of organization.

Secondary objectives are: (1) To provide the student with a broad background in business administration. (2) To improve the understanding of human behaviour in connection with administrative problems. (3) To provide the future officer with a knowledge of public administration which will enable him to be an effective manager in the Canadian Forces. (4) To provide the future manager with the knowledge which will permit utilization of quantitative methods in decision-making.

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.

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

The following compensative courses must be taken at CMR:

ADM 231: Accounting I (if CO203 not taken in Second Year)
ADM 232: Accounting II
ADM 241: Managerial Mathematics
SCH 212: Microeconomic Analysis

b. **Bachelor of Computing Science — CMR**

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 program should necessarily be of a broad nature.

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

1) 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.

   As a general rule, officer cadets from the three Canadian Military Colleges, who have successfully completed the second year of a Science or Engineering program are admissible provided that they have taken MAT 212, MAT 251 or the equivalent, and have obtained a 60 percent general average. Admission to the course is always subject to approval by the chairmen of the departments involved and must be sanctioned by the Deans of the divisions concerned.

2) The goal in the Management Concentration is to form computer specialists with a good knowledge of modern management techniques and the capability of making their science serve these techniques.

3) 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 specifically of the physics related to computers.

4) 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.

   As a general rule, officer cadets from the three Canadian Military Colleges, who have successfully completed the second year of a Science or Engineering program are admissible in the Management, Physics or Mathematics Concentrations provided that they have taken MAT 212, MAT 251 or the equivalent, and have obtained a 55 percent general average. Admission to these courses is always subject to approval by the chairmen of the departments involved and must be sanctioned by the Deans of the divisions concerned.

c. **Bachelor of Science — CMR**

The science options at CMR are designed to impart a full appreciation of quantitative and analytical methods. They encourage and stimulate a critical analysis of cause and effect, a quest for precision and a scientific 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:

1) **Bachelor of Science with Honours in Physics**

This most demanding program emphasizes fundamental physical principles. Graduates are prepared to undertake post-graduate studies 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 MAT 212, MAT 251 or the equivalent, and have obtained a minimum combined average of 66 percent in mathematics and physics and an overall average of 60 percent. Entry to the Honours program is subject to the approval of the Mathematics and Physics Department at CMR and must be sanctioned by the Dean of the division concerned.

2) **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 interests who have demonstrated at least an average achievement in previous science courses.

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 percent in mathematics and physics.

3) **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.

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.

d. **Bachelor of Arts in Canadian Studies (Minor in Administration) — CMR**

The primary objective of the Canadian Studies program is to give students an opportunity to gain a comprehensive understanding of Canadian civilization as a living culture. A number of departments cooperate in offering this course of study.

Secondary objectives are: (1) 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. (2) To provide the student with a university education which will enable him to be an effective young officer in the Canadian Forces. (3) To offer the officer cadet the possibility of earning a BA degree in relation to his aptitudes and interests.

Methods of study include: (1) The field method: students have the opportunity to experience CMR and the Montreal area as a microcosm of the Canadian reality and the interface of the three major components of our society. (2) Content analysis method: a qualitative and quantitative study of the values, beliefs and norms of Canadian Society done through a systematic analysis of the country's history, literature, arts and institutions. (3) Cross-cultural method: the study of the English and French Canadian cultures – their similarities and differences.

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

e. **Bachelor of Arts in Military and Strategic Studies — CMR**

The primary objective of this program is to prepare future officers to analyse and understand the military and strategic problems in the field of contemporary international relations. This program is of interest to the Canadian Forces because of its specialization.

The Military and Strategic Studies at CMR offers a General program and an Honours program. Following a progressive evolution from first through the second year, the program terminates by an indepth study during the third and fourth years.

The unique interdisciplinary character of this program is evident. Courses include Military History, Science of War, International Relations, Defence Policy, International Public Law and War and Law, Decision Making, Economy, Psychology, Technology of Weapons and some quantitative approaches to the study of conflicts.

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

This program is given in French only.

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.

RRMC PROGRAM TABLES

Tables 1 to 14 outline the programs of study available at Royal Roads Military College.

Corresponding course descriptions can be found on pages 83 to 128.

TABLE 1

First Year — Degrees in Arts or Administration

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training I	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
English RR113	English Literature 1100 to 1900	3	0	0	4	3	0	0	4	
English RR123	Composition, Logic and Linguistics	2	0	0	2	2	0	0	2	
History RR122	The Founding of New Societies, 1500-1763	—	—	—	—	(3)	(0)	(0)	(4)	4
History RR123	European History to 1763	3	0	0	4	3	0	0	4	
Political Science RR 102	Introduction to Political Science	—	—	—	—	3	0	0	4	
MLAP RR111	Psychology of the Individual	3	0	0	4	—	—	—	—	
MLAP RR212	Social Psychology	—	—	—	—	(3)	(0)	(0)	(4)	5
Mathematics RR103	Calculus and Analytical Geometry	3	2	0	4	3	2	0	4	
Mathematics RR113	Calculus and Linear Algebra	—	—	—	—	(5)	(2)	(0)	(5)	6
Computer Science RR102	Introduction to Computer Programming	—	—	—	—	1	0	1	2	
Chemistry RR123	Introductory Chemistry	3	0	3	4	3	0	3	4	
PE RR103		0	0	2	0	0	0	2	0	
Drill RR103		0	0	1	0	0	0	1	0	
Total		17	5	8	22	18	5	9	24	

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted.
3. Taken in lieu of Language Training I by cadets who are functionally bilingual.
4. Taken by those students who transfer to Arts from Science/Engineering at the end of the first semester.
5. Required by those cadets who transfer from Science/Engineering to Arts at the end of the first semester.
6. May be required by those cadets who transfer from Science/Engineering at the end of the first semester.

TABLE 2

First Year — Degrees in Science or Engineering

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training I	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training I A	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
English RR103	Composition, Logic, 14-16th Century Literature, Utopian Literature	3	1	0	4	3	1	0	4	
MLAP RR111	Psychology of the Individual	3	0	0	4	—	—	—	—	
Mathematics RR113	Calculus and Linear Algebra	5	3	0	5	5	2	0	5	
Computer Science RR122	Introduction to Computing	—	—	—	—	2	0	2	4	
Computer Science RR132	Introduction to Computing	—	—	—	—	(2)	(0)	(2)	(4)	4
Physics RR103	Mechanics	1½	½	0	2	1½	½	0	2	
Physics RR113	Optics and Electricity	2½	½	0	3	2½	½	0	3	
Experimental Physics		0	0	3	0	0	0	3	0	
Chemistry RR103	General Chemistry	3	0	3	4	3	0	3	4	
PE RR103		0	0	2	0	0	0	2	0	
Drill RR103		0	0	1	0	0	0	1	0	
Total		18	8	11	22	17	7	13	22	

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted.
3. Taken in lieu of Language Training I by cadets who are functionally bilingual.
4. For students with previous programming experience.

TABLE 3

Second Year — Degrees in Arts or Administration

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training II	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
English RR231	British and European Literature	3	0	0	4	—	—	—	—	
English RR242	Canadian and American Literature	—	—	—	—	3	0	0	4	
History RR121	The Founding of New Societies, 1500-1763	(3)	(0)	(0)	(4)	—	—	—	—	4
History RR123	European History to 1763	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	5
History RR213	History of Canada	3	0	0	4	3	0	0	4	
Economics RR213	Principles of Economics	3	0	0	4	3	0	0	4	
Commerce RR203	Accounting	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	6
Political Science RR102	Introduction to Political Science	—	—	—	—	(3)	(0)	(0)	(4)	7
Political Science RR213	Introduction to International Politics	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	8
MLAP RR111	Psychology of the Individual	(3)	(0)	(0)	(4)	—	—	—	—	5
MLAP RR212	Social Psychology	—	—	—	—	3	0	0	4	9
Mathematics RR203	Finite Mathematics, Probability & Statistics	3	2	0	4	3	2	0	4	
Computer Science RR102	Introduction to Computer Programming	—	—	—	—	(1)	(0)	(1)	(2)	5
Physics RR221	Elementary Mechanics	3	0	0	4	—	—	—	—	10
Physics RR232	Elementary Electricity and Magnetism	—	—	—	—	3	0	0	4	11
Experimental Physics		0	0	3	0	0	0	3	0	10,11
Arts Elective		(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	
PE RR203		0	0	2	0	0	0	2	0	
Drill RR203		0	0	1	0	0	0	1	0	
Total		15	5	8	20	18	5	8	24	12

TABLE 3 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted.
3. Taken in lieu of Language Training II by cadets who are functionally bilingual.
4. Required by students who transfer from Science/Engineering at the end of their first semester in first year.
5. Required if not completed in first year.
6. Required for entry to BAdm degree program (CMR).
7. Required if Political Science RR213 is not selected as an elective.
8. Optional, but recommended for cadets intending to remain at RRMC in the Military and Strategic Studies program.
9. Not required if completed in first year.
10. A student who has passed Physics RR103 will be credited with Physics RR221 and the first semester of Experimental Physics.
11. A student who has passed Physics RR113 will be credited with Physics RR232 and the second semester of Experimental Physics.
12. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 4

Second Year — General Degrees in Science

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training II	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
History RR201	Modern Europe, 1789-1945	3	0	0	4	—	—	—	—	
Economics RR201	Economics for Engineers	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	4
MLAP RR212	Social Psychology	—	—	—	—	3	0	0	4	
Mathematics RR223	Calculus, Vector Calculus, Differential Equations	3	1	0	3	3	1	0	3	
Mathematics RR241	Probability and Statistics	(2½)	(½)	(0)	(3)	—	—	—	—	5,6,7
Mathematics RR252	Linear Algebra	—	—	—	—	(2)	(1)	(0)	(2)	6,8
Physics RR203	AC Circuits & Electromagnetism	2	½	0	2½	2	½	0	2½	
Physics RR211	Vibrations and Waves	2	½	0	2½	—	—	—	—	
Physics RR252	Modern Physics	—	—	—	—	2	½	0	2½	
Experimental Physics		0	0	3	0	0	0	3	0	
Chemistry RR203	Engineering Chemistry	2	0	0	2	3	0	0	2	
Chemistry RR242	Engineering Chemistry Laboratory	—	—	—	—	0	0	3	1	
Computer Science RR201	Computer Applications	2	0	2	3	—	—	—	—	
Engineering RR232	Mechanics of Materials	—	—	—	—	(3)	(0)	(2)	(4)	9
Engineering RR261	Engineering Graphics	2	0	1	2	—	—	—	—	
PE RR203		0	0	2	0	0	0	2	0	
Drill RR203		0	0	1	0	0	0	1	0	
Total		19	5	11	23	13	5	11	15	

TABLE 4 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted.
3. Taken in lieu of Language Training II by cadets who are functionally bilingual.
4. With the permission of Faculty Council and if timetabling permits.
5. Optional, but prerequisite for students who wish to continue in Physics and Oceanography at RRMC.
6. Optional, but prerequisite for students wishing to continue in the Physics and Computer Science program in third year at RRMC.
7. Prequisite for students who wish to continue in General Science at RRMC.
8. Not required for Physics and Oceanography degree at RRMC, Science (Applied) degree at RMC, or General Science degree at RRMC or CMR, but recommended. Required for other Science degree programs at RMC or CMR.
9. Optional, but recommended, for students who wish to continue in Physics and Oceanography at RRMC.

TABLE 5

Second Year — Engineering/Honours Science Degrees

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training II	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
History RR201	Modern Europe, 1789-1945	3	0	0	4	—	—	—	—	
Economics RR201	Economics for Engineers	3	0	0	4	—	—	—	—	
MLAP RR212	Social Psychology	—	—	—	—	3	0	0	4	
Mathematics RR223	Calculus, Vector Calculus, Differential Equations	3	1	0	3	3	1	0	3	
Mathematics RR233	Calculus, Vector Calculus, Differential Equations	(4)	(1)	(0)	(4)	(4)	(1)	(0)	(4)	4
Mathematics RR241	Probability and Statistics	2½	½	0	3	—	—	—	—	5,6
Mathematics RR252	Linear Algebra	—	—	—	—	2	1	0	2	5,7
Physics RR203	AC Circuits & Electromagnetism	2	½	0	2½	2	½	0	2½	
Physics RR211	Vibrations and Waves	2	½	0	2½	—	—	—	—	
Physics RR252	Modern Physics	—	—	—	—	2	½	0	2½	
Experimental Physics		0	0	3	0	0	0	3	0	
Chemistry RR203	Engineering Chemistry	2	0	0	2	3	0	0	2	
Chemistry RR242	Engineering Chemistry Laboratory	—	—	—	—	(0)	(0)	(3)	(1)	8
Computer Science RR201	Computer Applications	2	0	2	3	—	—	—	—	
Engineering RR232	Mechanics of Materials	—	—	—	—	3	0	2	4	7
Engineering RR263	Engineering Graphics and Descriptive Geometry	2	0	1	2	3	0	1	4	9
PE RR203		0	0	2	0	0	0	2	0	
Drill RR203		0	0	1	0	0	0	1	0	
Total		21½	5½	11	26	21	6	11	24	

TABLE 5 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted.
3. Taken in lieu of Language Training II by cadets who are functionally bilingual.
4. Recommended for those who plan to continue in Electrical Engineering, Engineering Physics or Honours Science, in lieu of Mathematics RR223.
5. Required for students wishing to continue in Physics & Computer Science at Royal Roads.
6. Required for students wishing to continue in Physics & Oceanography at Royal Roads.
7. Recommended for students wishing to continue in Physics & Oceanography at Royal Roads.
8. Required of those in Honours Science.
9. Second semester of Engineering RR263 not required of cadets in the Honours Science program. A final grade in Engineering RR261 will be given.

TABLE 6

Third Year — General/Honours Degree in Military and Strategic Studies

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training III	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Political Science RR213	Introduction to International Politics	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	4
Political Science RR302	Crisis and War in International Relations	—	—	—	—	3	0	0	4	
Political Science RR371	The Politcs of International Law	3	0	0	4	—	—	—	—	5
Political Science RR343	Modern Strategic Thought: 1815 to present	3	0	0	4	3	0	0	4	
History RR302	Technology and War, 1914 to present	—	—	—	—	3	0	0	4	
History RR343	War and Diplomacy in Europe: 1848-1960	3	0	0	4	3	0	0	4	
Elective		3	0	0	4	3	0	0	4	6
PE RR303		0	0	2	0	0	0	2	0	
Drill RR303		0	0	1	0	0	0	1	0	
Total		15	3	5	20	15	3	5	20	7

TABLE 6 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training III by cadets who are functionally bilingual.
4. If Political Science RR213, or its equivalent, was not completed in second year, it must be taken in third year in lieu of two elective courses.
5. Replaces Political Science RR321 Irregular Warfare for academic year 1986-87 only.
6. Electives may be selected from any 300 or 400 level Arts or Science course for which the student has the prerequisite if timetabling permits. In the third and fourth years an elective must be taken each semester. A minimum of two must be taken from among the Department of History and Political Economy offerings and at least one must be from outside these disciplines.
7. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 7

Third Year — General Degree in Science

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training III	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Arts Elective		3	0	0	4	3	0	0	4	4,6
Mathematics RR241	Probability and Statistics	(2½)	(½)	(0)	(3)	—	—	—	—	5
Mathematics RR301	Differential Equations	3	0	0	4	—	—	—	—	
Physics RR332	Electromagnetic Wave Propagation	—	—	—	—	3	0	3	5	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR362	Acoustics	—	—	—	—	2	0	0	3	
Physics RR371	Electronics and Microcomputers	3	0	3	5	—	—	—	—	
Oceanography RR301	Descriptive Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR321	Biological Oceanography	2	0	1	3	—	—	—	—	
Oceanography RR331	Chemical Oceanography	3	0	2	4	—	—	—	—	
Oceanography RR352	Oceanographic Methods	—	—	—	—	2	0	0	4	
Computer Science RR301	Introduction to Computer Systems	4	0	2	5	—	—	—	—	
Computer Science RR312	Numerical Analysis	—	—	—	—	3	0	0	4	
Computer Science RR322	Microcomputer Architecture	—	—	—	—	2	0	4	4	
Computer Science RR332	Organization of Programming Languages	—	—	—	—	3	0	1	4	
Computer Science RR341	Advanced Programming Techniques	3	0	1	4	—	—	—	—	
Engineering RR311	Applied Fluid Mechanics	4	0	2	5	—	—	—	—	
Science Elective		3	0	0	4	3	0	0	4	6
PE RR303		0	0	2	0	0	0	2	0	
Drill RR303		0	0	1	0	0	0	1	0	
Total										6

TABLE 7 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training III by cadets who are functionally bilingual.
4. Arts electives are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy, or political science as timetable permits.
5. Required if not completed in second year.
6. In third and fourth years, a minimum of 80 units of credit (excluding SLT) in 300 or 400 level courses must be obtained. Eight units of credit must be in MLAP; a minimum of 12 or a maximum of 16 must be in Arts electives; and the remainder must be in Science subjects. SLT, Drill and PE are also required in each year. A student will normally be required to take and pass a minimum semester course load of 16 units of credit. The course load for each semester must be approved by Faculty Council.

TABLE 8

Third Year — Combined Major Degree in Physics and Computer Science

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training III	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	3	0	0	4	4
Mathematics RR241	Probability & Statistics	(2½)	½	(0)	(3)	—	—	—	—	5
Mathematics RR252	Linear Algebra	—	—	—	—	(2)	(1)	(0)	(2)	5
Mathematics RR301	Differential Equations	3	0	0	4	—	—	—	—	
Physics RR332	Electromagnetic Wave Propagation	—	—	—	—	3	0	3	5	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR371	Electronics and Microcomputers	3	0	3	5	—	—	—	—	
Computer Science RR301	Introduction to Computer Systems	4	0	2	5	—	—	—	—	
Computer Science RR312	Numerical Analysis	—	—	—	—	3	0	0	4	
Computer Science RR322	Microcomputer Architecture	—	—	—	—	2	0	4	4	
Computer Science RR332	Organization of Programming Languages	—	—	—	—	3	0	1	4	
Computer Science RR341	Advanced Programming Techniques	3	0	1	4	—	—	—	—	
Science Elective		3	0	0	4	(3)	(0)	(0)	(4)	6
PE RR303		0	0	2	0	0	0	2	0	
Drill RR303		0	0	1	0	0	0	1	0	
Total		19	3	11	26	17	3	13	25	

NOTES — 1. Final grade based on year's work; no end-of-semester examination.

2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Second Language Training III by cadets who are functionally bilingual.
4. Arts electives are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy, or political science as timetable permits. A minimum of three Arts electives must be taken during the third and fourth years. Arts electives may be taken in either semester.
5. Required if not completed (or its equivalent not completed) in second year.
6. Over the third and fourth years three science electives worth at least 10 units of credit must be taken by Honours (course) students and two Science electives worth at least 7 units of credit must be taken by Combined Major students. Science electives may be taken in either semester.

