Royal Roads Military College

Calendar 1984-85

Victoria, B.C.

ADDENDUM TO 1984/85 RRMC CALENDAR

The following should be included in the 1984/85 calendar:

1. Department of History and Political Economy

a. HISTORY RR371: Topics in Modern German History, 1870-1945 (-,-,-,-/3,0,0,-)

This course will examine selected topics in modern German history from Unification to the collapse of the Nazi regime. It will focus on the domestic origins of German foreign policy and will include discussions of the political and social structure of Imperial Germany, the socialist tradition in Germany, the domestic origins of world policy, navalism and World War I, the question of Germany's war aims, the failed revolution of 1918, the reparations crisis and failure of moderation in Weimar Germany, the rise and social composition of rearmament and origins of World War II, the Nazi order in Europe and the final solution.

Arendt, Eichmann in Jerusalem (Revised Ed.)
Nichols, Weimar and the Rise of Hitler (2nd Ed.)
Berghaun, Germany and the Approach of War in 1914
Berghaun, Modern Germany: Society and Politics in the 20th Century
Carr, Arms, Autarky and Agression (U.S. Ed.)
Lent, Bismark and His Time

b. Additional textbooks should be included with listings for various courses as follows:

History RR302 - Gardham, Seventy Years After: 1914-1984
History RR343 - Ropp, War in the Modern World (Revised Ed.)
- Keegan, Six Armies in Normandy
History RR362 - Keiger, France and the Origins of the First World War
- Mayer, The Persistence of the Old Regime - Europe to the Great War
Economics RR341 - Call & Hollahan, Microeconomics (2nd Ed.)
Economics RR352 - Cherneff, Macroeconomics: Theory and Policy

2. Department of Mathematics

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

For first year Science or 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

b. The following text should be added to the course description as indicated:

Computer Science RR312 - Meissner & Organick, FORTRAN 77: Featuring Structured Programming
Mathematics RR412 - Kerrighan & Ritchie, The C Programming Language

3. Department of Military Leadership and Management

a. MILITARY LEADERSHIP AND MANAGEMENT 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 applicaton 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: MLM RR212 or consent of instructor.

Kellet, Combat Motivation: The Behaviour of Soldiers in Battle
Watson, War on the Mind: The Military Uses and Abuses of Psychology

b. The following texts should be added to the course description for Military Leadership and Management RR402:

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

4. Department of Chemistry

a. Additional texts should be added to course descriptions as indicated below:

Chemistry RR103 - Barrow, Computer Based Studies for General Chemistry
Chemistry RR301 - Brown & Lemay, Chemistry: The Central Science (3rd Ed.)

5. Department of Physics

a. The textbooks used in Physics RR212 are as follows:

Main, Vibrations and Waves in Physics (2ndEd.)
Tipler, Modern Physics

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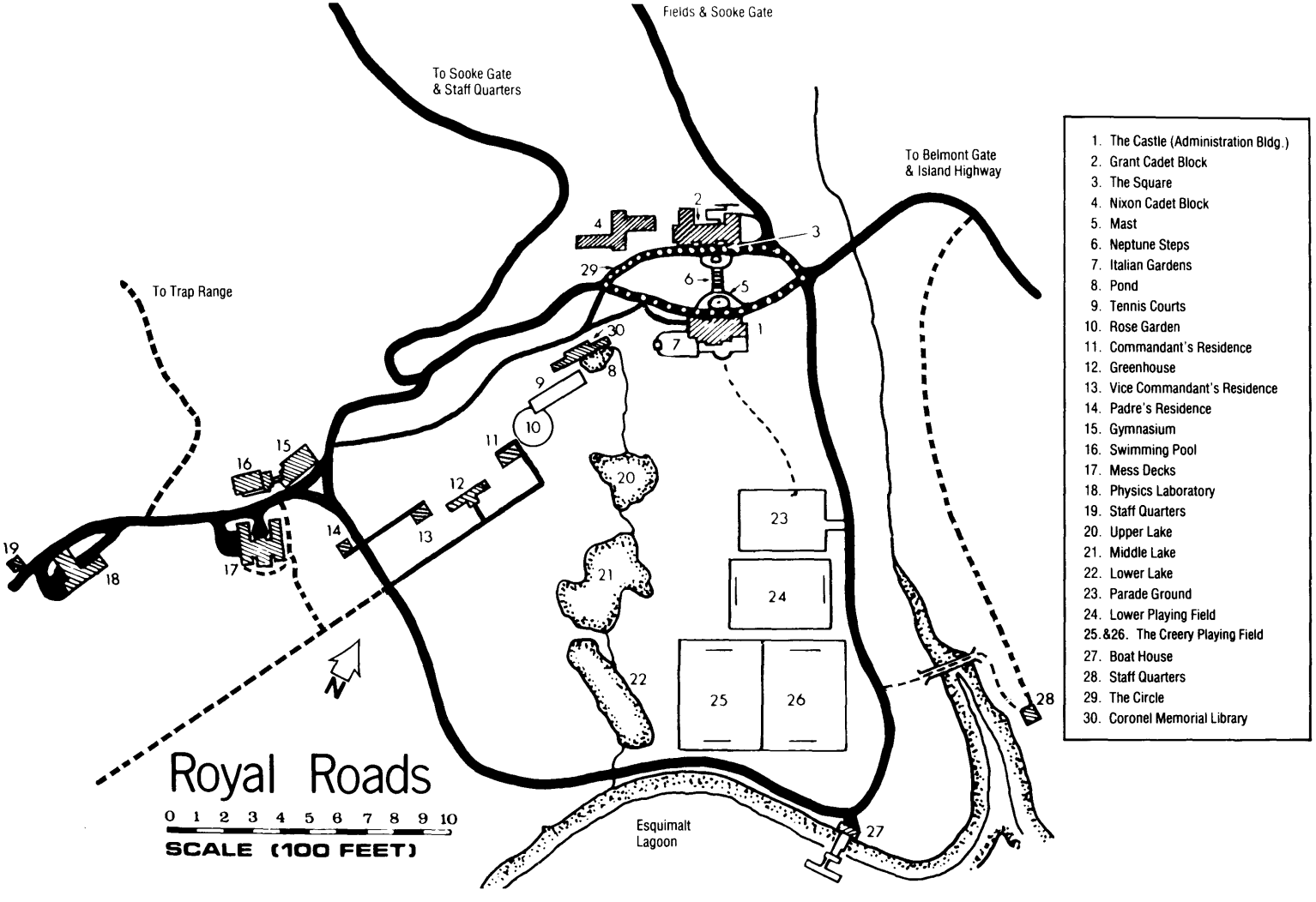
Fields & Sooke Gate
To Sooke Gate
& Staff Quarters
To Belmont Gate
& Island Highway
To Trap Range
Esquimalt
Lagoon
Royal Roads
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SCALE (100 FEET)
1. The Castle (Administration Bldg.)
2. Grant Cadet Block
3. The Square
4. Nixon Cadet Block
5. Mast
6. 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

1984

JANUARY

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THE ACADEMIC YEAR

CALENDAR OF EVENTS — 1984-85

First Semester

Aug 20	Mon	Cadet Officers return
Aug 24	Fri	BOTC Graduation/Recruits arrive
Aug 25-Sept 3	Sat-Mon	Administration
Sept 4	Tue	Classes start
Sept 19	Wed	Honours Day
Oct 5-8	Fri-Mon	Stand down (no classes)
Oct 26	Fri	Mid-semester academic reports due
Nov 12	Mon	Statutory Holiday (no classes)
Dec 6	Thu	Classes end
Dec 7	Fri	Exams start
Dec 17	Mon	Exams end
Dec 19	Wed	0900 — Results due Registrar
Dec 20	Thu	1300 — Faculty Board/Faculty Council
Dec 21	Fri	Christmas Ball
Dec 22-Jan 7	Sat-Mon	Christmas Leave
Jan 7	Mon	Cadets return
Jan 8-13	Tue-Sun	Military Training
Jan 10-11	Thu-Fri	Supplemental Examinations

Second Semester

Jan 14	Mon	Academic Open House
Jan 15	Tue	Classes start
Feb 22-25	Fri-Mon	Stand down (no classes)
Mar 1	Fri	Mid-semester academic reports due
Apr 5-8	Fri-Mon	Easter Break (no classes)
Apr 19	Fri	Classes end
Apr 22-May 2	Mon-Thu	Second semester examinations
May 6	Mon	0900 — Results due Registrar
May 7	Tue	1000 — Faculty Board/Faculty Council
May 15-17	Wed-Fri	First Year supplemental exams
May 17	Fri	Convocation, Sunset Ceremony
May 18	Sat	Graduation Parade and Ball
May 19	Sun	Successful cadets to summer duties
May 23-24	Thu-Fri	Senior Years supplemental examinations