TABLE 9

Third Year — Combined Major Degree in Physics and Oceanography

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training III	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IIIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	3	0	0	4	4
Mathematics RR241	Probability and Statistics	(2½)	(½)	(0)	(3)	—	—	—	—	5
Mathematics RR252	Linear Algebra	—	—	—	—	(2)	(1)	(0)	(2)	6
Mathematics RR301	Differential Equations	3	0	0	4	—	—	—	—	
Computer Science RR312	Numerical Analysis	—	—	—	—	3	0	0	4	
Physics RR332	Electromagnetic Wave Propagation	—	—	—	—	3	0	3	5	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR362	Acoustics	—	—	—	—	3	0	0	4	
Physics RR371	Electronics and Microcomputers	3	0	3	5	—	—	—	—	
Oceanography RR301	Descriptive Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR321	Biological Oceanography	2	0	1	3	—	—	—	—	
Oceanography RR331	Chemical Oceanography	3	0	2	4	—	—	—	—	
Oceanography RR352	Oceanographic Methods	—	—	—	—	2	0	4	4	
Engineering RR232	Mechanics of Materials	—	—	—	—	(3)	(0)	(2)	(4)	6
Engineering RR311	Applied Fluid Mechanics	4	0	2	5	—	—	—	—	
PE RR303		0	0	2	0	0	0	2	0	
Drill RR303		0	0	1	0	0	0	1	0	
Total		21	3	13	29	17	3	12	25	

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Second Language Training III by cadets who are functionally bilingual.
4. Arts electives are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy, or political science as timetable permits. A minimum of three Arts electives must be taken during the third and fourth years.
5. Required if not completed (or its equivalent not completed) in second year.
6. Recommended if not taken in second year.

TABLE 10

Fourth Year — General/Honours Degree in Military and Strategic Studies

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training IV	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IVA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR402	Challenges to Leadership	—	—	—	—	3	0	0	4	
History RR411	America as a World Power	3	0	0	4	—	—	—	—	
History RR421	Naval History in the Twentieth Century	3	0	0	4	—	—	—	—	
History RR432	China and Japan in the Twentieth Century	—	—	—	—	3	0	0	4	
History RR443	Honours Thesis	(0)	(5)	(0)	(4)	(0)	(5)	(0)	(4)	4
History RR452	Russia in the Twentieth Century	—	—	—	—	3	0	0	4	
History RR471	Pacific Rim and East Asia to 1905	3	0	0	4	—	—	—	—	
Political Science RR432	Arms Control	—	—	—	—	3	0	0	4	
Political Science RR441	Canadian Foreign Policy	3	0	0	4	—	—	—	—	
Elective		3	0	0	4	3	0	0	4	5
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total		15	3	5	20	15	3	5	20	6

TABLE 10 CONTINUED

NOTES —
1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen units of Dialogue Canada or its equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training IV by cadets who are functionally bilingual.
4. Required of those in the Honours Program. Regulations governing Honours thesis are available from the Head of the Department of History and Political Economy.
5. Electives may be selected from any 300 or 400 level Arts or Science course for which the student has the prerequisite if timetabling permits. Over the third and fourth years an elective must be taken each semester. A minimum of two electives must be taken from among the Department of History and Political Economy offerings and at least one must be from outside these disciplines.
6. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 11

Fourth Year — General Degree in Science

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training IV	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IVA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR402	Challenges to Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	(3)	(0)	(0)	(4)	4,7
Mathematics RR401	Complex Analysis	3	0	0	4	—	—	—	—	
Mathematics RR411	Signal Processing I	3	0	0	4	—	—	—	—	
Mathematics RR432	Advanced Applied Mathematics	—	—	—	—	3	0	0	4	
Physics RR401	Experimental Physics	0	0	3	1	—	—	—	—	5
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	0	4	—	—	—	—	
Chemistry RR401	Applied Thermodynamics	3	0	0	4	—	—	—	—	
Oceanography RR401	Geophysical and Geological Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR442	Practical Marine Oceanography	—	—	—	—	0	0	3	1	6
Oceanography RR451	Introduction to Dynamic Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR462	Advanced Dynamic Oceanography	—	—	—	—	3	0	0	4	
Computer Science RR401	Digital Design	2	0	4	4	—	—	—	—	
Computer Science RR411	Operating Systems	3	0	1	4	—	—	—	—	
Computer Science RR422	Topics in Computer Systems	—	—	—	—	3	0	0	4	
Computer Science RR432	Solid State Device Technology	—	—	—	—	3	0	0	4	
Science Elective		3	0	0	4	3	0	0	4	7
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total										7

TABLE 11 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen units of Dialogue Canada or its equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training IV by cadets who are functionally bilingual.
4. Arts electives may be taken in either semester. Elective choices are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy or political science as timetable permits.
5. Required if Physics RR441 selected.
6. Final grade based on semester's work; no end-of-semester examination.
7. In third and fourth years a minimum of 80 units of credit (excluding SLT) in 300 or 400 level courses must be obtained. Eight units of credit must be in MLAP; a minimum of 12 or a maximum of 16 must be in Arts electives and the remainder must be from Science subjects. SLT, Drill and PE are also required in each year. A student will normally be required to take and pass a minimum semester course load of 16 units of credit. The courses load for each semester must be approved by Faculty Council.

TABLE 12

Fourth Year — Combined Major/Honours Degree in Physics and Computer Science

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training IV	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IVA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
MLAP RR402	Challenges to Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	3	0	0	4	4
Mathematics RR411	Signal Processing I	3	0	0	4	—	—	—	—	
Mathematics RR432	Advanced Applied Mathematics	—	—	—	—	(3)	(0)	(0)	(4)	5
Physics RR401	Experimental Physics	0	0	3	1	—	—	—	—	
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	0	4	—	—	—	—	
Computer Science RR401	Digital Design	2	0	4	4	—	—	—	—	
Computer Science RR411	Operating Systems	3	0	1	4	—	—	—	—	
Computer Science RR422	Topics in Computer Systems	—	—	—	—	3	0	0	4	
Computer Science RR432	Solid State Device Technology	—	—	—	—	3	0	0	4	
Computer Science RR443	Computer Science Project	(0)	(0)	(2)	(1)	(0)	(0)	(2)	(1)	5
Science Elective		(3)	(0)	(0)	(4)	3	0	0	4	6
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total		17	3	13	25	18	3	5	24	

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training IV by cadets who are functionally bilingual.
4. Arts electives are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy, or political science as timetable permits. A minimum of three Arts electives must be taken during the third and fourth years.
5. Required by those in the Honours (course) program.
6. Over the third and fourth years, three science electives worth at least 10 units of credit must be taken by Honours (course) students and two science electives worth at least 7 units of credit must be taken by Combined Major students. Science electives may be taken in either semester.

TABLE 13

Fourth Year — Combined Major/Honours Degree in Physics and Oceanography

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training IV	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training IVA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
Engineering RR232	Mechanics of Materials	—	—	—	—	(3)	(0)	(2)	(4)	4
MLAP RR402	Challenges to Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	3	0	0	4	5
Mathematics RR252	Linear Algebra	—	—	—	—	(2)	(1)	(0)	(2)	4
Mathematics RR401	Complex Analysis	3	0	0	4	—	—	—	—	
Mathematics RR432	Advanced Applied Mathematics	—	—	—	—	(3)	(0)	(0)	(4)	6
Physics RR401	Experimental Physics	0	0	3	1	—	—	—	—	
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	0	4	—	—	—	—	
Chemistry RR401	Applied Thermodynamics	3	0	0	4	—	—	—	—	
Oceanography RR401	Geophysical and Geological Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR442	Practical Marine Oceanography	—	—	—	—	0	0	3	1	7
Oceanography RR451	Introduction to Dynamic Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR462	Advanced Dynamic Oceanography	—	—	—	—	3	0	0	4	
Oceanography RR473	Oceanography Project	(0)	(0)	(2)	(1)	(0)	(0)	(2)	(1)	6
Oceanography RR483	Oceanography Thesis Project	(0)	(1)	(4)	(4)	(0)	(1)	(4)	(4)	8
Oceanography RR492	Oceanography Seminar	—	—	—	—	0	0	2	0	
Science Elective		(3)	(0)	(0)	(4)	3	0	0	4	9
Science Elective		—	—	—	—	3	0	0	4	9
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total		21	3	8	29	18	3	10	25	

TABLE 13 CONTINUED

NOTES — 1. Final grade based on year's work; no end-of-semester examination.
2. For each fifteen lessons of Dialogue Canada or equivalent satisfactorily completed, three units of academic credit will be granted to a maximum of nine in the full degree program.
3. Taken in lieu of Language Training IV by cadets who are functionally bilingual.
4. Recommended if not previously completed.
5. Arts electives are Political Science RR102, or any 300 or 400 level course offered in economics, French, history, literature, philosophy, or political science as timetable permits. A minimum of three Arts electives must be taken during the third and fourth years.
6. Required of cadets in the Honours (course) program.
7. Final grade based on semester's work; no end-of-semester examination.
8. Required of cadets in the Honours (thesis) program.
9. Two science electives worth at least 7 units of credit must be taken by Combined Major and Honours (thesis) students and three science electives worth at least 10 units of credit must be taken by Honours (course) students. Science electives may be taken in either semester.

TABLE 14

Diploma in Oceanography

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Oceanography RR301	Descriptive Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR352	Oceanographic Methods	—	—	—	—	2	0	4	4	
Oceanography RR401	Geophysical & Geological Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR451	Introduction to Dynamic Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR462	Advanced Dynamic Oceanography	—	—	—	—	3	0	0	4	
Oceanography RR473	Oceanography Project	0	0	2	1	0	0	2	1	
Oceanography RR492	Oceanography Seminar	—	—	—	—	0	0	2	0	
Physics RR362	Acoustics	—	—	—	—	3	0	0	4	
Science Elective		3	0	0	4	3	0	0	4	1
Total		12	0	2	17	11	0	8	17	

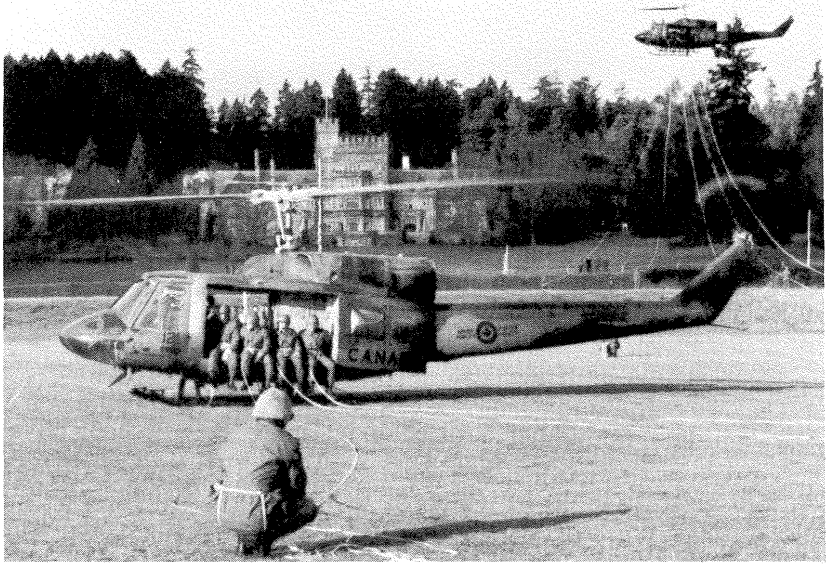
NOTES — 1. Particularly relevant courses from which to elect a course are listed below. Other courses offered in the Calendar may also be taken, subject to timetabling.

RELEVANT ELECTIVE LIST

First Semester
Engineering RR311 – Applied Fluid Mechanics
Oceanography RR321 – Biological Oceanography
Oceanography RR331 – Chemical Oceanography
Mathematics RR411 – Signal Processing I

Second Semester
Physics RR342 – Applied Optics and Remote Sensing
Oceanography RR412 – Aeronomy
Oceanography RR422 – Geochemistry of Marine Sediment
Oceanography RR442 – Practical Marine Oceanography
Mathematics RR422 – Signal Processing II
Mathematics RR432 – Advanced Applied Mathematics

MILITARY TRAINING



MILITARY TRAINING

COURSE DESCRIPTIONS

The different courses offered at RRMC are described in detail in the sections that follow (listed alphabetically by departments). For each course at RRMC the name of the subject (e.g. History) is given, followed by a three digit number prefixed by the letters RR. The RR designates that the course is offered at Royal Roads Military College; the first number indicates the year in which the course is normally taken, the second number is used to distinguish between the various courses offered by the department in that year, and the third number indicates the semester in which the course is offered. Some courses at RRMC extend over a full academic year of two semesters; these courses will be indicated by a 3 as the third number (e.g. Mathematics RR203). The course number is followed by a brief descriptive title of the course; this in turn is followed by numbers in parentheses that indicate respectively the number of lectures, tutorials, and laboratory periods each week in each semester, and the number of units of credit assigned to the course each semester. A detailed course description would read as follows:

PHYSICS RR221: Elementary Mechanics **(3,0,0,4/-,-,-,-)**

This is a one semester course in elementary mechanics offered by the Department of Physics in the first semester of the second year. The course meets three times each week for lectures, has no tutorial or laboratory periods and carries four units of credit.

MATHEMATICS RR203: Finite Mathematics, Probablity & Statistics **(3,2,0,4/3,2,0,4)**

This is a year course in mathematics offered by the Department of Mathematics in the second year. The course extends over both the first and second semesters of the year, meets three times each week for lectures, twice for tutorials, has no laboratory periods, and carries eight units of credit for the year (four units each semester).

Note 1: In a few cases, a student may take only one semester of a two semester course. In this case his transcript will indicate a course numbering ending in a 1 or 2, instead of the usual 3 (e.g. History RR121 is the first semester of the History RR123 course).

DEPARTMENT OF CHEMISTRY

Associate Professor and Head of Department — M.R. Barr, BSc, MSc, PhD

Professor — M.G. Robinson, BSc, PhD

Associate Professor — G.M. Barrow, BASc, MASc, PhD

Associate Professor — K.J. Reimer, BSc, MSc, PhD

CHEMISTRY RR103: General Chemistry **(3,0,3,4/3,0,3,4)**

Review of fundamental laws. The properties of gases; elementary kinetic theory, Atomic structure, the Periodic Law. Types of valence bond; molecular structure. Redox processes and electrolytic and voltaic cells. The properties of solutions. Rates of chemical reactions. First and Second Laws of Thermodynamics. Chemical equilibrium; ionic equilibria; pH, hydrolysis, and buffers. A brief introduction to organic chemistry.

The laboratory course supplements the lecture material. Types of substances and their physical and chemical properties are investigated. Included are studies of elements and compounds, covalent and ionic substances, anions and cations, acids and bases, and transition metal coordination compounds. The principles of spectroscopy and thermodynamics are introduced. Principles of redox reactions, equilibria, and kinetics are illustrated with organic chemistry reactions.

Computer supplements provide additional studies of chemical bonding, quantum mechanics, kinetics and chemical equilibria.

Russel, *General Chemistry (1980)*
Nyman, King & Weyh, *Problems for General Chemistry and Qualitative Analysis (4th Ed.)*
Barrow, *Computer Based Studies for General Chemistry*

CHEMISTRY RR123: Introductory Chemistry **(3,0,3,4/3,0,3,4)**

This course surveys the development of modern chemical science with an emphasis on the application of the scientific method. The concept of atoms and atomic structure will be considered as will the nature of chemical bonds and the relation of chemical properties to the periodic table. Topics such as redox reactions, solubility, physical state, equilibrium, polymers, biochemistry, and radio-activity will be covered; the emphasis being on the application of these principles to an understanding of the world in terms of molecular behaviour. Examples will include polymers, explosives, war gases, corrosion, chemotherapy, toxicology, energy options. Laboratory experiments will illustrate and supplement the lecture material.

Dickerson & Geis, *Chemistry: Matter and the Universe*
Jones, Netterville, Johnston & Wood, *Chemistry: Man and Society (3rd Ed.)*
Brown & Lemay, *Chemistry, The Central Science (3rd Ed.)*

CHEMISTRY RR203: Engineering Chemistry **(2,0,0,2/3,0,0,2)**

The course is divided into two parts:

(a) Review of the Gas Laws — Elementary thermodynamics — discussion of the first, second and third laws — reversible and irreversible processes — spontaneity of reactions involving gases and different types of heterogeneous systems. Electrode potentials, cells, free energy, chemical potential, one and two phase systems, the phase rule; and, as time allows;

(b) Applications of chemistry of interest specifically to engineers, drawn from such topics as gaseous, liquid, and solid fuels, lubricants, corrosion, cells, batteries, plastics, protective coatings, explosives, etc.

Daniels & Alberty, *Physical Chemistry (5th Ed.)*

CHEMISTRY RR242: Engineering Chemistry Laboratory **(-,-,-,-/0,0,3,1)**

Taken by General Science and Honours Science students in the second semester to accompany the Chemistry RR203 lectures. Experiments include enthalpies of combusion, neutralization and vaporization; electrode potential and temperature dependence; phase rule; distillation; calculation of thermodynamic values and computer simulations.

CHEMISTRY RR401: Applied Thermodynamics **(3,0,0,4/-,-,-,-)**

Review of the laws of thermodynamics and applications of fundamental relationships. Heat engines; study of types and thermodynamics of operation, gas liquefaction and refrigeration systems; non-ideal substances and the use of steam tables; thermodynamics of flow processes for compressible and incompressible fluids. Methods of presenting thermodynamic data. Psychrometry and the application of thermodynamics to meteorology.

Holman, *Thermodynamics (3rd Ed.)*

ELECTIVES

The following courses may be taken by students in third or fourth year as a Science elective. These courses will only be offered on sufficient demand (normally four or more students).

CHEMISTRY RR311: Applications of Chemistry **(3,0,0,4/-,-,-,-)**

Review of bonding and structural chemistry; fuels, combustion processes and energy sources; explosives; lubricants and protective coatings; organic and inorganic polymers including mechanisms for synthesis and breakdown.

Structures and properties of solids; properties of metals including ferrous and non-ferrous alloys; electrochemistry of cells, batteries, and fuel cells; principles of corrosion and corrosion control.

Offered on demand: Prerequisite: Consent of the Department.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

COMPUTER SCIENCE

The undergraduate degree in Physics and Computer Science is interdisciplinary. As there is no department of Computer Science, the curriculum is under the guidance of the Computer Science Curriculum Committee chaired by the Dean of Science and Engineering.

INSTRUCTORS	DEPARTMENT
Professor — M.J. Wilmut, ndc, BSc, MA, PhD	Mathematics
Associate Professor — F. Milinazzo, BSc, PhD	Mathematics
Associate Professor — R.C. Snell, BSc, MSc, PhD	Mathematics
Associate Professor — W.W. Wolfe, BSc, MSc, PhD	Mathematics
Associate Professor — J.S. Collins, BSc, BEng, MEng, PhD, MCSEE, MEIC, MIEEE	Engineering
Associate Professor — M.J. Press, BSc, MSc, PhD	Physics
Special Lecturer — J.L. LaCombe, BSc, MSc, PhD	Physics

The descriptions of named Computer Science courses follow, but there are a number of associated courses which are to be found under the department offering them, e.g. signal processing, electronics and microcomputers.

COMPUTER SCIENCE RR102: An Introduction to Computer Programming **(-,-,-,-/1,0,1,2)**

For first year Arts or Administration students.

Introduction to a structured dialect of the BASIC language and possibly some FORTRAN. Proficiency in programming will be achieved by writing programs to solve problems. Fundamental techniques of file manipulation and information retrieval useful to managers will be covered. The Honeywell TEXT processor may be discussed briefly, as time permits.

Bent and Sethares, *Business BASIC (2nd Ed.)*

COMPUTER SCIENCE RR122: An Introduction to Computing **(-,-,-,-/2,0,2,4)**

For first year Science and Engineering students.

An introduction to programming and problem solving on a computer. The emphasis will be on problem analysis, program design and the production of quality programs. FORTRAN syntax is introduced.

Meissner & Organick, *FORTRAN 77: Featuring Structured Programming*

COMPUTER SCIENCE RR132: An Introduction to Computing **(-,-,-,-/2,0,2,4)**

For first year Science and Engineering students with previous programming experience. Admission to this course will be at the discretion of the Department of Mathematics.

Structured FORTRAN syntax; problem analysis; error handling; debugging techniques; modular structure and linking to external routines; program design and analysis including documentation standards; individual and group projects including numerical methods.

Meissner & Organick, *FORTRAN 77:Featuring Structured Programming*

COMPUTER SCIENCE RR201: Computer Applications (2 ,0,2,3/-,-,-,-)

For second year Science or Engineering students.

This course is intended to develop the student's ability to use the computer for practical problem solving. The students will write their own programs as well as use library programs. Proper documentation, critical examination and interpretation of program results will be emphasized.

Topics covered include number and data representation, computational pitfalls, numerical integration, modelling of measured data by curve fitting, simulation of dynamic systems and solution of linear simultaneous equations.

Selected applications from engineering, physics, and chemistry will be used to illustrate the use of the computer.

David & Hoffman, *FORTRAN 77: A Structured Discipline Style (2nd Ed.)*
Burden & Faires, *Numerical Analysis (3rd Ed.)*
Rice, *Numerical Methods, Software and Analysis (ISML Ref. Ed.)*

COMPUTER SCIENCE RR301: Introduction to Computer Systems (4,0,2,5/-,-,-,-)

Systems components and machine language including instruction types, addressing modes, opcode design and microprogramming. Assembly language programming techniques including arithmetic and logical operations, data representation, list processing, loop control and I/O buffering. Comparison of several machine architectures.

Prerequisite: Computer Science RR201 or consent of the Department.

Tanenbaum, *Structured Computer Organization*
Zarrella, *Systems Architecture*
Zarrella, *Operating Systems - Concepts and Principles*
Leventhal, *8080A-8085 Assembly Language Programming*
Zaks, *CP/M Handbook with MP/M*

COMPUTER SCIENCE RR312: Numerical Analysis (-,-,-,-/3,0,0,4)

Numerical solutions of problems encountered in applied mathematics using the computer, numerical integration, solutions of ordinary differential equations; roots of equations; polynomial interpolation; linear systems.

Prerequisites: Mathematics RR223, RR252, RR301. Computer Science RR201.

Burden, Farres & Reynolds, *Numerical Analysis (3rd Ed.)*
Meissner & Organick, *FORTRAN 77: Featuring Structured programming*

COMPUTER SCIENCE RR322: Microcomputer Architecture (-,-,-,-/2,0,4,4)

A discussion of the hardware requirements needed to make a microcomputer function. Includes CPU, RAM, ROM, system bus. I/O (programmed, interrupt, DMA and serial) with handshaking, A/D and D/A converters, timing diagrams and microprogramming. The laboratory gives hands-on experience with these concepts as well as practical experience building several I/O interfaces.

Prerequisites: Physics RR371, Computer Science RR301 or consent of the Department.

Coffron, *Practical Hardware Details for Microprocessor Systems*
Osborne, *An Introduction to Microcomputers – Vol 1 Basic Concepts (2nd Ed.)*

COMPUTER SCIENCE RR332: Organization of Programming Languages -,-,-,-/3,0,1,4)

Lanaguage definition; data types and structures; control structures; run-time considerations. Comparison of the structure of several high-level languages both compiled and interpreted.

Prerequisite: Computer Science RR301 or consent of the Department.

Pratt, *Programming Languages, Design and Implementation (2nd Ed.)*

COMPUTER SCIENCE RR341: Advanced Programming Techniques (3,1,0,4/-,-,-,-)

Topics covered include analysis of algorithms; representations and applications of data structures (stacks, lists, trees, queues); file processing technique including sequential and random acess organizations, sorting, merging and searching. Students will gain experience with a number of programming languages in a variety of operating system environments.

Dale & Orshalick, *Introduction to Pascal & Structured Design*
Zaks, *CP/M Handbook with MP/M*

COMPUTER SCIENCE RR401: Digital Design (2,0,4,4/-,-,-,-)

This course develops the ideas of the top-down design of digital circuits. Topics discussed include Boolean Algebra, Karnaugh maps, building blocks for digital design and memory, the Algorithmic State Machine and how to implement it, as well as design pitfalls. Practical examples are used to illustrate these concepts including the design of a small mini computer. In the laboratory, various hardware interfaces are built and tested and small individual projects are undertaken.

Prerequisite: Computer Science RR322.

Winkel & Prosser, *The Art of Digital Design*

COMPUTER SCIENCE RR411: Operating Systems (3,0,1,4/-,-,-,-)

Resource management including memory, processor, process and devices. Operation of loaders, segmentation and paging. Process dispatching, queue management. Concurrency, mutual exclusion, synchronization and communication. I/O buffering and request processing.

Prerequisite: Computer Science RR301 or consent of the Department.

Calingaert, *Operating System Elements - A User Perspective*
Peterson & Silberschatz, *Operating System Concepts*
Kerrighan & Ritchie, *The C Programming Lanaguge*

COMPUTER SCIENCE RR422: Topics in Computer Systems (-,-,-,-/3,0,0,4)

The content will include point and line drawing displays, two dimensional transformations, graphics packages, interactive graphics, and raster graphics. Instruction and exercises will be oriented toward use of the College's Tektronix 4113-4114 and PLOT 10 IGL facilities.

This course is intended primarily for Physics and Computer Science students who have PASCAL programming experience and who are conversant with machine organization and data structures. Completion of Computer Science RR332 satisfies these requirements.

Newman & Sproull, *Principles of Interactive Computer Graphics (2nd Ed.)*
Foley & van Dam, *Fundamentals of Interactive Computer Graphics (1982)*
Tetetronix Canada Ltd., *Plot 10 IGL Users Reference Guide*

COMPUTER SCIENCE RR432: Solid State Device Technology (-,-,-,-/3,0,0,4)

Semiconductor materials and physics of semiconducting devices. Materials science of integrated circuit construction and packaging. Techniques of diffusion, ion implanation, lithography, etching, metallization, oxide and crystal growth. Comparison of various technologies and levels of integration from the viewpoint of complexity, signal-to-noise criteria, power requirements and operational speed. Discussion of specific CF-related hostile-environment requirements for circuit components.

Prerequisites: Physics RR371, RR421, RR441 or consent of the Department.

Bar-Lev, *Semi-Conductors and Electronic Devices*

COMPUTER SCIENCE RR443: Computer Science Project (0,0,2,1/0,0,2,1)

Fourth year cadets in the Honours (course) program, working singly or in syndicates, work on an experimental or theoretical project in the general area of computer science with members of the staff of the Department of Chemistry, Engineering, Mathematics or Physics. A cadet must submit and defend a project report according to thesis regulations but of much narrower scope.

The topic must be approved by Faculty Council.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF ENGINEERING

Associate Professor and Head of Department — E.R. Chappell, rmc, BSc, MASc, MEIC, MCSCE, MCASI, PEng

Associate Professor — J.S. Collins, BSc, BEng (EE), MEng (EE), PhD (EE), MCSEE, MEIC, MIEEE, PEng

Associate Professor — J.W. Madill, CD, BSc (CE), MSc (CE), EdD, MEIC, MCGS, PEng

Associate Professor — M.D. Thom, CD, rmc, pfsc, pcsc, aws, BASc, AdeC

ENGINEERING RR232: Mechanics of Materials **(-,-,-,-/3,0,2,4)**

For second year Engineering and Honours Science students; recommended for those intending to enter the Physics and Oceanography program; optional for General Science.

Review of statics; stresses due to axial loads, strain and axial deformation; stress due to temperature change; physical properties of materials, torsion of circular shafts and thin walled tubes; analysis of plane stress, stresses in beams due to bending, combined stresses. The elastic properties are emphasized throughout.

The Mechanics of Materials laboratory gives the student an opportunity to carry out: tensile tests on a number of different metal samples; Rockwell Hardness tests; and torsion tests to failure. There will be demonstrations of strain distribution in a beam due to bending to help illustrate the subject matter.

Popov, *Mechanics of Materials (2nd Ed.) - SI Version*
Beer & Johnston, *Vector Mechanics for Engineers - Statics, (4th Ed.)*

ENGINEERING RR261: Engineering Graphics **(2,0,1,2/-,-,-,-)**

For second year General and Honours Science students.

Use of drawing instruments and drawing materials; geometric constructions; lettering; sketching and shape description; multiview projection; reading drawings; sectional views; auxiliary views; dimensioning; oblique and isometric pictorial sketching.

Giesecke, Mitchell, Spencer, Hill, Loving & Dygdon, *Engineering Graphics (3rd Ed.)*
Nee, *Engineering Graphic Problems, Series 2*

ENGINEERING RR263: Engineering Graphics and Descriptive Geometry **(2,0,1,2/3,0,1,4)**

For second year Engineering students.

Includes all topics covered in Engineering RR261 and the following additional topics.

Point projection of lines, normal views of planes, cuts and fills, revolutions, developments, graphical solution of vectors, simple determinate truss analysis, graphical calculus, determination of areas, centroids and moments of inertia, empirical equations.

Perspective drawings, double auxiliary views, intersections, screw threads, fasteners, assembly drawings, and an introduction to creative design where cadet teams provide design solutions to given problems.

Practical problems are used throughout the course.

Giesecke, Mitchell, Spencer, Hill, Loving & Dygdon, *Engineering Graphics (3rd Ed.)*
Nee, *Engineering Graphics Problems, Series 2*

ENGINEERING RR311: Applied Fluid Mechanics **(4,0,2,5/-,-,-,-)**

For third year Physics and Oceanography students; optional for General Science students.

Newtonian and non-Newtonian fluid properties, fluid pressure, ship stability, free surfaces and manometry; fundamental equations for steady one-dimensional, non-viscous incompressible flow; dimensional analysis and principles of similarity and modelling; Navier-Stokes equations; laminar flow, turbulent flow, boundary layer, skin friction, and drag estimation; incompressible flow in closed circuits and open channels; Mach number, cavitation and selected topics.

The laboratory course amplifies topics discussed in the lectures. Experiments include ship stability, jet impact, flow measurements, boundary layer flows, pipe system friction losses, vortex flows and demonstrations of flow phenomena.

Streeter & Wylie, *Fluid Mechanics (1st SI Metric Ed.)*

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF HISTORY AND POLITICAL ECONOMY

Professor and Dean of Arts — W. Rodney, DFC and Bar, BA, MA, PhD, FRGS, FRHist S

Associate Professor and Head of Department — J.A. Boutilier, BA, MA, PhD

Associate Professor – J.A. Bayer, BA, MA, PhD (on leave of absence 1986-87)

Associate Professor — P.J.S. Dunnett, BSc, MA, PhD

Associate Professor — A.G. Martel, BA, MA, PhD

Special Lecturer – Lieutenant (N) W.R. Glover, CD, BA, MA

Special Lecturer – W.T. Mann, BComm, FCGA

Special Lecturer – A.C. Cutler, BA, MSc, BLaws

Special Lecturer – T.B. Killip, BA, MA

Special Lecturer – W. Magnusson, BA, PhD

Special Lecturer – P.G. Nixon, BA, BEd, MA, PhD

Special Lecturer – R.B.J. Walker, BA, MA

HISTORY RR121: European History to 1500 **(3,0,0,4/-,-,-,-)**

For second year Arts students who transferred from Science at the end of the first semester in the first year.

A survey of European civilization from the Ancient World to the Renaissance with particular emphasis upon the growth of Christianity, the nature of feudal society, the impact of the Renaissance and the beginnings of the European expansion.

Chambers, Grew et al, *The Western Experience*

HISTORY RR122: The Founding of New Societies, 1500-1763 **(-,-,-,-/3,0,0,4)**

For first year Arts students who transfer from Science at the end of the first semester.

A survey of the expansion of Europe beyond the European frontier: the founding of the Spanish, Portuguese, British, French and Dutch colonies, with particular emphasis upon New France and British North America. The impact of the expansion on European society is also considered, along with the Reformation, absolutism and the Enlightenment.

Bennett & Jaenen, *Emerging Identities*
Chambers & Grew et al, *The Western Experience*

HISTORY RR123: European History to 1763 **(3,0,0,4/3,0,0,4)**

For first year Arts students and for second year Arts students who did not take it in first year.

A survey of European civilization from the Ancient World to the Renaissance with particular emphasis upon the growth of Christianity, the nature of feudal society, the impact of the Renaissance and the beginnings of the European expansion.

A survey of the expansion of Europe beyond the European frontier: the founding of the Spanish, Portuguese, British, French and Dutch colonies, with particular emphasis upon New France and British North America. The impact of the expansion on European society is also considered, along with the Reformation, absolutism and the Englightenment.

Bennett & Jaenen, *Emerging Identities*
Chambers & Grew et al, *The Western Experience*

HISTORY RR201: Modern Europe, 1789-1945 **(3,0,0,4/-,-,-,-)**

For second year Science and Engineering students.

A survey of the history of European civilization from the French Revolution to the Twentieth Century; the fundamental changes in economic and military techniques and their impact on political and social organization; the development of ideas; the relation of these ideas to conflicts between states or within states, and the solution of these conflicts.

Thomson, *Europe Since Napoleon (2nd Revised Ed.)*

HISTORY RR213: History of Canada **(3,0,0,4/3,0,0,4)**

For second year Arts students.

The history of Canada from earliest times to the present. Directed reading, essays, and seminar discussions, supplemented by lectures covering various aspects of economic, political, military and social development.

McInnis, *Canada: A Political & Social History (4th Ed.)*
Kerr, *A Historical Atlas of Canada (3rd Revised Ed.)*
Morton, *The Kingdom of Canada (2nd Ed.)*

HISTORY RR302: Technology and War 1914 to Present **(-,-,-,-/3,0,0,4)**

The focus is on the political history of technology in this century. Seminars examine the themes of technology and morality, the difficulties of adopting new technology during a war, the relationship of politics and military technology, and finally, what predictions can be made for the future based on historical "lessons". Required readings, selected for the specific questions discussed, are used rather than a text.

HISTORY RR343: War and Diplomacy in Europe: 1848-1960 **(3,0,0,4/3,0,0,4)**

History in the grand manner: the rise and fall of Great Powers, the making and unmaking of states, the eclipse of Europe by America and Asia. The origins of the First World War, the peace of Versailles, the twenty years' crisis and the beginnings of the Cold War form the broad divisions of the course, while imperialism and nationalism, communism and fascism predominate as factors underlying the flow of events. The interplay of diplomacy with strategy, trade, finance and technology is examined throughout.

Martel, *The Origins of the Second World War Reconsidered*
Taylor, *The Origins of the Second Word War*
Taylor, *The Struggles for Mastery in Europe*

HISTORY RR411: America as a World Power **(3,0,0,4/-,-,-,-)**

A survey of American foreign relations from the Spanish-American War to the withdrawal from Vietnam. It analyzes the transformation of the United States from colonial to great power status, with attention upon the internal dynamics of that evolution as well as external causes. America's foreign policies are considered in relation to the nation's economic growth and cultural development, its involvement in wars, and the advent of the Truman Doctrine, the Marshal Plan, NATO, SEATO, and NORAD. Particular emphasis is given to the impact of industrial development and technological change, coupled with the role of ideology in the political decision-making process, including changes in strategic thinking and diplomatic method.

Paterson, *Major Problems in American Foreign Policy Vol. 1 & 2*
DeConde, *A History of American Foreign Policy Vol. 1 & 2 (3rd Ed.)*
Williams, *The Tragedy of American Diplomacy (2nd Revised Ed.)*

HISTORY RR421: Naval History in the Twentieth Century **(3,0,0,4/-,-,-,-)**

This course examines the emergence and eclipse of Japan as a major naval power, the decline of the Royal Navy, the character of critical naval engagements in the First and Second World Wars, the growth of the American and Soviet navies, the role of the Royal Canadian Navy in war and peace, and changes in naval technology and doctrine.

Potter, *Sea Power: A Naval History (2nd Ed.)*

HISTORY RR432: China and Japan in the Twentieth Century **(-,-,-,-/3,0,0,4)**

This course examines: the rise of Japan as an imperial power; the 1911 revolution in China and ensuing warlord era; the struggle between the Kuomintang and communist forces in China prior to the Pacific War; the Pacific War; the Chinese Revolution of 1949; the American occupation of Japan; the Korean War; the dramatic growth of the Japanese economy; the cultural revolution in China; the rapproachment between China and the Western powers; and the new economic, political, and military balance in East Asia.

Reischauer, *The Japanese*
Fairbank, Reischauer & Craig, *East Asia: Tradition and Transformation*

HISTORY RR443: Honours Thesis **(0,5,0,4/0,5,0,4)**

During the fourth year, honours students will be required to undertake a research project or "honours thesis" extending over two terms, directed by a supervisor. Students will be required to speak on their research topic during the first term, and defend their findings in an oral examination at the end by the second semester.

HISTORY RR452: Russia in the Twentieth Century **(-,-,-,-/3,0,0,4)**

Pre-revolutionary Russia; the 1917 revolution; establishment and consolidation of Soviet power, NEP and its repercussions; Stalinization; Comintern; the evolution of Soviet foreign policy and the development of Soviet military power.

McLellan, *Russia: A History of the Soviet Period*
Treadgold, *20th Century Russia (5th Ed.)*

HISTORY RR471: The Pacific Rim and East Asia to 1905 **(3,0,0,4/-,-,-,-)**

This course examines the European exploration of the Pacific Basin, the establishment of European colonial empires throughout the region, the response of indigenous cultures to European contact, the growth of great power interests in the area, and the emergence of the modern state of Japan.

Dodge, *Islands and Empires: Western Impact on the Pacific*
Lower, *Ocean of Destiny*

ECONOMICS RR201: Economics for Engineers **(3,0,0,4/-,-,-,-)**

For second year Science and Engineering students.

An introduction to the methods of economics: the central problems of every economic society, the elements of supply and demand, theory of production and the firm, the concept and determination of national income, the monetary system, international trade and finance, and Canadian economic problems and policy. A number of topics of particular interest to engineers including time-value, present worth, rate of return comparison, depreciation and replacement are also treated.

Lipsey, Purvis, Sparks & Steiner, *Economics (5th Ed.)*

ECONOMICS RR213: Principles of Economics **(3,0,0,4/3,0,0,4)**

For second year Arts students.

This course amplifies the material covered in Economics RR201 and includes research projects calculated to enrich a principles course.