CANADIAN MILITARY COLLEGES

ADVISORY BOARD 1984

CHAIRMAN

C.F. Moir, BSc, BEd, MA

VICE-CHAIRMAN

K. Francoeur-Hendriks, BEd, MEd (Adm)

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Rear Admiral (Retired) R.W. Murdoch, CD, PScA, ndc

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Captain (N) (R) M.L. Hadley, CD, BA, MA, PhD
P.P.M. Meincke, rmc, BSc, MA, PhD

MEMBERS

Lieutenant-Colonel (Retired) L.M. Anholt, MD, LMCC, FRCP (C), FACP
C. Belhumeur
R. Boldoc, BA, LLB, MPA
D.P. Brownlow, BEd
Brigadier-General (Retired) J.P.A. Cadieux, CD, rmc, BEng, MSc, MBA, PEng
General (Retired) J.A. Dextraze, CC, CBE, CMM, DSO, CD
W.N. Gardner
W.E. Ludlow, BSc, BEd, MEd, Ed.D
E.E. Newton, BEd, BA, MEd, PhD (Ed Adm)
P.W. Oland, BSc
C.M. Powis, rmc, BA, BComm
Rear Admiral (Retired) R.H. Roberts, CD, MD, ChB, FRCP (C), FACP
D.H. Robertson
Colonel (Retired) C.E. Savard, OMM, CD, rmc
Major-General (Retired) G.H. Spencer, OBE, CD, rmc, psc, idc, BSc, DEng, PEng
M.M. Soule, rmc, BA, LLB
Colonel (Retired) J.E. Terry, CD, BEng, BEd, PEng

EX-OFFICIO MEMBERS

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, BA

OFFICERS OF ADMINISTRATION

PRESIDENT — The Minister of National Defence, The Honourable J.J. Blais, QC, PC, BA (Ottawa), LLB, MP

COMMANDANT — Captain (N) A.J. Goode, CD, rmc, pfsc, BA (RMC)

PRINCIPAL AND DIRECTOR OF STUDIES — J.S. Mothersill, BSc (Carlton), BSc (Eng), PhD (Queen's), P.Eng

VICE-COMMANDANT — Lieutenant-Colonel D.L. McCarthy, CD, rmc, pfsc, pcsc, asc, BA (RMC)*

DEAN OF SCIENCE AND ENGINEERING — H.J. Duffus, ndc, BA, BASc (Brit Col), DPhil (Oxon), PEng — Professor of Physics

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)*

ASSOCIATE REGISTRAR — Captain J.R. DeLong, CD, rmc, plsc, BSc (RMC)*

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

CHIEF ADMINISTRATIVE OFFICER — Major R.W. Kuntz, CD, rmc, pfsc, BSc (RMC), MBA (Ottawa)*

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

COMPTROLLER AND LOGISTICS OFFICER — Captain D. Gri, BSc (Alberta)

STAFF OFFICER CADETS AND MILITARY TRAINING — Major P.R. Learmonth, CD, rmc, psc, BA (RMC)*

SQUADRON COMMANDERS —
Lieutenant (N) C.E.P. Richards, rrmc, BSc (RRMC)*
Captain J.D. Slater, rmc, BEng (RMC)*
Captain J.D. Guerin, cmr, BAd (CMR)
Captain M.B.L. Tremblay, BBA

DIRECTOR OF ATHLETICS — Captain H.R. Schilds, CD

PHYSICAL EDUCATION OFFICER — Captain H.G.W. Pronk, CD, BSc (Acadia)

CHAPLAINS —
Chaplain (P) — Lieutenant (N) G.L. Zimmerman, CD, BSc (McMaster), MDiv (Knox)
Chaplain (RC) — Captain R.J. Paulin, rmc, BSc (RMC), BTh (Newman)

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

*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)

OFFICERS OF INSTRUCTION

A. Allard, BA (Brit Col) MA (Berkley), Instructor in French

N. Arnold, BA, DipEd (Victoria), Instructor in French

W. Babinchuk, BSc (Sask), MSc (Brit Col), Assistant Professor of Mathematics

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

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, rmc, BSc (RMC), Special Lecturer in Mathematics*

Major R.H. Clark, CD, BA, MA (RMC), Special Lecturer in History and Political Science

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

M. Connor, BA (Victoria), Instructor in French

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

A. Hadley, BA (Brit Col), DipEd (Victoria), Instructor in French

L. Hof, BA (Sherbrooke), BSc, MA, MEd (Ottawa), Instructor in French

H. Jorch, BSc (Waterloo), MSc, PhD (Guelph), Assistant Professor of Physics

~~D.P. Krauel~~, BSc (McMaster), MSc (Dalhousie), PhD (Liverpool), Associate Professor and Head of the Department of Physics (attending NDC during 1984-85)

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

Major S.E. ~~Lipin~~, CD, rmc, BEng (RMC), MSc (~~Brit Col~~), ~~Special~~ Lecturer in Chemistry*

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, MCSCE, PEng, Associate Professor of Engineering

M.S. Madoff, AB (Michigan), PhD (Brit Col), Assistant Professor of Literature

Major A.T. Malcolm, CD, BA, MA (Manitoba), Special Lecturer in Military Leadership and Management

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

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

~~A.G. Martel~~, BA (SFU), MA (Fletcher), PhD (Toronto), Associate Professor of History (on leave of absence 1984)

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

G. Morgan, BA (Loyola), MA (Phil), MA (Lit), PhD (Montreal), MNI, CMMC, Professor and Head of the Department of Literature and Philosophy

M.J. Press, BSc, MSc, (McG), PhD (SFU), Associate Professor of Physics and Acting Head of the Department 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), Special Lecturer and Head of the Department of Military Leadership and Management

J. Robichaud, BA (Edmunston), BAEd (Montreal), Licence théologie (Laval), Instructor in French

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

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

~~R.C. Snell~~, BSc, MSc (Queen's), PhD (Brit Col), Associate Professor of Mathematics (on leave of absence 1984-85)

~~C. Tchalekian, BSc, MA (Iowa)~~, PhD (Texas), Associate Professor and Head of the Department of ~~Second~~ Language Training

A. Tétreault, BA (Montreal), Instructor in French

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), Instructor in French

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

LIBRARY STAFF

CHIEF LIBRARIAN — (to be appointed)
ACTING CHIEF LIBRARIAN — Susan E. Day, BS (Queen's), MLS (Toronto)

COMPUTER SERVICES STAFF

DIRECTOR — J.L. Dorscher, BSc (Calgary)
SENIOR PROGRAMMER/ANALYST — S.W. Lloyd, rmc, BEng (RMC)
JUNIOR PROGRAMMER/ANALYST — S.L. Lang, BSc (Victoria)
HONEYWELL STAFF —
System Manager — I.P. Dewar
Operators/Programmers - D.M. Pettyjohn
— R.A. Kinnaird

* 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), M.G. Robinson (term expires 31 May, 1985), Dr. P.J.S. Dunnett (term expires 31 May, 1986), Dr. J.A. Bayer (term expires May 31, 1987).

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.

COMMITTEES

THE 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.

THE 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 Management, Physics, Second Language Training, as well as the Chief Librarian, the Director of Computer Services and the Registrar *(Secretary).*

THE FACULTY BOARD

The Principal and Director of Studies *(Chairman),* the Vice-Commandant, faculty members of the rank of lecturer and above, the officers of the military wing, the Chief Librarian, the Chief Administrative Officer, and the Registrar *(Secretary).*

AD HOC COMMITTEES

THE LIBRARY COMMITTEE

M.R. Barr, S.E. Day (Secretary), J.M. Gilliland, R.W. Kuntz, J.W. Madill, M.S. Madoff, J.S. Mothersill (ex-officio), C.N. Ramkeesoon, G.D. Resch, W. Rodney (Chairman), M.J. Wilmut, Head Librarian (to be appointed).

THE PICTURES AND RELICS COMMITTEE

R.J. Beardmore, D.L. Christensen, J.M. Gilliland, G.L. Zimmerman (Secretary and Curator), Chairman - (to be appointed), and one cadet appointed by the Vice-Commandant.

after 1 July 1985

THE CADET ACADEMIC ADVISORS

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

b. Second Year Cadets, M.R. Barr (General Science), E.R. Chappell and J.W. Madill (Engineering), G.M. Lancaster (Honours Science and Engineering with Honours Math), G.A. Morgan and W. Rodney (Arts/Administration). ~~J~~ Boutilier

c. Third Year Cadets, ~~R.F. Marsden~~ (Oceanography), ~~J.S. Collins~~ (Computing Science), J.A. Bayer (Arts).
Press Kramek Snell

d. Fourth Year Cadets, ~~M.J. Press~~ (Oceanography), S.D. Wray (Computing Science), ~~P.J.S. Dunnett~~ (Arts).
Marsden
Martel

THE LECTURESHIPS COMMITTEE

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THE FACULTY-CADET ACADEMIC COMMITTEE

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 CWAO (Secretary), the Flight Proctors, a UTPM cadet, one third year cadet, and one fourth year cadet (to be appointed).