Lipsey, Purvis, Sparks & Steiner, *Economics (5th Ed.)*

COMMERCE RR203: Accounting **(3,0,0,4/3,0,0,4)**

For second year Arts students intending to pursue a degree in Administration at Le Collège militaire royal de Saint-Jean.

With Faculty Council permission, also available as an Arts option to other cadets.

Basic elements of accounting method. Analysis of financial transactions. The recognition of revenue and expense. Financial statement preparation. Recognition of profit. Introduction to analysis of funds flow, cost control and identification of costs, budgetary planning and control systems and accounting for corporations and partnerships.

Pyle, White, Larson & Zin, *Fundamental Accounting Principles (4th Cdn. Ed.)*

POLITICAL SCIENCE RR102: Introduction to Political Science **(-,-,-,-/3,0,0,4)**

An introduction to the basic concepts of political science.

Kahn, McNiven, MacKown, *An Introduction to Political Science.*
MacPherson, *The Real World of Democracy.*
Marx, *The Communist Manifesto.*

POLITICAL SCIENCE RR213: Introduction to International Politics **(3,0,0,4/3,0,0,4)**

A study of factors governing the international political system with emphasis on the development of Russo-American relations since 1945.

LaFeber, *America, Russia & The Cold War, 1945-1980 (4th Ed.)*
Stoessinger, *Crusaders & Pragmatists: Movers of Modern American Foreign Policy*
Nogee & Donaldson, *Soviet Foreign Policy Since W.W. II*
Holsti, *International Politics (4th Ed. 1983)*
Matthews, Rubinoff & Stein, *International Conflict and Conflict Management*

POLITICAL SCIENCE RR302: Crisis and War in International Relations **(-,-,-,-/3,0,0,4)**

A study of factors determining the nature, extent and control of international conflict through discussion of selected problems and issues in international politics.

Prerequisite: Political Science RR213 or consent of the Department

POLITICAL SCIENCE RR321: Irregular Warfare **(3,0,0,4/-,-,-,-)**

An examination of the uses of revolution, guerrilla warfare, subversion and terrorism as techniques for the disruption of national security.

Prerequisite: Political Science RR213 or consent of the Department.

POLITICAL SCIENCE RR343: Modern Strategic Thought: 1815-Present **(3,0,0,4/3,0,0,4)**

The first term examines the evolution of strategic thought from Clausewitz to 1945. In the second term specific problems of nuclear doctrine are studied.

Ropp, *Wars in the Modern World*
Earle, *Makers of Modern Strategy*
Freedman, *The Evolution of Nuclear Strategy*
International Institute for Strategic Studies, *Strategic Survey 1985-86*

POLITICAL SCIENCE RR371: The Politics of International Law (3,0,0,4/-,-,-,-)

This course will examine the history, theory, and formal sources of international law. The distinction between domestic law and international law will be considered and particular emphasis will be placed upon the distinct politcal environment in which international law operates. Consideration will be given to current international oraganizations. The course will focus upon specific subject areas of international law including the Law of the Sea, air and space law, international human rights law, the law of armed conflict and legal aspects of terrorism.

POLITICAL SCIENCE RR432: Arms Control (-,-,-,-/3,0,0,4)

An examination of the theory and practice of arms control in contemporary international politics. Topics discussed will include strategic arms limitation agreements, nuclear test ban treaties, and the control of chemical and bacteriological warfare.

Prerequisite: Political Science RR213 or consent of the Department.

Blacker & Duffy, *International Arms Control: Issues and Agreements (2nd Ed.)*
National Academy of Science, *Nuclear Arms Control: Background & Issues*
International Institute of Strategic Studies, *Strategic Survey 1985-86*

POLITICAL SCIENCE RR441: Canadian Foreign Policy (3,0,0,4/-,-,-,-)

An examination of important issues and developments in Canada's relations with the international community from 1914 to the present day.

Prerequisite: Political Science RR213 or consent of the Department.

Stacey, *Canada & The Age of Conflict, Vol. 1 & 2*
Holmes, *Canada: A Middle-Aged Power*
Hillmer & Stevenson, *Foremost Nation: Canadian Foreign Policy and A Changing World*

ELECTIVES

The following courses may be taken by students in third and fourth year as an Arts elective, and by students in second year Arts, Administration, or General Science as an extra course (with the approval of Faculty Council). These courses will be offered only on sufficient demand (four or more students).

HISTORY RR312: Armies and Society **(-,-,-,-/3,0,0,4)**

An examination of the military as a social and political phenomenon in various cultures: to what extent is the military 'a mirror of society'? to what extent have military organizations attempted to impose their values on the rest of society? Each term a particular culture or ideology is selected for investigation: communist, fascist, liberal-democratic or third world.

Offered on demand. Prerequisite: consent of the instructor.

HISTORY RR322: Armies and Politics in The Third World **(-,-,-,-/3,0,0,4)**

Why do the armed forces, or certain sectors of it, choose to intervene in politics? Why do they sometimes quickly return to the barracks, and at other times stay in power and create new, perhaps stable, regimes? The principal cases examined are Greece, Argentina, Egypt, Chile, Nigeria and Peru. Special attention is given to the influence of modernism and traditionalism upon the philosophy of the armed forces.

Offered on demand. Prerequisite: consent of the instructor.

Perlmutter, *The Military & Politics in Modern Times*
Bienen, *Armies and Parties in Africa*
Huntington, *The Soldier and The State*

Offered on demand. Prerequisite: consent of the instructor.

HISTORY RR331: Historiography and Methodology **(3,0,0,4/-,-,-,-)**

This course is designed to introduce students to research and writing techniques as well as the problems of historiography.

Offered on demand. Prerequisite: consent of the instructor.

Winks, *The Historian as Detective*
Davidson & Lytle, *After the Fact: The Art of Historical Detection*
Barker, *The Superhistorians*

HISTORY RR351: Russia Under the Romanovs **(3,0,0,4/-,-,-,-)**

A survey of the major economic, political and social developments during the Romanov dynasty which transformed Muscovy from a weak, backward, underdeveloped state to a significant European power. The course will touch upon the external forces which influenced Russia, and whether the country belonged properly to Europe and European values, or constitutes a separate civilization which could afford to be indifferent to the West. It will examine the factors which led to the 1905 uprisings and the Bolshevik takeover in 1917. Essentially, the course is intended to provide a basis for a better understanding of Russia's subsequent evolution under Soviet control, and its present world status.

Offered on demand. Prerequisite: consent of the instructor.

Riasanovsky, *A History of Russia (3rd Ed.)*

ECONOMICS RR311: The Canadian Economy **(3,0,0,4/-,-,-,-)**

An examination of contemporary economic issues in Canada; inflation, unemployment, immigration, the economic basis of nationalism, separatism, trade unionism, and the role of multi-national corporations.

Offered on demand. Prerequisite: consent of the instructor.

Kennedy & Dorosh, *Dateline Canada (2nd Ed.)*
Officer & Smith, *Issues in Canadian Economics*

ECONOMICS RR321: The Economics of Defence **(3,0,0,4/-,-,-,-)**

An examination of the implications of Canadian defence policy upon the Canadian economy, and the constraints placed by economic considerations.

Offered on demand. Prerequisite: consent of the instructor.

Hitch & McKean, *Economics of Defence in the Nuclear Age*

ECONOMICS RR332: Canadian Economic History **(-,-,-,-/3,0,0,4)**

This course examines the development of the Canadian economy to the present day. The roles of labour, capital and technology are analyzed in the light of modern growth theories.

Offered on demand. Prerequisite: consent of the instructor.

ECONOMICS RR341: Intermediate Microeconomic Theory **(3,0,0,4/-,-,-,-)**

Resource allocation under competitive and non-competitive market conditions. The analytics of prices, wages and rents in a market exchange economy. Private and public choice in both decentralized and centrally planned economies. The implications of economic management at the micro-level.

Offered on demand. Prerequisite: consent of the instructor.

Call & Hollahan, *Microeconomics (2nd Ed.)*

ECONOMICS RR352: Intermediate Macroeconomic Theory **(-,-,-,-/3,0,0,4)**

Theories of aggregate economic conduct. The determination of national income, employment, consumption, investment, inflation and economic growth. The study of economic policy at the macro-level.

Offered on demand. Prerequisite: consent of the instructor.

Chernoff, *Macroeconomics: Theory and Policy*

ECONOMICS RR361: Applied Business Finance **(3,0,0,4/-,-,-,-)**

This course is designed to provide students with a basic understanding of business finance. Topics included are: annuities, sinking funds, amortization of debt, bonds and bond discounting, residential and commercial mortgages, capitalized cost, and finally, an overviw of financial instruments most commonly used in business. Beyond the basic business applications, students will be exposed to government uses of annuities and sinking funds.

Offered on demand. Prerequisite: consent of the instructor.

ECONOMICS RR402: Labour Economics **(-,-,-,-/3,0,0,4)**

Using Canadian applications this course studies the labour supply and the determination of wages. Topics to be covered will include labour force participation, labour mobility, the role of unions, the changing composition of the workforce, trends in hours of work, unemployment, manpower policy and incomes policy.

Offered on demand. Prerequisite: consent of the instructor.

ECONOMICS RR412: Industrial Organization **(-,-,-,-/3,0,0,4)**

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

Offered on demand. Prerequisite: consent of the instructor.

Green, *Canadian Industrial Organization and Policy*

ECONOMICS RR422: Money and Banking **(-,-,-,-/3,0,0,4)**

The principles of money, credit creation and banking; organization, operation and control of the banking system; and the relationship between the quantity of money and the level of economic activity.

Offered on demand. Prerequisite: consent of the instructor.

Binhammer, *Money, Banking and the Canadian Financial System*

POLITICAL SCIENCE RR322: Issues in Canadian Politics (-,-,-,-/3,0,0,4)

This course will examine contemporary issues in Canadian politics. Topics discussed will include issues such as Quebec nationalism, northern sovereignty, western separatism, free trade, national energy policy, and senate reform.

Offered on demand. Prerequisite: consent of the instructor.

Whittington & Williams, *Canadian Politics in The 1980's. (Revised Edition)*
Gibbins, *Conflict and Unity: An Introduction to Canadian Political Life*

POLITICAL SCIENCE RR351: Civil Military Relations (3,0,0,4/-,-,-,-)

This course will examine some aspects of civil military relations. What are the constraints on the political/military relationship in the decision making process of established liberal democracies? What is the role of military organizations in the governing of countries with less well developed political cultures?

Offered on demand. Prerequisite: consent of the instructor.

POLITICAL SCIENCE RR361: Modern Political Thought (3,0,0,4/-,-,-,-)

Any examination of basic issues in western political thought including democracy, authority, legitimacy and dissent.

Offered on demand. Prerequisite: consent of the instructor.

Berki, *The History of Political Thought*
Bondanella (Ed), *The Prince*
Crocker, *Social Contract and Discourse on the Origin of Inequality*
Gamble, *An Introduction to Modern Social and Political Thought*

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF LITERATURE AND PHILOSOPHY

Associate Professor and Head of Department – M.S. Madoff, AB, PhD (On leave of absence 1986-87)

Assistant Professor — C.N. Ramkeesoon, BA, MA, PhD

Assistant Professor — P.S. Sri, BSc, MA, PhD

Assistant Professor — D.R. Tallentire, BSc, MA, PhD

ENGLISH RR103: Composition, Logic, 14-16th Century Literature, Utopian Literature **(3,1,0,4/3,1,0,4)**

For first year Science and Engineering students. Students considered weak in English composition will receive additional instructional emphasis upon composition.

Part I: Logic and Linguistics: Chaucer and Marlowe (First Semester).

This part of the course includes a review of the principles of clear and accurate expression and a study of works by Chaucer and Marlowe.

Two essays and other exercises are required from each student.

Norton & Green, *The Bare Essentials (Form B)*
Francis, *The History of English*
Holman, *A Handbook to Literature (4th Edition)*
Chaucer, *The Canterbury Tales (edited by Hieatt & Hieatt)*
Marlowe, *Doctor Faustus (edited by Jump)*

Part II: Utopian Literature (Second Semester).

In this part of the course, the student analyzes various literary forms of social criticism and examines the effect of ideas of social organizations on the individual citizen. Beginning with Plato and More, the student proceeds to other examples of Utopian thought, including the satire of Swift and several modern anti-Utopias (e.g., Zamiatin, Burgess).

Two essays are required from each student.

A selection of seven or eight texts will be chosen by the instructors from the following list:

Plato, *The Republic*
Shakespeare, *Coriolanus*
More, *Utopia*
Swift, *Gulliver's Travels*
Shelley, *Frankenstein*
Abbott, *Flatland*
Zamiatin, *We*
Huxley, *Brave New World*
Orwell, *1984*
Miller, *A Canticle for Leibowitz*
Burgess, *The Wanting Seed*

ENGLISH RR113: English Literature 1100-1900 **(3,0,0,4/3,0,0,4)**

Study of important literary works by major authors from the age of Chaucer to the Baroque occupies the first semester. Readings include medieval lyrics and ballads, selections from Chaucer's *Canterbury Tales,* mystery and morality plays, Mallory's *Morte d'Arthur,* the drama of Marlowe and Shakespeare, the poetry of the "Metaphysicals", Milton, and the Restoration arts.

In the second semester, important literary works by major authors from the Augustan Age to mid-twentieth century will be studied. Readings include the satires of Pope and Swift, poetry by Blake, the Romantics, and the Victorians, and the fiction of Conrad.

Students are required to write two main essays and shorter compositions.

Barrows, *Norton: Anthology of Poetry*
Holman, *A Handbook to Literature (4th Ed.)*
Chaucer, *Canterbury Tales: A Dual Language Edition*
Marlowe, *Doctor Faustus*
Shakespeare, *Hamlet*
Mallory, *Le Morte d'Arthur*
Swift, *Gulliver's Travels (Norton ed.)*
Conrad, *The Nigger of the Narcissus*
Hopkins, *Poems & Prose (Gardner ed.)*

ENGLISH RR123: Composition, Logic and Linguistics **(2,0,0,2/2,0,0,2)**

This course provides review of the principles of clear expression through intensive, regular practice in applying them. It encourages clarity of thought and facility of expression by introducing students to the methods of logic and by opening a study of the English language over its historical development. Students will practice composition during the class periods, and no out of class assignments will be given.

Norton & Green, *The Bare Essentials (Form B)*
Francis, *History of English*

ENGLISH RR231: British and European Literature **(3,0,0,4/-,-,-,-)**

A survey of nineteenth and twentieth century British and European literature, its origins and connections. Comparative studies of short fiction, poetry and drama.

Two essays will be required.

Students are encouraged to take original approaches and to practice self-expression with formal precision of statement. Wide background reading is stimulated and required.

David & Lecker, *Introduction to Fiction*
Allison, Carr, & Eastman, *Masterpieces of the Drama*
Barrows, *Norton: Anthology of Poetry*

ENGLISH RR242: Canadian and American Literature **(-,-,-,-/3,0,0,4)**

A study of themes, forms, and methods adopted by English-speaking authors in Canada and the United States, from the early nineteenth century to the present, with particular attention to poetry, short fiction and drama.

Two essays will be required.

David & Lecker, *Introduction to Fiction*
Allison, Carr & Eastman, *Masterpieces of the Drama*
Reaney, *The Donnellys*
Barrow, *Norton: Anthology of Poetry*
Klinck & Watters, *Canadian Anthology*

ELECTIVES

The following courses may be taken by students in third and fourth years as an Arts elective, and by students in second year Arts, Administration, or General Science as an extra course (with the approval of Faculty Council). These courses will be offered only on sufficient demand (normally four or more students).

ENGLISH RR301: Seminar in Canadian Literature **(3,0,0,4/-,-,-,-)**

A study of the themes, models, techniques, and problems of the English writer in Canada during the twentieth century. Wide background reading is stimulated and required. Québecois works may be studied in translation.

A term paper and a seminar are required from each student.

Offered on demand. Prerequisite: consent of the instructor.

Ross, *As For Me and My House*
Tremblay, *Les Belles Soeurs*
Lawrence, *The Diviners*
Watson, *The Double Hook*
Davies, *World of Wonders*
Blais, *Mad Shadows*
MacLennan, *Barometer Rising*
Geddes & Bruce, *Fifteen Canadian Poets plus Five*

ENGLISH RR312: Literature of War in the Modern Age **(-,-,-,-/3,0,0,4)**

This seminar course is a study of prose and poetry reflecting the impact of modern mass warfare on the warrior and his society from the mid-nineteenth century to the present. Changing conceptions of military honour and morality in war are examined in their historical context.

One section of seminar leadership and one term essay are required.

Offered on demand. Prerequisite: consent of the instructor.

Homer, *Iliad*
Mallory, *Le Morte d'Arthur*
Crane, *The Red Badge of Courage*
Remarque, *All Quiet on the Western Front*
Brecht, *Mother Courage*
Jones, *In Parenthesis*
Vonnegut, *Slaughterhouse Five*
McDonaugh, *Platoon Leader*

LITERATURE RR412: Introduction to the Literature and Culture of French Canada **(-,-,-,-/3,0,0,4)**

For second year Arts, third and fourth year students.

This course is given entirely in French. Candidates must express themselves fluently and write their second language competently. The study of French-Canadian writers will be carried out through the reading and critical evaluation of selected passages from the earliest writers to those of the modern days.

Offered on demand. Prerequisite: consent of the instructor.

Lapierre, *Quebec - Hier et Aujourd'hui*
LeBel & Paquette, *Le Quebec par ses Textes Litteraires (1534-1976)*

PHILOSOPHY RR311: Introduction to Philosophy **(3,0,0,4/-,-,-,-)**

This course is a thematic approach to philosophy, ancient and modern. It will attemp to bridge the apparent divisions between the sciences and the humanities, the east and the west. Scientific and literary works will often be used to illuminate abstract philosophical problems.

A term paper and a seminar are required from each student, in addition to the final examination.

Offered on demand. Prerequisite: consent of the instructor.

Bambrough, *The Philosophy of Aristotle*
Plato, *The Republic*
Lawton & Bishop, *Living Philosophy*
Wolff, *Ten Great Works of Philosophy*

PHILOSOPHY RR422: Prospects of Philosophy **(-,-,-,-/3,0,0,4)**

This course focuses on philosophical questions that are rooted in concrete and often profoundly perplexing experiences. It highlights the crucial role of imagination as well as of reason in human affairs and explores topics ranging from existentialism to zen, evolutionism to relativity.

A term paper and one or two seminars will be required from each student.

Offered on demand. Prerequisite: Philosophy RR311 or consent of the instructor.

Abelson, Friquegnon, and Lockwood, *The Philosophical Imagination*
Huxley, *The Perennial Philosophy*
Kaufmann (Ed), *Existentialism: From Dostoevsky to Sartre*
Franck (Ed), *Zen & Zen Classics: Selections from R.H. Blyth*
Moscaro (Trans), *The Bhagavad Gita*
Capra, *The Turning Point*

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF MATHEMATICS

Professor and Head of the Department – G.M. Lancaster, BSc, PhD

Professor – P. Smart, BSc, BEd, MEd, MPA, PhD

Professor – M.J. Wilmut, ndc, BSc, MA, PhD

Associate Professor – F. Milinazzo, BSc, PhD

Associate Professor — R.C. Snell, BSc, MSc, PhD

Associate Professor — W.W. Wolfe, BSc, MSc, PhD

Associate Professor — S.D. Wray, BSc, BSc (Hons.), MSc, PhD

Special Lecturer — Captain D.L. Christensen, BSc

MATHEMATICS RR103: Calculus and Analytic Geometry (3,2,0,4/3,2,0,4)

For first year Arts students.

An introduction to the calculus of one and two variables, including geometric vectors; the mathematics of finance. The emphasis is on non-science applications.

Bittinger, *Calculus, A Modelling Approach (2nd Ed.)*
Ayres, *Mathematics of Finance*

MATHEMATICS RR113: Calculus and Linear Algebra (5,3,0,5/5,2,0,5)

For first year Science and Engineering students.

This course includes the normal topics of a first year calculus course and selected topics from elementary linear algebra. Topics from both areas will be selected in each semester.

Algebra. sets, relations, and functions: vector algebra with applications to geometry in two and three dimensions; determinants; and complex numbers.

Calculus. An introductory course in differential and integral calculus, including differentiation of algebraic, trigonometric, and other elementary functions; related rates; slopes, maxima and minima, and inflection points; curve sketching, the differential; the definite integral and applications to areas , volumes, arc length, surfaces, and other physical problems; simple separable differential equations; polar co-ordinates and parametric equations; techniques of integration. Indeterminate forms. Improper integrals. Hyperbolic functions and partial fractions are introduced as the need arises in the calculus.

Leithold, *The Calculus with Analytic Geometry, Part 1, 2 & 3 (5th Ed.)*

MATHEMATICS RR203: Finite Mathematics, Probability and Statistics **(3,2,0,4/3,2,0,4)**

For second year Arts students.

Selected topics from linear algebra, probability, game theory, linear programming, network and graph theory.

Statistical measures and description of data; discrete and continuous probability distributions; sampling theory; t-distribution.

Introductory statistics for data analysis, including estimation theory with confidence intervals; hypothesis testing on mean, difference of means and variance; Type I and Type II errors; goodness-of-fit test and test for independence; regression and correlation; non-parametric tests.

Bittinger & Crown, *Finite Mathematics, A Modelling Approach (2nd Ed.)*
Walpole, *Introduction to Statistics (3rd Ed.)*

MATHEMATICS RR223: Calculus, Vector Calculus, and Differential Equations **(3,1,0,3/3,1,0,3)**

For General Science students and most Engineering students.

Partial differentiation with applications to maxima and minima in several variables, indeterminate forms, multiple integration, vector analysis including Green's, divergence and Stokes's Theorems, and infinite series.

Differential equations of first order, linear equations of higher order with constant coefficients, applications.

Thomas & Finney, *Calculus and Analytic Geometry (6th Ed.)*
Zill, *A First Course in Differential Equations with Applications (2nd Ed.)*

MATHEMATICS RR233: Calculus, Vector Calculus, and Differential Equations **(4,1,0,4/4,1,0,4)**

Recommended for those students who plan on choosing Honours Science, Engineering Physics, or Electrical Engineering programs of study.

This course will include all of the topics of Mathematics RR223 but with more rigorous treatment.

This course may be taken only with the approval of the Department of Mathematics.

Thomas & Finney, *Calculus and Analytic Geometry (6th Ed.)*
Zill, *A First Course in Differential Equations with Applications (3rd Ed.)*

MATHEMATICS RR241: Probability and Statistics **(2½,½,0,3/-,-,-,-)**

For second year Engineering students and General Science students; required for third year Physics and Oceanography and Physics and Computer Science students.

Basic concepts of probability, including discrete and continuous probability distributions, joint distributions, expectation. Introductory statistics for data analysis, including estimation theory with confidence intervals, hypothesis tests on mean and variance, significance and power curves, goodness-of-fit tests, and contingency tables.

Walpole, *Introduction to Statistics (3rd Ed.)*

MATHEMATICS RR252: Linear Algebra **(-,-,-,-/2,1,0,2)**

For second year Engineering students; optional for General Science students; and recommended for third year Physics and Oceanography students.

Matrices; systems of linear equations; determinants; abstract vector spaces; linear transformations; co-ordinatization of vectors; eigenvectors; diagonalization; Cayley-Hamilton theorem.

Anton, *Elementary Linear Algebra (4rd Ed.)*

MATHEMATICS RR301: Differential Equations **(3,0,0,4/-,-,-,-)**

Laplace Transform methods for solving ordinary differential equations; series solutions; solution of partial differential equations using separation of variables; the principle of super-position and Fourier series; applications to problems such as wave motion, heat transfer, gravitational potential, control theory, and Sturm-Liouville systems.

Prerequisite: Mathematics RR223, RR252 or consent of the Department.

Spiegel, *Fourier Analysis*
O'Neil, *Advanced Engineering Mathematics*

MATHEMATICS RR401: Complex Analysis **(3,0,0,4/-,-,-,-)**

Differentiability of functions of a complex variable; analytic functions; Cauchy-Riemann equations; contour integration; Cauchy's Theorem and formulae; maximum modulus theorem; Liouville's theorem; Taylor and Laurent series; singularities; residue theorem and applications; elementary conformal mappings.

Prerequisite: Mathematics RR301 or consent of the Department.

O'Neil, *Advanced Engineering Mathematics*

MATHEMATICS RR411: Signal Processing I **(3,0,0,4/-,-,-,-)**

Frequency domain signal analysis; linear systems: Discrete systems including digital filter design and the Fast Fourier Transform.

Prerequisite: Mathematics RR301, or consent of the Department.

Stanley, *Digital Signal Processing*

MATHEMATICS RR432: Advanced Applied Mathematics **(-,-,-,-/3,0,0,4)**

This course is a continuation of Math 301. The emphasis is on analytic techniques used in the analysis of solutions of ordinary and partial differential equations. Among the topics discussed will be Fourier analysis, transform methods, asymptotic analysis and perturbation methods for ordinary differential equations. Special attention will be given to physically relevant applications. It is strongly recommended that students enrolled in this course have taken Mathematics RR401.

Prerequisite: Mathematics RR301 and consent of the Department.

Butkov, *Mathematical Physics*

ELECTIVES

The following courses may be taken by students in third and fourth years as a Science elective. These courses will only be offered on sufficient demand (normally four or more students).

MATHEMATICS RR422: Signal Processing II **(-,-,-,-/3,0,0,4)**

Fourier Transforms, review of probability theory, functions of random variables; classifications and analysis of stochastic process; signal detection.

Offered on demand. Prerequisite: consent of the Department.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY

Assistant Professor and Head of Department — Major G.D. Resch, CD, BA, MA

Assistant Professor — Major A.T. Malcolm, CD, pcsc, asc BA, MA, PhD

MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY RR111: Psychology of the Individual (3,0,0,4/-,-,-,-)

An introduction of those areas of human development and behaviour that are relevant to future leaders' needs and interests. The course commences with an exposure to the fundamental topics and elementary psychological vocabulary necessary for the understanding of the rationale of individual differences. These topics are then related to certain developmental and social psychological concepts with a view to understanding human behaviour in situations where there is a requirement to influence the behaviour of others. To this end, elementary topics of perception, learning, motivation, intelligence, personality, adjustment, and maturation will be related to concepts of social structure, individual socialization, attitude formation, and interpersonal processes.

Papalia & Olds, *Psychology*

MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY RR212: Social Psychology (-,-,-,-/3,0,0,4)

The basic objective is to introduce and acquaint the student with the broad field of social psychology. The course is designed to provide a fundamental understanding of human social behaviour. Emphasis is placed on the types and degrees of social influences on individuals by groups. An awareness of the dynamic components of social behaviour will contribute to the development of effective leadership and management principles and help the student to prepare for a career as a military officer. Topics will be selected from social perception, norms, attitudes and persuasion, conformity, obedience, groups and group behaviour, aggression, violence and conflict, and social power. In addition, professional officer development and leadership theories and approaches will be presented.

Prerequsite: Military Leadership and Applied Psychology RR111 or consent of the Department.

Wrightsman & Deaux, *Social Psychology in the Eighties (4th Ed.)*

MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY RR311: Leadership and Management Theories and Techniques (3,0,0,4/-,-,-,-)

This course is designed to familiarize students with leadership theories and techniques as well as the basic management skills required of military leaders. It also aims at developing elementary skills in interviewing and in the analysis of group phenomena. Exercises deal with group dynamics, the leadership process, human relations, supervisory skills, communication and non-directive interviewing, problem analysis, conflict management and decision making.

Prerequisite: Military Leadership and Applied Psychology RR111 or consent of the Department.

Whetten & Cameron, *Developing Management Skills*

MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY RR402:
Challenges to Leadership **(-,-,-,-/3,0,0,4)**

This course is designed to provide students with an opportunity to develop an awareness and understanding of some of the issues, concerns and challenges they will have to face and deal with as military officers. Proceeding from a comprehensive review of military professionalism and ethics, the course examines some of the ethical dilemma which must be confronted by the military officer. Ethical decision making, assessing the ethical climate, institutional pressures, ethical codes and the role of the military personnel system in supporting the military ethos are topics studied in detail. Leadership challenges posed by the nature of continuous operations as well as presentations, contemporary issues in military leadership are examined. Organizational leadership, development and change and the attainment of institutional excellence are studied. Finally, an understanding of advanced communications skills is provided through the medium of a media workshop.

Prerequisite: Military Leadership and Applied Psychology RR111 or consent of the Department.

Taylor & Rosenbach, *Military Leadership: In Pursuit of Excellence*
Wakin, *War, Morality and the Military Profession*
Rosenbach & Taylor, *Contemporary Issues in Leadership*

ELECTIVES

The following courses may be taken by students in third or fourth year as an Arts elective. These courses will only be offered on sufficient demand (normally four or more students).

MILITARY LEADERSHIP AND APPLIED PSYCHOLOGY RR412:
Applied Military Psychology **(-,-,-,-/3,0,0,4)**

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 selections, training, man-weapon interface, cohesion, morale, hostile environments, combat behaviour, and psychological warfare.

Offered on demand. Prerequisite: Military Leadership and Applied Psychology RR212 or consent of the instructor.

Henderson, *Cohesion: The Human Elelent in Combat*
Kellet, *Combat Motivation: The Behaviour of Soldiers in Battle*

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

OCEANOGRAPHY

The undergraduate degrees in Physics and Oceanography, and the postgraduate diploma, BSc and MSc in Oceanography and Acoustics are all interdisciplinary. As there is no department of Oceanography, the curricula are under the guidance of the Oceanography Curriculum Committee, chaired by the Dean of Science and Engineering.

INSTRUCTORS	DEPARTMENT
Professor — M.G. Robinson, BSc, PhD	Chemistry
Associate Professor — D.P. Krauel, ndc, BSc, MSc, PhD	Physics
Associate Professor — W.T. MacFarlane, BA, MSc, PhD	Physics
Associate Professor — K.J. Reimer, BSc, MSc, PhD	Chemistry
Assistant Professor — J.M. Gilliland, BSc, MA, PhD	Physics
Assistant Professor — R.F. Marsden, BSc, PhD	Physics

The descriptions of named Oeanography courses follow, but there are a number of associated courses which are to be found under the department offering them, e.g. Applied Optics and Remote Sensing, Acoustics, Signal Processing, Applied Fluid Mechanics, Modern Analytical and Oceanographic Methods, etc.

OCEANOGRAPHY RR301: Descriptive Oceanography (3,0,0,4/-,-,-,-)

This course gives a general introduction to the oceans. The principal topics covered are: a survey of the physical properties of sea water; the distribution of salinity, temperature, etc., and their seasonal variations; the circulation of the oceans; energy budgets: oceanographic instrumentation and measurement techniques; and underwater sound velocity distributions as a result of temperature and salinity variations.

Pickard & Emery, *Descriptive Physical Oceanography: An Introduction (4th SI Ed.)*
Knauss, *Introduction to Physical Oceanography*
Beer, *Environmental Oceanography*

OCEANOGRAPHY RR321: Biological Oceanography (2,0,1,3/-,-,-,-)

This course is an introductory course which deals with the marine ecosystem. Topics include: the chemical and physical characteristics of sea water; the ecosystem and the basis of life and its development; principles of taxonomy and the marine biota and finally marine productivity. This final topic introduces the factors affecting primary productivity, global plant production, fish production and fisheries biology.

Russell & Hunter, *Aquatic Productivity (1st Ed.)*
Sumich, *Introduction to the Biology of Marine Life (2nd Ed.)*
Canadian Rubles Company, *Handbook of Chemistry and Physics*

OCEANOGRAPHY RR331: Chemical Oceanography (3,0,2,4/-,-,-,-)

Chemical composition and properties of sea water. Geochemical cycles, carbonate, silicon, etc. Dissolved and suspended organic material. Dissolved gases, pH and alkalinity. Nutrients. Trace metals and sediments. Corrosion and fouling. Commercial extraction of chemicals from the ocean.

In the laboratory program, an attempt is made to duplicate the collection of samples in an actual oceanography study. Students collect samples from stations in nearby marine areas on a routine basis and analyze them using current analytical methods. The analysis covers both Oceanography RR321 and Oceanography RR331. The data are interpreted in terms of the seasonal changes in the chemistry and biology of a marine ecosystem.

Riley & Chester, *Introduction to Marine Chemistry*
Horne, *Marine Chemistry*
Strickland & Parsons, *A Practical Handbook of Seawater Analysis (2nd Ed.)*
Broecker, *Chemical Oceanography*

OCEANOGRAPHY RR352: Oceanographic Methods **(-,-,-,-/2,0,4,4)**

The principles covered in Oceanography RR301, RR321, and RR331 are applied in practical field and laboratory studies of the physics, biology and chemistry of local waters. Sea time will be available aboard both the College launch, the Tayut and the MV Strickland (in cooperation with the University of Victoria). Modern instrumentation will be employed in the measurement of current; temperature; salinity; oxygen, nutrient, trace metal concentrations; marine pollutants, etc. Data reduction and interpretation will be required. The student must submit project report following the format outlined in the honours thesis regulations.

Prerequisite: Oceanography RR301, RR321, RR331

Harris, *Quantitative Chemical Analysis*
Strickland & Parsons, *A Practical Handbook of Seawater Analysis (2nd Ed.)*

OCEANOGRAPHY RR401: Geophysical and Geological Oceanography **(3,0,0,4/-,-,-,-)**

This course gives a general introduction to the physics of the earth within the framework of global plate tectonics. Following a discussion of the plate tectonic hypothesis and the differences between ocean floors and continental surfaces, the main topics are seismology; gravimetry and the interpretation of gravity anomalies; geodosy; geomagnetism and paleomagnetism; geothermal studies; marine geophysics and geophysical prospecting.

Prerequisite: Physics RR332, Mathematics RR301*

Garland, *Introduction to Geophysics - Mantle, Core & Crust (2nd Ed.)*
Dobrin, *Introduction to Geophysical Prospecting (3rd Ed.)*

*(*May be taken concurrently.)*

OCEANOGRAPHY RR442: Practical Marine Oceanography (-,-,-,-/0,0,3,1)

Field experience is obtained in a local coastal environment. Measurement of current, temperature, salinity, etc. are taken. Data reduction, interpretation, and a final report are required.

Prerequisite: Oceanography RR301 or consent of the Department.

OCEANOGRAPHY RR451: Introduction to Dynamic Oceanography (3,0,0,4/-,-,-,-)

The equations of motion and continuity are developed and applied to hydrostatics, geostrophic and wind-driven currents, thermohaline circulation, waves, tides, and estuarine circulation.

Prerequisite: Oceanography RR301 or consent of the Department.

Pond & Pickard, *Introductory Dynamical Oceanography (2nd Ed.)*
LeMehaute, *An Introduction to Hydrodynamics & Water Waves*
Gill, *Atmosphere - Ocean Dynamics*

OCEANOGRAPHY RR462: Advanced Dynamic Oceanography (-,-,-,-/3,0,0,4)

Selected topics in turbulence, turbulent diffusion, waves, design of experiments, and analysis of data.

Prerequisites: Oceanography RR451, Mathematics RR301.

Pond & Pickard, *Introductory Dynamical Oceanography (2nd Ed.)*
LeMehaute, *An Introduction to Hydrodynamics & Water Waves*
Gill, *Atmosphere – Ocean Dynamics*

OCEANOGRAPHY RR473: Oceanography Project (0,0,2,1/0,0,2,1)

Fourth year students in the Honours (course) program, working singly or in syndicates, work on an experimental or theoretical project in the general area of oceanography with members of the staff of the Department of Chemistry, Engineering, Mathematics or Physics. The student must submit and defend a project report according to thesis regulations but of much narrower scope.

The topic must be approved by Faculty Council.

OCEANOGRAPHY RR483: Oceanography Thesis Project (0,1,4,4/0,1,4,4)

Fourth year students in the Honours (Thesis) program, working singly or in syndicates, work on an experimental or theoretical project in the general area of oceanography with members of the staff of the Department of Chemistry, Engineering, Mathematics or Physics. The student must submit and defend a thesis according to thesis regulations.

The topic must be approved by Faculty Council.

OCEANOGRAPHY RR492: Oceanography Seminar (-,-,-,-/0,0,2,0)

A series of lectures on various topics in oceanography, presented by guest speakers, members of the college staff, and by students in the Honours program.

ELECTIVES

The following courses may be taken by students in the third or fourth years as a Science elective. These courses will only be offered on sufficient demand (normally four or more students).

OCEANOGRAPHY RR412: Aeronomy (-,-,-,-/3,0,0,4)

This course deals principally with the atmosphere and its interactions with the oceans. Major topics covered are: the composition and properties of the atmosphere; comparison of dynamics of the atmosphere to the dynamics of the ocean, thermodynamics of the atmosphere; water vapour and cloud formation; solar and terrestrial radiation; transfer processes, including air-sea-ice interaction; satellites, remote sensing and interpretation of satellite imagery; magnetic fields and ionospheric physics; instruments, observations and their presentation; synoptic patterns; and military application.

Offered on demand. Prerequisite: consent of the Department.

Wallace & Hobbs, *Atmospheric Science*
Iribarne & Cho, *Atmospheric Physics (1980)*

OCEANOGRAPHY RR431: Practical Physical Oceanograhpy 0,0,3,1/-,-,-,-)

This course usually takes the form of a field project. Project topics are chosen in consultation with the instructor. Examples of acceptable topics: the measurement of seawater properties; bottom sampling; seismic experiments; coastal gravimetry; geomagnetic studies, etc. Data reduction, interpretation and a final report are required.

Offered on demand. Prerequisite: Oceanography RR301 or consent of the Department.

OCEANOGRAPHY RR422: Geochemistry of Marine Sediments (-,-,-,-/2,0,0,3)

A review of the chemical and mineralogical composition of marine sediments; the interaction of sediments and the water column; adsorption and desorption processes; recent developments in sediment research including the behaviour of hydrothermal vents; ocean mining.

Offered on demand. Prerequisite: Oceanography RR331 or consent of the Department.

Note: Details of individual courses offered at RMC and CMR should be obtained from their respective calendars.

DEPARTMENT OF PHYSICS

Professor and Dean of Science and Engineering — H.J. Duffus, ndc, BA, BASc, DPhil, PEng

Associate Professor and Head of Department — D.P. Krauel, ndc, BSc, MSc, PhD

Associate Professor — W.T. MacFarlane, BA, MSc, PhD

Associate Professor — M.J. Press, BSc, MSc, PhD

Associate Professor — P.J. Schurer, BSc, MSc, PhD

Assistant Professor — J.M. Gilliland, BSc, MA, PhD

Assistant Professor – R.F. Marsden, rmc, BSc, PhD

Special Lecturer – Major G.J. Ousey, CD, BSc, MSc

Special Lecturer – J.L. LaCombe, BSc, MSc, PhD

PHYSICS RR103: Mechanics **(1½,½0,2/1½,½,0,2)**

For all first year students taking the Science and Engineering program of studies.

An introduction to the principles of physics through the study of mechanics. In the first semester the course includes the following topics: vectors; Newtonian kinematics; motion along a straight line, in a plane, and in three dimensions; friction; work; mechanical energy; conservation of energy; statics.

In the second semester topics include: dynamics; collisions; conservation of momentum; simple harmonic motion; Hooke's Law; the simple pendulum; rotational dynamics; moment of inertia; rotational energy; introduction to special relativity; law of universal gravitation.

Kepes, *Introduction to Physics for Scientists & Engineers*
Halliday & Resnick, *Physics - Part I and II (3rd Ed.)*
Baird, *Experimentation: An Introduction to Measurement Theory & Experimental Design*

PHYSICS RR113: Optics and Electricity **(2½,½,0,3/2½,½,0,3)**

For all first year students taking the Science and Engineering program of studies.

An introduction to the principles of physics through the study of optics and electricity. In the first semester the course includes the following topics: nature and propagation of light; reflection; refraction; interference; diffraction; polarization; mirrors; lenses; optical instruments.

In the second semester the following topics are covered: electric charge and matter; Coulomb's Law; electric field; electrical potential; capacitance; electric current; Ohm's Law; DC circuits; Kirchhoff's Laws; concepts of magnetic field and Lorentz' force.

Halliday & Resnick, *Physics - Part I & II (3rd Ed.)*
Baird, *Experimention: An Introduction to Measurement Theory & Experimental Design*

EXPERIMENTAL PHYSICS **(0,0,3,0,/0,0,3,0)**

For all first year students taking the Science and Engineering program of studies.

Standing in this course will be included in the standing obtained in Physics RR103 and Physics RR113. The laboratory is a series of experiments which illustrate and supplement the work discussed in the lecture courses, and provide training in methods of measurement and experiment design.

PHYSICS RR203: AC Circuits and Electromagnetism **(2,½,0,2½/2,½,0,2½)**

For all second year students taking the Science or Engineering program of studies.

In the first semester the course is an introduction to AC circuit analysis and includes the following topics: resistance; capacitance; inductance; sinusoidal steady state; complex numbers; Kirchhoff's Laws; power; series and parallel resonance; mesh current analysis; nodal analysis; Thevenin's Theorem; Norton's Theorem; transients.

Electromagnetism is covered in the second semester and includes the following topics: review of electrostatics; Gauss' Theorem; dielectrics; polarization; magnetic field interactions in free space and in matter; Ampere's Law; Biot-Savard Law; Faraday's Law; Maxwell's equations.

Prerequisites: Physics RR103, RR113, Mathematics RR113.

Lorrain & Corson, *Electromagnetism*
Edminster, *Electric Circuits (2nd Ed.) (Schaums Outline*
Edminister, *Theory & Problems of Electromagnetics (Schaums Outline)*
Mix & Schmitt, *Circuit Analysis for Engineers*

PHYSICS RR211: Vibrations and Waves **(2,½,0,2½/-,-,-,-)**

For all second year students taking the Science or Engineering program of studies.

The course includes the following topics: undamped and damped harmonic motion; forced harmonic motion; resonance; coupled oscillators; normal modes; travelling waves; superposition; dispersion; phase and group velocities; potential and kinetic energy in an elastic wave; Doppler effect; shock waves; introduction to advanced problems in dynamics.

Prerequisites: Physics RR103, RR113, Mathematics RR113.

Main, *Vibrations and Waves in Physics (2nd Ed.)*
Tipler, *Modern Physics*

PHYSICS RR221: Elementary Mechanics **(3,0,0,4/-,-,-,-)**

For second year students taking the Arts or Administration programs of study.

This course provides an introduction to Newtonian mechanics for students without a strong mathematical background. Concepts studied include: mass, length, time, force, torque, velocity, acceleration, Newton's Laws of Motion, the gravitational field, work, energy, power, simple machines, impulse, momentum, and rotational motion. Considerable emphasis is placed on the conservation of energy and momentum. Some contrasts are drawn between Newtonian and relativistic views of space and time.

Mulligan, *Introductory College Physics*
Epstein & Hewitt, *Thinking Physics - Part I & II*

PHYSICS RR232: Elementary Electricity and Magnetism **(-,-,-,-/3,0,0,4)**

For second year students taking the Arts or Administration programs of study.

This course provides an introduction to the fundamentals of electricity and magnetism for students without a strong mathematical background. Concepts studied include: the structure of matter, electric fields, electrical potential, potential differences, capacitance, resistance, current flow, simple DC and AC circuits, magnetic fields, electromagnetic properties of materials. Aspects of electromagnetic waves, optics, and acoustics of particular concern to the Canadian Forces may be studied as time permits.

Mulligan, *Introductory College Physics*
Epstein & Hewitt, *Thinking Physics - Part I & II*

EXPERIMENTAL PHYSICS **(0,0,3,0/0,0,3,0)**

For all students taking the Arts or Administration program of studies.

Standing in this course will be included in the standing obtained in Physics RR221 and Physics RR232.

The laboratory is a series of experiments which illustrate and supplement the work discussed in the lecture courses, and provide training in methods of measurement and experiment design.

PHYSICS RR252: Modern Physics **(-,-,-,-/2,½,0,2½)**

For all second year students taking the Science or Engineering program of studies.

The course is an introduction to the elementary concepts in quantum mechanics as developed by Einstein, Planck, Bohr, Heisenberg, Schrodinger and others, and includes the following topics: the particle concept of electromagnetic radiation and photon interactions; the Bohr model of the hydrogen atom, energy levels and bound states; introduction to Schrodinger's wave mechanics for particles; probabilistic views and applications in one dimension with step potentials.

Prerequisites: Physics RR103, RR113, Mathematics RR113.

Tipler, *Modern Physics*

EXPERIMENTAL PHYSICS **(0,0,3,0/0,0,3,0)**

For all second year students taking the Science or Engineering program of studies.

Standing in this course will be included in the standing obtained in Physics RR203, Physics RR211 and Physics RR252.

The laboratory is a series of experiments which illustrate and supplement the work discussed in the lecture courses, and provide training in methods of measurement and experiment design.

PHYSICS RR332: Electromagnetic Wave Propagation **(-,-,-,-/3,0,3,5)**

This course deals with the creation, propagation, reflection and absorption of electromagnetic waves in homogeneous isotropic or layered media, and by transmission lines, wave guides, antennae, and cavities.

Prerequisites: Physics RR203, RR211.

Edminster, *Theory & Problems of Electromagnetics (Schaums Outline)*
Brown, Sharpe, Hughes & Post, *Lines, Waves & Antennas (2nd Ed.)*

PHYSICS RR352: Intermediate Mechanics **(-,-,-,-/3,0,0,4)**

Methods of handling systems and rigid body dynamics in three dimensions are studied, including the use of LaGrange's equations, the Hamiltonian, and accelerated coordinate frame equations. The principles of Gauss, D'Alembert and Fermat are studied. Application of computers and numerical techniques are emphasized as well as the traditional methods of mathematical vector analysis.

Prerequisites: Physics RR103, RR211, RR252, Mathematics RR223 or RR233.

Fowels, *Analytical Mechanics (4th Ed.)*

PHYSICS RR362: Acoustics **(-,-,-,-/3,0,0,4)**

The Acoustic Wave and Sonar equations are studied as they per;tain to the creation, propagation, reflection, refraction and absorption of acoustic waves in homogeneous and horizontally layered media and in the real oceans. Sound signatures with applications to exporation geophysics, acoustic emmission and silencing; and, in particular, underwater submarine detection and surveillance are discussed.

Prerequisites: Physics RR211, Mathematics RR301.

Kinsler & Frey, *Fundamentals of Acoustics (3nd Ed.)*
Urick, *Principles of Underwater Sound (3rd Ed.)*
Seto, *Acoustics (Schaum's Outline)*

PHYSICS RR371: Electronics and Microcomputers **(3,0,3,5/-,-,-,-)**

The course can be broken into three main sections. I. Analog electronics; theory of operation of diodes and transistors and typical solid state circuits, operational amplifiers, analog control theory. II. Digital electronics; gates, counters, registers, ROM, RAM, multiplexers, analog-digital and digital-analog conversion. III. Introduction to microcomputers; architecture; timing; input-output; interfacing; simple programming; digital control.

The laboratory work deals with experiments on analog (25%) and digital (25%) electronics and with experiments involving simple programming, input-output and timing on single-board microcomputers (50%).

Prerequisite: Physics RR203, RR252.

Diefenderfer, *Principles of Electronic Instrumentation (2nd Ed.)*
Leventhal & Walsh, *Microcomputer Experimentation with the Int. SDK-85*

PHYSICS RR401: Experimental Physics **(0,0,3,1/-,-,-,-)**

For all fourth year Physics and Computer Science and Physics and Oceanography students as well as for those General Science students who choose Physics RR441.

A course of experiments which illustrate and supplement the work discussed in the lecture courses.

PHYSICS RR421: Quantum Mechanics **(3,0,0,4/-,-,-,-)**

This course deals with the quantum theory of the electronic structure of the atom. Applications to optical and solid state devices are discussed, e.g. lasers, magnetometers, fibre optics, integrated circuits, spectroscopy, and remote sensing.

Prerequisites: Physics RR332, RR352.

Matthews, *Introduction to Quantum Mechanics (3rd Ed.)*

PHYSICS RR432: Applied Nuclear Physics **(-,-,-,-/3,0,0,4)**

This course gives a broad overview of nuclear physics and its applications. Topics discussed include: the structure of matter, elementary forces, elementary particles, nuclear composition and binding energy, nuclear structure, radioactivity, Rutherford scattering, nuclear hazards, radiation monitoring, nuclear reactors, and radiation shielding.

Prerequisites: Physics RR421 recommended, Mathematics RR301.

Littlefield & Thorley, *Atomic and Nuclear Physics, An Introduction (3rd Ed. 1979)*
Nero, *A Guidebook to Nuclear Physics*
Tsoulfanidis, *Measurement and Detection of Radiation*

PHYSICS RR441: Solid State Physics **(3,0,0,4/-,-,-,-)**

A discussion of basic properties of the solid state of matter and applications to electronics and computers. Symmetry in crystals, X-ray analysis, crystal defects, lattice dynamics (phonons), free electron theory, energy bands, p-n junction, magnetic and dielectric properties, super conductivity.

Prerequisites: Physics RR203, RR211.

Kittel, *Introduction to the Solid State (5th Ed.)*
Rosenberg, *The Solid State (2nd Ed.)*

ELECTIVES

The following courses may be taken by students in the third and fourth years as a Science elective. These courses will only be offered on sufficient demand (normally four or more students).

PHYSICS RR342: Applied Optics and Remote Sensing **(-,-,-,-/3,0,0,4)**

A discussion of the practical aspects of the production, transmission and detection of electromagnetic radiation. Topics include the fundamental concepts behind lasers, radar, synthetic aperture radar and holography. The principles of remote sensing, fiber optic communications, optical imaging, and image analysis are discussed in addition to practical considerations such as spatial and temporal resolution and transmission windows in the atmosphere and ocean.

Offered on demand. Prerequisite: Physics RR332* and consent of the Department.

(*May be taken consurrently)

Castleman, *Digital Image Processing*
Hecht & Zajac, *Optics*
Lintz & Simonett, *Remote Sensing of the Environment*

Note: Details of individual coures offered at RMC or CMR should be obtained from their respective calendars.

DEPARTMENT OF SECOND LANGUAGE TRAINING

Senior Teacher and Head of Department – A. Hadley, BA, DipEd

Language Teacher	– A. Allard, BA, MA
Language Teacher	– N. Arnold, BA, DipEd
Language Teacher	– M. Connor, BA
Language Teacher	– L. Hof, BA, BSc, MA, MEd
Language Teacher	– F. Nantais, BA, BacEd
Language Teacher	– J. Robichaud, BA, BAEd, Licence (théologie)
Language Teacher	– M. Savard, BA, MA
Language Teacher	– A. Tétreault, BA
Language Teacher	– J. van Campen, BA, BSW, MA

In accordance with Department of National Defence policy that bilingualism become a quality of officership, Royal Roads Military College offers training in French as a second language to all students who have not reached the level of *integral bilingualism*.

Upon entry, students are tested to establish their ability in the second language. Tests are administered in Listening, Speaking, Reading and Writing. The results give each student a second language profile which indicates a level of ability measured on a five point scale in each area tested. Scores of at least 4 in listening and speaking, with a total of at least 14 signify the integral bilingualism level. The latter is a permanent profile and students reaching this level do not need to be retested during their military career. Students who reach the integral level are exempt from attending further second language training.

Based on their language profiles students are assigned to small, homogeneous classes where they work at their own level towards the integral level.

Five periods per week instruction are given during the Academic Year. In addition students attend ten weeks of intensive SLT at the conclusion of their First Year.

Instruction is based upon the communicative approach to second language learning. The objective is to enable future officers to function in French in the carrying out of their professional duties.

The measure of individual bilingualism in the Canadian Military Colleges is based on a fundamental concept of accountability-responsibility. Each student must show regular and adequate individual progress in communicative competence on a yearly basis. Failure to do so will result in action being taken by a Progress Review Board.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

DRILL

Officer in Charge of Drill — Lt(N) P.J. Macauley, BSc

Drill Sergeant Major — Master Warrant Officer L.P. Baumgarten, CD

Drill Instructor — Sergeant J.O. Boucher, CD

Drill Instructor — Petty Officer 2nd Class W.J. Rudolph, CD

Bandmaster — Petty Officer 1st Class T.R. Vickery, CD

The objectives of the Drill program are to teach the officer cadets the fundamentals of drill as required in the Canadian Forces, to develop discipline and *esprit de corps*, to stimulate the power of command through mutual instruction, and to promote leadership through responsibility in handling groups of officer cadets.

Reference: A-PD-201-000/PT-000 — Canadian Forces Manual of Drill and Ceremonial.

DRILL RR103 **(0,0,1,0/0,0,1,0)**

Includes rifle, foot, and ceremonial drill.

DRILL RR203 **(0,0,1,0/0,0,1,0)**

In addition to rifle, foot, and ceremonial drill, this course includes sword drill and mutual instruction.

DRILL RR303 **(0,0,1,0/0,0,1,0)**

Includes rifle, foot, and colours drill, as well as ceremonial and mutual instruction.

DRILL RR403 **(0,0,1,0/0,0,1,0)**

Reviews of all phases of drill previously taught.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.

PHYSICAL EDUCATION AND ATHLETICS

Director of Athletics — Captain H.G. Pronk CD, BSc
Physical Education Officer – Captain R.E. Kinnee, CD, BSc
Chief Instructor — Master Warrant Officer W.E. Sears, CD
Physical Education and Recreation Instructors:

— Sergeant K.P. Straight, CD
— Sergeant J.P.Y. Tremblay, CD
— Master Corporal J.L. Joyce

The aim of the Physical Education Program is to instil an understanding of the theory and philosophy of physical education, recreation and athletics; to develop leadership qualities; and to instil habits necessary for maintaining a healthy standard of personal fitness that will enhance the service person's career. The program is divided into an instructional phase, an intra-mural (recreational) phase and a representative team sports phase. A progressive four-year program designed for the Canadian Military Colleges is followed.

Anderson, *Stretching*
Stewart, *Everybody's Fitness Book*

PHYSICAL EDUCATION RR103 **(0,0,2,0/0,0,2,0)**

The instructional phase of this course covers personal conditioning activities, combatives (wrestling) and aquatics. Physiological fitness tests are conducted to further assess individual capabilities and improvement.

In the recreational phase of this course, practical participation in major team games is introduced, with participation compulsory in at least three of the college intramural sports. In conjunction with participation as players, cadets are also involved actively in officiating various sports.

PHYSICAL EDUCATION RR203 **(0,0,2,0/0,0,2,0)**

The instructional phase of this course branches into a core elective program. Electives offered include soccer, hockey, basketball, volleyball, aquatics, orienteering, softball, rugby, touch football, and how to conduct a warm-up. The high level of instructor ability allows the cadet to develop his potential in each activity. An example is the aquatic program and, although all cadets must attain the Military Swim Standard, instruction to RLSS Bronze Cross level is available.

The recreational phase is a continuation of PE RR103 by maintenance of compulsory participation in three intra-mural sports (two of which must be different from first year). Cadets are again active in officiating. As well, participation in the organization and conduct of various special events is introduced.

PHYSICAL EDUCATION RR303 **(0,0,2,0/0,0,2,0)**

The instructional phase continues the comprehensive elective program, offering instruction in basketball, badminton, squash, tennis, and aquatics. Cadets choose sports in which they may pursue further personal development of skills, and are offered the opportunity to earn an RLSS Bronze Medallion or Cross in aquatics.

The recreational phase continues the compulsory participation in three intramural sports (one of which must be new to the cadet). Cadets also become involved in the leadership and management of the various recreation clubs at the college, ranging in scope from a camera club to a scuba club. Approximately fifteen such clubs operate at Royal Roads.

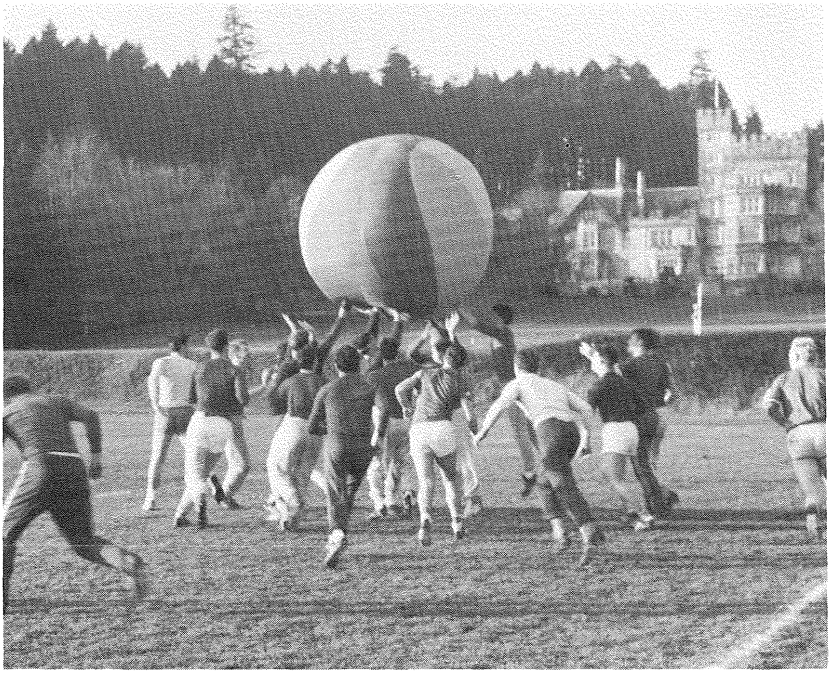
PHYSICAL EDUCATION RR403 **(0,0,2,0/0,0,2,0)**

The instructional phase electives offered are badminton, squash, curling, tennis, bowling, golf, volleyball, and aquatics. Cadets are introduced to the "life-time" sport skills that may be part of their life style for most of their career. As well, specific instruction is given related to post graduation career responsibilities and duties as a unit Sports Officer.

The recreational phase is a continuation of that programmed in PE RR303.

Note: Details of individual courses offered at RMC or CMR should be obtained from their respective calendars.


Royal Roads
Royal Roads



UNDERGRADUATE STUDY
ACADEMIC REGULATIONS

DEFINITIONS

Student: a member of the Canadian Forces attending Royal Roads Military College to study for a baccalaureate degree. Such students may be of the following types:

a. **Officer Cadet:** a student attending RRMC under the Regular Officer Training Plan (ROTP), the Reserve Entry Training Plan (RETP), or the University Training Plan — Men (UTPM).

b. **Officer:** a student attending RRMC under the University Training Plan — Officers (UTPO).

c. **Special Student:** other members of the Canadian Forces taking one or more courses at RRMC on a part-time basis. The academic regulations which follow do not apply to special students except where specifically noted.

Program of Study: a group of courses comprising a year's program of studies, e.g., Mechanical Engineering, Physics and Oceanography, etc.

Subject: a division of the program of studies, e.g., physics, history, etc.

Course: a series of lectures and/or laboratory sessions in a given subject, designated by a number and for which an annual or semester assessment must be provided, e.g., Chemistry RR103, Oceanography RR401, etc.

Mandatory Course: a course required to be taken by a student to fulfill the requirements of an approved program of study.

Elective: a course selected by the student from several designated offerings as opposed to a mandatory course to fulfill requirements of an approved program of study.

Extra Course: a course which is not a required part of a program of study but which, under certain circumstances, may be taken in addition to the regular requirements of the program of study.

Failed-Credit Standing: standing granted on the recommendation of the Faculty Board, and with the approval of the Faculty Council and the Commandant, in a failed course for the purpose of allowing a student who has failed one course to pass the year. The actual final grade earned will be recorded on the transcript with the annotation "failed-credit" (FC), and will remain a failure for the purpose of determining whether or not work prerequisite to other courses has been completed.

Carry a Course: when so recommended by the Faculty Board and approved by the Faculty Council and the Commandant, a student carries a course — after failing this course in the previous semester or year — by taking the failed course (or an authorized equivalent) again in the first subsequent academic semester or year in which the course is scheduled, together with the normal academic workload of that semester or year. The grade accorded on the first attempt will be recorded on the student's transcript with the notation "Failed — but permitted to carry". The semester or year will not be cleared until the carried course has been passed. A student may not carry a course from one CMC to another.

Credit: a course at RRMC would be assigned four units of credit for a semester's work (thirteen weeks of instruction) if it corresponded to approximately one-fifth of a normal Canadian university academic semester work load in a faculty of Arts and Science. Most courses at RRMC carry four units of credit in a semester, some may be heavier and carry as much as five units of credit in a semester, and others may be lighter (one, two or three units of credit in a semester).

Supplemental Examination: an examination set upon the recommendation of the Faculty Board, and with the approval of Faculty Council and the Commandant, in a course in which a student has failed. A pass in a supplemental examination may be accepted by Faculty Board to remove the deficiency of the failure. If the failed course is required to complete the work of a year, the year is failed until pass standing is obtained in that course.

DURATION OF THE PROGRAM OF STUDIES

1. For students starting their studies at the Royal Military College of Canada, or at the Royal Roads Military College, the duration of the program of studies is four years of two terms or semesters each; for students starting their studies at le Collège militaire royal de Saint-Jean, it is four or five years of two terms or semesters each, depending upon whether the student enters at the first year or at the preparatory year level.
2. The years in the program of studies for students are designated as follows: preparatory year (at le Collège militaire royal de Saint-Jean only); the first, second, third, and fourth years (all three colleges). Entrance to the Preparatory Year and to the First Year requires completion of the Secondary school programs as outlined as admission requirements in the appropriate Calendar.
3. Students successfully completing the second year at Royal Roads Military College and not entering a Bachelor of Science, or Bachelor of Arts program at RRMC will normally complete their final two years at either RMC or CMR.

DEGREES

4. a) A degree of Bachelor of Arts (Honours Military and Strategic Studies), Bachelor of Arts (Military and Strategic Studies), Bachelor of Science (Honours Physics and Oceanography), Bachelor of Science (Honours Physics and Computer Science), Bachelor of Science (Physics and Oceanography), Bachelor of Science (Physics and Computer Science), or Bachelor of Science (General) as appropriate shall be granted by Royal Roads Military College to a student who has successfully completed the final year at that institution.

   b) The degree of Doctor of Laws (LLD) *honoris causa*, Doctor of Science (DSc) *honoris causa*, and Doctor of Military Science (DScMil) *honoris causa* shall be granted by Royal Roads Military College to those who are worthy of the honour.

5. Students who complete the final year with first class honours standing will have their degree scripts inscribed "With Distinction" (see Academic Regulations 25 and 29).

Certificate of Qualification

6a. At the end of the second year a Certificate of Qualification may be granted by Royal Roads Military College to any student who has successfully completed the first and second year of their programs of studies at that institution.

6b. At the end of the first and third year a Certificate of Qualification may be granted by Royal Roads Military College to any student who has successfully completed with first class honours without supplementals that year of their programs of studies at that institution.

6c. Upon completion of any graduate short course, such as the METOC Short Course in Oceanography, a certificate of qualification may be granted to any student who has successfully completed the course.

RRMC PROGRAMS OF STUDY

General Limitations

7. The Canadian Forces reserve the right to limit enrolment in any given program of studies at any Canadian Military College, or to select the location at which a program of studies will be offered.

The First Year

8. All students registered in First Year are required to take all the courses prescribed in the calendar under "First Year - Degrees in Arts or Administration" or "First Year - Degrees in Science or Engineering". Students may transfer into First Year Arts following completion of the first semester of the First Year Science or Engineering program.

The Second Year

9a. All students registered in the Second Year Arts or Administration program of study are required to take the courses prescribed in the calendar under "Second Year - Degrees in Arts or Administration".

9b. All students registered in a Second Year Science or Engineering program of study are required to take courses prescribed in the calendar under "Second Year - General Degrees in Science" or "Second Year - Engineering/Honours Science Degrees". A student may not normally transfer into Second Year Arts on the completion of the first semester.

9c. Students who have completed the Science or Engineering program of study in the Second Year may transfer to the Third Year Arts program for the Military and Strategic Studies general or honours degree program, or to a Third Year Arts degree program at the other Canadian Military Colleges. The department(s) in which the student becomes registered may require that a specified course be taken instead of an elective in the Third or Fourth Year of the respective Arts degree program.

Third and Fourth Years

10. Programs of study offered are Honours Miliary and Strategic Studies, General Military and Strategic Studies, General Science, Physics and Oceanography (Combined Major), Physics and Computer Science (Combined Major), Honours (Thesis) and Honours (Course) in Physics and Oceanography, and Honours (Course) in Physics and Computer Science. Details of courses are laid down in the current calendar.

11. Admission into the degree programs completed at RRMC requires the satisfactory completion of second year at any CMC with the following prerequisites:

— **General or Honours Degree in Military and Strategic Studies**
any CMC program of studies - Arts, Administration, Science or Engineering.

— **General Degree in Science**
any CMC Science or Engineering program of study which includes a course in Mathematics RR241, or its equivalent.

— **Combined Major in Physics and Oceanography**
any CMC Science or Engineering program of study which includes a course in Mathematics RR241 or its equivalent. Engineering RR232 and Mathematics RR252, or their equivalents, are recommended courses. A weighted grade average of at least 55 percent is required in mathematics, science, and engineering courses.

— **Combined Major in Physics and Computer Science**
any CMC Science or Engineering program of study which includes a course in Mathematics RR241 and Mathematics RR252, or their equivalents. A weighted grade average of at least 55 percent is required in mathematics, science, and engineering courses.

12a. Candidates for a degree in General Military and Strategic Studies must generally take a semester course loading of 20 units of credit. Electives may be selected from any Third or Fourth Year level Arts or Science courses for which the student has the prerequisite if timetabling permits. A minimum of two electives must be taken from among the Department of History and Political Economy offerings and at least one must be from outside these disciplines.

12b. Candidates for a degree in General Science must normally take a minimum semester course loading of 20 units of credit and pass a minimum semester load of 16 units of credit. A minimum of 80 units of credit in 300 and 400 level courses must be obtained in four semesters. Eight units of credit must be in MLAP, a minimum of 12 or a maximum of 16 units of credit must be in Arts electives and the remainder must be in Science courses.

12c. Candidates for a combined major degree in Physics and Oceanography must normally take a minimum semester load of 24 units of credit. A total of 107 units of credit in four semesters is required. A minimum of three Arts electives must be taken during the third and fourth years and two science electives worth at least 7 units of credit must be taken in the foruth year.

12d. Candidates for a combined major degree in Physics and Computer Science must normally take a minimum semester load of 20 units of credit. A total of 104 credits in four semesters is required. A minimum of three Arts electives and two science electives worth at least 7 units of credit must be taken during the third and fourth years.

12e. Elective courses selected by students must be approved by the departments concerned and the Registrar.

Honours Degree Programs

13a. Admission into the Honours Degree program in Military and Strategic Studies requires completion of third year Military and Strategic Studies with a minimum of second class honours. Students who have achieved less than second class honours may be admitted to the Honours program on a probationary basis with Faculty Council approval.

13b. Admission into the Honours Degree program in Physics and Oceanography requires completion of "Third Year - Combined Major in Physics and Oceanography" with a weighted average of at least 66 percent in third year science and engineering subjects. Students who have achieved less than the required average may be admitted to the Honours program on a probationary basis with Faculty Council approval.

13c. Admission into the Honours Degree program in Physics and Computer Science requires completion of "Third Year - Combined Major in Physics and Computer Science" with a weighted average of at least 66 percent in third year science and engineering subjects. Students who have achieved less than the required average may be admitted to the Honours program on a probationary basis with Faculty Council approval.

13d. A student wishing to enter any honours program must apply in writing to the Dean concerned, no later than the first week of May in the Third Year. A candidate accepted into a thesis honour program will have a detailed thesis proposal submitted to Faculty Council in accordance with thesis regulations not later than the first day of October in the Fourth Year.

13e. To be graduated with a thesis honours degree a candidate must normally maintain an overall weighted average of 66 percent or better throughout the fourth year of studies.

Extra Courses

14. In certain years of some programs of study a student may, with the permission of Faculty Council, register in an extra course over and above those required for the given program of study. In this case the extra course must be designated in advance and may not be counted for standing and for calculating the student's overall average. A grade will be recorded unless a student formally withdraws from the extra course by application to the Registrar (see Academic Regulation 20). Credit for extra courses taken in the First or Second Years will not normally be granted in lieu of credit for elective courses in the Third and Fourth Years.

Limitation of Selection of Third Year Program of Study

15. A student who has been recommended not to take a certain Program of Study by a Canadian Military College on the completion of the Second Year may be refused permission to register in that Program of Study in the Third Year.

DRILL AND PHYSICAL EDUCATION

16. Courses in drill and physical education must be taken by all students in all years.

SECOND LANGUAGE TRAINING

17. Courses in second language training must be taken by all students in all years.

CONTINUITY OF STUDY

18. Under normal circumstances a student may not postpone a semester or a year of study.

CHANGES IN REGISTRATION (RRMC)

19. Any change in registration in a program of study requires the permission of Faculty Council. Within a program of study, the courses selected by any student may not be altered later than one month after the beginning of the academic year without the permission of Faculty Council.

20. Changes in registration in a program of study or in a course will be considered by Faculty Council up to the end of the seventh week from the beginning of lectures without academic penalty. A student withdrawing from a course subsequent to that date will have failed attempt (FA) entered on the record. A grade of FA will not be included in the student's weighted average, and if the course is an extra course, for academic regulation purposes it will not count as a failed course. Withdrawal at any time without academic penalty may be allowed in cases of illness or other compelling reasons.

21. Students may not normally transfer from one program of study to another without having completed full prerequisite standing in the courses of the program of study they wish to enter.

ATTENDANCE

22a. Students are required to attend all classes unless placed on the voluntary attendance list by the Principal. Students may be placed on the voluntary attendance list if they have successfully completed the previous year of studies with a weighted average of 66 percent and having no failures. Individual instructor approval must be obtained prior to missing a specific lecture or tutorial.

22b. A student who does not attend classes through illness or any other cause must complete term work and all assignments to the satisfaction of the department concerned.

RESTRICTION OF PRIVILEGES

23. A student who fails to maintain a satisfactory academic standing may be subject to such restrictions of privilege and/or academic assistance as may be recommended by the Faculty Council and approved by the Commandant.

24. A special student who fails to maintain a satisfactory academic standing in a given course may be withdrawn from that course upon the recommendation of the head of the department concerned, and the approval of Faculty Council.

ACADEMIC STANDING

Grades

25. Final grades in all courses will be reported as follows:

First Class Honours	(75% and over)	grade A
Second Class Honours	(66 to 74%)	grade B
Third Class Honours	(60 to 65%)	grade C
Pass	(50 to 59%)	grade D
Failure	(40 to 49%)	grade F
Serious Failure	(less than 40%)	grade FF
Failed Attempt	(final examination not written)	grade FA
Failed Credit		grade FC

Pass Standing

26. To be granted pass standing a student must obtain:

i) a final weighted average over the year's work of at least D;

ii) a final grade of at least D in each course of the program of study other than second language training courses except that a student may be passed with failed-credit standing in one course. However, with the permission of Faculty Council, a student who fails to obtain a final grade of D in one subject may carry that course or an authorized equivalent into the subsequent year;

iii) a satisfactory standard in Second Language Training;

iv) a satisfactory standard in Physical Training and Drill; and

(v) a favourable report in Officer-Like Qualities.

27. To be allowed to continue into the second semester of a year, a student should normally obtain at least a final grade of D in each one semester course. However, with the permission of Faculty Council, a student who fails to obtain a final grade of D in one subject in the first semester may carry that subject into the subsequent semester or year.

Aegrotat Standing

28. Aegrotat standing may be granted by the Faculty Council, upon the recommendation of the head of the department concerned, to any student or special student who has been unable to write one or more of the final examinations but who has achieved a satisfactory standing in the course or courses concerned.

Grade Average and Rank in Class

29. At the end of each year a student's numerical weighted grade average will be calculated based on all courses taken excluding any extra courses. The calculation is the sum of the products of the numerical final grade in each course and the units of credit assigned to that course divided by the total number of units of credit carried.

FINAL EXAMINATIONS

30. Final examinations in each course will be held at the end of each semester at dates and times to be specified in the examination timetable, except for courses that extend over two semesters (year courses) for which the examination at the end of the second semester is normally the final examination. With the permission of Faculty Council, the requirement for a final examination in third and fourth year courses may be waived.

31. Students taking a year course who, at the end of the first semester, wish to transfer into a program of study for which the second semester of the year course is not required may petition the Faculty Council for permission to write a final examination in the first semester's work of the year course and to retain credit for the work thus completed.

32. A student or special student may write examinations in either English or French, except that the examinations in language courses must be written in the language concerned.

33a. A student or special student may be refused permission by Faculty Council on the recommendation of the department concerned to write the final examination in a course in the following circumstances:

i) The student has neglected to do a substantial proportion of the written assignments in a course of which these are an essential feature, or the student has attended insufficiently in a course in which class participation is a necessity.

ii) The student has failed to make satisfactory standing in the laboratory work in any course involving practical work in a laboratory. Results in laboratory work normally will be announced by the department concerned by the last day of classes in the semester.

33b. In those courses where a term work mark comprises a part of the final course grade and students may be debarred from writing final examinations if the term work has not been completed to the satisfaction of the department, instructors shall advise students in writing at the beginning of the semester of the standard required in term assignments and of the circumstances under which they may be denied permission to write final examinations.

34. All instructors shall submit final grades each semester in each course in which a final examination is written. In each course, the relative contribution to the final grade of class assignments, tests, laboratory work, and the final examination will be determined by the instructor concerned, in consultation with the head of the department.

35. Final grades in courses are granted by the Faculty Board, subject to confirmation by the Faculty Council.

SUPPLEMENTAL EXAMINATIONS

36. A student may be granted the privilege of writing supplemental examinations only for courses in which final examinations have been written and for which final grades of less than D was received, provided that not more than two courses have been failed, or not more than three courses if one of the failed courses carries not more than one unit of credit, and the student's weighted grade average over the first semester's, or the year's work, in his program of study is D or better.

37. In those courses where the final grade is not exclusively the final examination mark, the mark obtained on the supplemental examination will normally be used to replace only that of the final examination and the weighting shall not be less than that assigned to the final examination. However, the weight assigned to the supplemental examination mark should not count for less than 50%.

38. To obtain a pass standing in a failed course, a student must obtain a final course grade of D or better, normally including previous term work but not including the final examination mark which is replaced by the supplemental examination mark.

39. Supplemental examinations shall be written at dates and times to be specified by Faculty Council and shall normally be written within three weeks of the completion of final examinations. Supplemental examinations in second language training courses are not offered.

40. Marks obtained in supplemental examinations may not be used to advance a student's academic grade average for the semester or year.

41. With the consent of Faculty Council, and under extenuating circumstances, a special student may write a supplemental examination.

FAILURE OF A YEAR

42. A student shall fail his year if:
    - i) the student's overall grade average for the year is less than D; or
    - ii) the student fails in more than two courses and is ineligible to write supplemental examinations under the conditions of Academic Regulation 36; or
    - iii) after writing a supplemental examination, the student has failed to achieve a pass standing in that course and is not granted a failed-credit standing or is not allowed to carry a failed course; or
    - iv) the student fails a course that the student has been permitted to carry.

REPEATING A YEAR

43a. A student who has failed a year but who has indicated sufficient military and academic potential to succeed at a Canadian Military College may repeat the year at the student's own expense.

43b. A student may repeat a year only if authorized by NDHQ on the recommendation of the Faculty Council and the Commandant.

43c. A student permitted to repeat a year must carry the equivalent work load of the student's full Program of Study. Except as noted in Academic Regulation 43(d), a student permitted to repeat must repeat the entire year including any courses, or their equivalent, passed in the first attempt.

43d. A student who fails a year as a result of failing the work in the first semester to the degree that the student is not permitted for academic reasons to enter the second semester, may be permitted to repeat the first semester at the student's own expense.

43e. A student may be permitted to repeat a year only once during the student's entire program of studies and must do so at the first opportunity.

43f. A student may be permitted to repeat any year, including the Fourth Year.

43g. A student may be permitted to repeat the Second Year in Engineering if the student has failed to qualify for Engineering as required by Academic Regulations.

WITHDRAWAL

44. A student who fails in more than 50 percent of the units of credit for final grades in a semester shall normally be required to withdraw.

45a. A student who fails a semester or year, having previously failed a semester or year, must withdraw.

45b. A student who fails a course that the student has been allowed to carry shall normally be required to withdraw.

46. A cadet who, in the opinion of the staff, fails to develop the necessary officer-like qualities will, on the approval of the Commandant, be required to withdraw.

APPEALS AND PETITIONS

47. A student with a complaint or grievance which is academic in nature should communicate that concern to the instructor, Head of Department and/or Dean of the faculty involved. If the matter remains unresolved in this informal process, a formal petition to the Faculty Council can be initiated.

48. Formal petitions to the Faculty Council must be made in writing on the form available from the Office of the Registrar. Normally, petitions will only be heard if submitted within ninety days of the event or academic decision giving rise to the appeal. For more specific information and other principles governing student appeals, the Registrar, as Secretary to the Faculty Council, should be consulted.

ACADEMIC MISCONDUCT

49. **Cheating:** This includes but is not limited to dishonest or attempted dishonest conduct at tests or examinations in which use is made of books, notes, diagrams or other aids excluding those authorized by the examiner. It includes communicating with others for the purpose of obtaining information, copying from the work of others and purposely exposing or conveying information to other students who are taking the test or examination.

50. **Plagiarism:** This includes, but is not limited to, the presentation or submission of the work of another person, without citation or credits, as the student's own work.

    Plagiarism is a form of academic dishonesty. Scholarship rests upon examining and referring to the thoughts and writings of others. A large part of the work done at the undergraduate level must involve the handling at second hand of ideas and material originally conceived or made accessible by others. There is a difference, however, between the use of an acknowledged restatement of such ideas and material after intelligent and critical assimilation and their unacknowledged, literal reproduction in the guise of new and original work. The latter amounts to plagiarism, whether it takes the specific form of verbatim and unacknowledged copying or appears in other forms, such as the use of commercially prepared essays in place of a student's own work or the fraudulent manipulation of laboratory processes in order to achieve desired results. Offences of this kind may occur in many different ways and circumstances in different disciplines. Substantial plagiarism exists when there is no recognition given to the author for phrases and sentences incorporated in an essay. Complete plagiarism exists when a whole essay is copied from an author or composed by another person and presented as original work. At the undergraduate level, fair treatment of these offences entails consideration of the contingent factors, requiring the flexible exercise of equal justice at all levels from the individual instructor upwards. Each instructor shall carefully define what constitutes plagiarism in the context of his particular course at the beginning of the term.

51. **Penalties:** Cheating and plagiarism as forms of academic dishonesty are considered serious offences at RRMC. The minimum penalty for a student found to have plagiarized by a member of Faculty will be a zero for the plagiarized submission. An officer cadet accused of cheating or plagiarism may be charged under the Code of College Conduct or the National Defence Act. An officer cadet found guilty of cheating or plagiarism may be expelled from the College.

GRADUATE STUDY
GENERAL REQUIREMENTS

Royal Roads Military College offers postgraduate study programs leading to a diploma or the degrees of BSc, MSc(Course) and MSc (Honours) to serving and reserve Commissioned Officers of the Canadian Armed Forces and to civilian employees of the Federal Government.

The following General Regulations specify the minimum academic requirements for these programs.

Policies and procedures governing postgraduate training are presented in CFAO 9-33. Selection of officer candidates will be made by NDHQ.

Academic Admission Requirements and Definitions

Decisions on academic admissibility are made on the recommendation of the Graduate Studies Committee, and with the approval of Faculty Council.

All persons already possessing a degree who take any RRMC courses, whether postgraduate or undergraduate, and whether for degree credit or not, will register as **graduate students.**

Students are registered as **Regular Graduate Students, Probationary Graduate Students** or **Special Graduate Students.**

A Regular Graduate Student is a candidate who aspires to a diploma or graduate degree and has been given evidence of capacity for postgraduate work acceptable to the major department, and to the Graduate Studies Committee.

A **Probationary Graduate Student** is a candidate who aspires to a diploma or graduate degree and who is acceptable on probation to the Graduate Studies Committee. Normally he/she will be required to complete prerequisite undergraduate or other work at a satisfactory standard in order to qualify for admission as a regular graduate student. When qualification for such admission is recommended to the Graduate Studies Committee by the major department concerned, admission will be considered on the same or equivalent basis as for direct admission as a Regular Graduate Student.

A **Special Graduate Student** is a graduate from a recognized university who is not a candidate for a diploma or degree, but who wishes to take one or more courses at either the postgraduate or undergraduate level or both. Permission of the major department concerned must be obtained prior to admission.

For direct admission as a Regular Graduate Student to courses of study, an applicant must hold a science or engineering degree from a recognized university with at least Second Class Honours and a sound background in Mathematics and Physics.

Programs of Studies

a. **Diploma program in Oceanography**

Entrance requirement: a degree in Science or Engineering with a sound background in Mathematics and Physics.

Minimum residence: 2 sequential semesters; last day to start, 15 Aug.

Course content: Undergraduate oceanography core courses in the Physics and Oceanography Degree program plus electives, totalling at least 16 credits each semester. (See Table 14 page 79).

b. **BSc in Oceanography and Acoustics**

Entrance requirement: a degree in Science or Engineering with a sound background in Mathematics and Physics.

Minimum residence: 2 sequential semesters; last date to start, 15 Aug.

Course content: Undergraduate oceanography core courses in the Physics and Oceanography Degree program plus a graduate course in acoustics plus electives, totalling at least 16 credits each semester.

c. **MSc in Oceanography and Acoustics (Course)**

Entrance requirements: a degree in Science or Engineering with undergraduate specialization in physical oceanography.

Minimum residence: 12 consecutive months (1 year posting); last date to start, 1 July.

Course content: A minimum of five full 2 semester postgraduate courses including not more than one 2 semester or two 1 semester undergraduate courses and a project totalling at least 16 credits each semester.

d. **MSc in Oceanography and Acoustics (Thesis)**

Entrance requirement: a degree in Science and Engineering with a sound background in Mathematics and Physics.

Minumum residence: 12 consecutive months (1 year posting); last date to start, 1 July.

Normal residence: 2 years.

Course content: Three full (2 semester) postgraduate courses and a thesis.

The minimum RRMC content required for the awarding of an RRMC postgraduate degree or diploma is work equivalent to one full academic year under the RRMC faculty.

Registration

All graduate students will register every term, before starting the term. Each graduate student is responsible for ensuring his/her own registration in each term. An outline of the Registration procedure is available to graduate students at the Registrar's office. All registration are provisional until approved by the Graduate Studies Committee.

Academic and Military Responsibilities

The Dean of Science and Engineering is responsible to the Principal for the control and direction of all academic matters affecting postgraduate studies and in-service short courses. In academic matters, the graduate student is responsible directly to the Head of the major department, and thence to the Dean of Science and Engineering. For military purposes, command of all officers posted to RRMC on Postgraduate Training is vested in the Vice-Commandant.

Full-time graduate students may be required to perform laboratory, tutorial and minor military duties but not marking, for up to six hours a week.

A Postgraduate Class Senior will be appointed annually by the Vice Commandant in consultation with the Dean of Science and Engineering. The Class Senior shall be responsible to the Vice-Commandant for general control and deportment of the graduate students, and shall also provide liaison between the academic and military wings and the graduate students.

Academic Regulations

a. Standing

A candidate for a diploma or a BSc in Oceanography and Acoustics must achieve a minimum standing of D or higher in each "Required Course".

A candidate for an MSc degree must achieve a minimum standing of Second Class Honours or higher in **each** "Required Course". A "Required Course" is considered failed if a lesser mark is obtained. This regulation applies only to MSc candidates registered as Regular Graduate Students.

b. Required Courses

A "Required Course" is defined as a course required for the degree sought. This definition is intended to include all courses required for the program, no matter whether in fields considered major or minor to the program, and no matter whether graduate or undergraduate.

Information recorded on the candidate's term registration forms and marks transcript will indicate which courses taken are "Required Courses", and which (if any) are extra courses not required for the program. Extra courses are graded on the pass standard applied to undergraduate courses. The decision as to whether each course taken is required or extra to the program is made by the Graduate Studies Committee at the time of registration, but may be changed at a later date on their recommendation.

c. Supplemental Examinations

Candidates for the diploma or BSc will be governed by Academic Regulations 36 to 41 inclusive regarding supplemental examinations.

In the case of a candidate for an MSc degree who has failed (i.e. achieved less than Second Class standing) in a "Required Course", his/her Department may petition Faculty Council through the Dean of Science and Engineering for permission to assign a supplemental examination in the failed "Required Course".

Normally a total of only one supplemental examination will be permitted each MSc candidate in his/her entire program of "Required Courses" for a graduate degree. If this supplemental examination is failed (i.e. achievement of less than Second Class standing), the candidate will be required to withdraw from the postgraduate program in which he/she is then registered.

Grades for individual courses will be accepted from Departments as numerical grades, and will be recorded on the candidate's transcript as letter grades by the Registrar.

No grades, whether numerical or letter, will be assigned to theses credited toward postgraduate degrees. An accepted thesis will be recorded in the transcript only as "Accepted'.

The progress of graduate students will be reviewed at regular intervals by the Graduate Studies Committee. Candidates who fail to maintain satisfactory levels of performance will be recommended by the Graduate Studies Committee to Faculty Council for withdrawal from their respective programs of postgraduate studies.

Supervision

A supervisory committee for each MSc candidate undertaking a thesis shall be named by the Graduate Studies Committee and shall consist of three members, the head of the major department or his designate, the supervisor and one member from outside the major department but in a related field. The supervisor shall be the committee chairman.

The role of the committee shall be:

a. To ensure that reasonable progress is being made by the student in his/her research and course work. The supervisor shall submit a report on this progress to the Graduate Studies Committee at the end of each semester;

b. To approve the thesis topic and scope of work;

c. To recommend to the Graduate Studies Committee appropriate action in light of the student's progress;

d. To determine the acceptability of the thesis for examination; and

e. To examine the thesis and conduct a final oral examination of the candidate on the thesis.

Examination and Acceptance of Thesis

A graduate student wishing to be considered as a candidate for receiving an MSc degree involving a thesis at a particular Convocation shall so inform the head of his/her major department in writing no later than eight full weeks before the date on which the Convocation is scheduled to be held. At this time, if the supervisory committee agrees that an acceptable thesis will be ready for examination, the department head will so inform the Dean of Science and Engineering and the Registrar.

The candidate shall submit to his/her supervisor, no later than six full weeks before the schedule date of the Convocation, the original and three copies of the thesis, each complete but unbound.

The format of the thesis must conform to the **New Guide for the Preparation of Coastal Marine Science Laboratory Reports and Honours Theses,** by M.S. Madoff, Internal Manuscript Series Report 83-1, insofar as it is applicable.

The oral examination will be chaired by the Dean of Science and Engineering. The examination committee will consist of the Dean of Science and Engineering and the supervisory committee but may also include a member appointed by the Graduate Studies Committee from outside the College.

Once a thesis has been accepted, no major revisions or additional work relating to the thesis can be required of the candidate. Should major revisions or additions to the thesis be required, it shall remain unaccepted until these are completed.

A rejected thesis may be submitted once for re-examination, but not before the elapse of at least three months from the time of its rejection.

The bound original and one copy of the thesis will remain in the permanent possession of the College. The original will be stored in the College library and the copy with the candidate's major department. Each candidate is also requested to provide a copy for D.S.I.S.

Time Limit

The period allowed from first registration for the thesis to its final submission normally shall be no more than five years.

Submission of Results

All marks for graduate students, including thesis acceptance or rejection, are submitted to the Registrar by the Department Heads.

Results for graduate students for consideration of the Graduate Studies Committee will be requested by the Registrar from Department Heads on completion of each academic term. However, in the case of graduate students who complete their programs or withdraw at other times of the year, completed records may be submitted to the Registrar at the time of completion or withdrawal.

Marks and thesis results are presented by the Registrar to the Faculty Board. Results approved and recommended by the Faculty Board for confirmation by Faculty Council are presented to the Senate by the Registrar.

Convocation

In order for a graduate student to be considered for the awarding of a diploma or degree at a particular Convocation, all results of his/her work including all marks for "Required Courses" and thesis acceptance must be reported by Department Heads to the Registrar on or before the date listed in the calendar for "Reports from Departments on Graduates" for that Convocation.

The Graduate Studies Committee will adjudicate whether or not the requirements for the degree have been met, and will report its recommendation to Faculty Council.

Publication of Results of Research

Publication of results of research is encouraged. Agreement on publication must be reached between supervisor and graduate student and communicated to the Dean of Science and Engineering prior to publication. Officers are reminded that the provisions of Queen's Regulations and Orders for the Canadian Forces, Articles 19.36 and 19.37 govern publication of thesis and journal articles.

HONOURS THESIS REGULATIONS

General

1. The Honours Thesis is intended to provide the candidate with the opportunity to study a topic in depth. The following regulations govern in part the thesis requirements for an Honours (Thesis) degree in the Physics and Oceanography or the Physics and Computer Science programs.

Regulations

2. A student wishing to enter an Honours (Thesis) program must apply in writing to the Dean of Science and Engineering, preferably not later than the end of the first week of May of his/her third year.

3. To be eligible as a candidate for an Honours (Thesis) program, a cadet normally must complete third year with a weighted average of at least 66 percent in third year science and engineering courses.

4. To be graduated with an Honours (Thesis) degree a candidate must: (a) maintain an overall weighted average of 66 percent or better during the fourth year of studies; and (b) must successfully complete an honours thesis, and present it at a seminar.

5. It is the responsibility of the student to produce the final typewritten copies of the thesis. Handwritten copy is not acceptable.

4. The format of the thesis shall conform to the **New Guide for the Preparation of Coastal Marine Sciene Laboratory Reports, and Honours Theses** by M.S. Madoff, Internal Manuscript Series Report 83-1, insofar as it is applicable.

7. The candidate will consult with the Head of the department concerned to determine an appropriate thesis topic and supervisor.

8. When a candidate has selected his/her thesis topic, a Thesis Supervisory Committee will be named by the Dean of Science and Engineering and will consist of three members: the head of the major department or his designate, the supervisor, and one member from outside the major department but in a related field. The role of this committee, which is charged by the supervisor, shall be:

    a. to approve the thesis topic and scope of work;

    b. to ensure that reasonable progress is being made by the student in his/her thesis and course work;

    c. to recommend to Faculty Council appropriate action in light of the student's progress; and

    d. to determine the acceptability of the thesis for examination.

9. Candidates must draft a detailed thesis proposal for approval by his/her supervisory committee. The thesis proposal must not exceed 1000 words and must outline the issues to be addressed. A working bibliography should be attached. Further, the bibliography should indicate those materials available in the Royal Roads library as well as materials that will have to be obtained elsewhere. Three typed copies of the completed thesis **proposal** must be submitted to the Thesis Supervisory Committee **not later than the first day of October.** When approved by the Committee, a copy of the proposal will be submitted through the Department Head to Faculty Council as an information item at the first meeting in October.

10. During the preparatory stages of the thesis, the candidate must meet regularly with his/her Thesis Supervisory Committee. The following timetable is recommended:

    a. October/December – research phase;

    b. January – preparation of first draft for committee;

    c. February – preparation of second draft for committee; and

    d. early March – preparation of final draft for oral presentation at a seminar.

11. The candidate must submit the original and two copies of his/her completed thesis to the Thesis Supervisory Committee **no later than 15 March.**

12. If the 1 October deadline for the proposal or the 15 March deadline for the completed thesis is not met, it will be assumed the the student has withdrawn from the Honours (Thesis) program. A student who has defaulted on one of these deadlines must apply in writing to Faculty Council for permission to re-enter the program. Such permission will not normally be granted.

13. The completed thesis will be examined privately and at a public seminar by the Thesis Supervisory Committee which, at the discretion of the Dean of Science and Engineering, may be augmented by an external examiner. The examining committee will be chaired by the Head of the relevant department unless he is the supervisor, in which case the Dean of Science and Engineering will be the chairman.

14. The examiners will assign a mark and rule the thesis to be either:

    a. acceptable as it stands;

    b. acceptable with minor revisions;

    c. acceptable with major revisions; or

    d. unacceptable

15. Thesis revisions, if required, must be submitted to a designated examiner one week before the end of the final examination period in the spring. The revisions must be completed on the original and two copies. The original must be deposited with the RRMC librarian for shelving.

16. The Registrar and the candidate will be informed in writing by the chairman of the examining committee of the decisions of the committee before the last day of the RRMC spring final examination period.

ROYAL ROADS MILITARY COLLEGE

FORMER COMMANDANTS		Years
Captain J.M. Grant, CBE.	RCN	1942-1946
Captain W.B. Creery, CBE, CD	RCN	1946-1948
Captain H.S. Rayner, DSC, CD	RCN	1948-1949
Group Captain J.B. Millward, DFC, CD	RCAF	1949-1952
Colonel C.B. Ware, DSO, CD	PPCLI	1952-1954
Captain J.A. Charles, CMM, CD	RCN	1954-1957
Colonel P.S. Cooper, OBE, CD	L EDMN R	1957-1960
Group Captain A.F. Avant, DSO, DFC, CD	RCAF	1960-1963
Captain W.P. Hayes, CD	RCN	1963-1965
Group Captain D.B. Wurtele, CD	RCAF	1965-1968
Colonel K.E. Lewis, CMM, CD	CF	1968-1970
Captain (N) R.C.K. Peers, CD	CF	1970-1976
Colonel J.H. Roddick, CD	CF	1976-1979
Colonel G.L. Logan, CD	RHC	1979-1983
Captain (N) W.J.A. Draper, CD	CF	1983-1984

FORMER DIRECTORS OF STUDY	
Commander K.G.B. Ketchum	1942-1945
Captain William Ogle	1945-1951
Professor L.A. Brown	1951-1955
Professor C.C. Cook	1955-1961
Doctor E.S. Graham	1961-1984

HONORARY DEGREE RECIPIENTS

1977

John Moreau Grant, Doctor of Military Science

Clennell Haggerston Dickins, Doctor of Military Science

1978

Charles Perry Stacey, Doctor of Military Science

Keith Rogers Greenaway, Doctor of Military Science

1979

Owen Connor Struan Robertson, Doctor of Military Science

Robert Thomas Duff Wallace, Doctor of Laws

John William Tranter Spinks, Doctor of Military Science

1980

George Lawson Pickard, Doctor of Military Science

Harry George DeWolf, Doctor of Military Science

1981

Henry Pybus Bell-Irving, Doctor of Military Science

1982

Louis de la Chesnaye Audette, Doctor of Military Science

1983

John Gellner, Doctor of Military Science

1984

John Arthur Davies, Doctor of Science
James Maurice Stockford Careless, Doctor of Military Science
Alan George Bricknell, Doctor of Military Science

1985

Desmond Dillon Paul Morton, Doctor of Military Science
Thomas Charles Pullen, Doctor of Science

1986

Robert Waugh Murdoch, Doctor of Military Science