THE COMMITTEE ON PROMOTIONS AND TENURE

The Principal and Director of Studies (Chairman), the Dean of Arts, the Dean of Science and Engineering, and the heads of the academic departments.

THE COMMITTEE ON GRADUATE FELLOWSHIPS

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HATLEY CASTLE

THE CANADIAN MILITARY COLLEGES

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; and

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 Comox, 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 McClure, a Victorian architect, to design the "Castle", and Messrs Bett 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 off 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. It satisfies both criteria. 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 chemical or biological oceanography experiments. 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 ten megabytes of memory and 1.3 billion bytes of disc storage. The peripherals include about thirty terminals plus two Tektronix 4113 and one 4114 graphics terminals and a Calcomp 1015 plotter. Software

includes PASCAL, FORTRAN 77, BASIC, LISP, APL, IMSL, COBOL, PLOT 10, IGL, SPSS, ARES Data Base, etc.

The college has recently acquired several microcomputer-based systems for use in computer science and laboratories of other teaching disciplines. This equipment includes sixteen Apple IIs, one Apple III, one Commodore Super Pet, one HP85, two HP 87s, four superbrains and one IBM PC.

Nixon Block

Nixon Block is the accommodation building. It contains about 150 rooms, a lounge and a dry canteen. 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 first Commanding Officer of the Royal Naval College of Canada, then situated in Halifax.

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.

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 25°C.

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.

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 (three courts), and European team hand ball.

Tennis Courts

There are five tennis courts for use by officer cadets during recreational training and on weekends. Two are marked by figure 9 on the plan of the college, and three are by the Sooke Gate field.

Squash Courts

Two squash courts are housed within the pool building; both are marked for softball (English) 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, and a 6.1 kilometre cross country course.

Boat House

The boat house and jetty replaced the original boat house belonging to the estate, which was located immediately south of the lower lake. This is the centre of all boat pulling 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.

Every committee at the college dealing with cadets has strong cadet representation. This gives the representatives an insight into the problems of administering sports and entertainment, including the budgeting of funds.

RECREATION CLUBS AND REPRESENTATIVE TEAMS

All officer cadets take part in compulsory physical education and intra-mural sports programs. They are also encouraged to participate on one of the college representative sports teams and/or belong to one or more of the college recreational clubs.

College representative teams come under the control of the Director of Athletics. The college participates in the Totem Conference in basketball, curling, volleyball and soccer and in the Lower Vancouver Island Rugby League. Other college representative teams such as wrestling, waterpolo, fencing, shooting, cross country running, hockey and sailing compete in various tournaments and invitational events throughout B.C. and the Western United States.

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 Physical Education Officer. College recreational clubs are broken down into two categories as follows

PARA MILITARY	CULTURAL/HOBBY
Alpine Outdoors	Auto
Archery	Camera
CASI	Dance
Flying	Debating
Karate	Radio
Parachuting	Great Performances
Scuba	War Games
Ski	Sailboarding

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 School of Music, 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.

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 — Military (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.

THE REGULAR OFFICER TRAINING PLAN (ROTP)

The defence program at home and abroad has created a demand for a large number of officers to meet current and future needs. This is especially true in the technical fields. To meet the demands of this program, the ROTP was introduced in 1951.

The purpose of the ROTP is to provide the principal source of highly qualified officers for the Canadian Forces. The plan gives young Canadians the opportunity of gaining a university education and a permanent commission in the Canadian Forces.

Under this plan, 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.

An officer cadet who is enrolled under the ROTP may apply for release without obligation between 1 November 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 day after he has received his degree on graduation from the Royal Military College of Canada, Royal Roads Military College, le Collège militaire royal de Saint-Jean, or a civilian university, an officer cadet is promoted to commissioned rank in the Regular component of the Canadian Forces, provided that he has also obtained complete military qualifications. Graduates of the ROTP are obliged to serve at least four years.

THE RESERVE ENTRY TRAINING PLAN (RETP)

Since 1961, provision has been made to have up to 15 percent of the annual ROTP intake at the Royal Military College of Canada, Royal Roads Military College, and le Collège militaire royal de Saint-Jean accepted as Reserve Entry cadets. Therefore, young Canadians who wish to enter any of the Canadian Military Colleges, other than through the ROTP, may apply for admission 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 costs 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. The admission requirements for Reserve Entry cadets are the same as those for cadets who enter under the ROTP.

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. All Reserve Entry cadets are required to take summer training with the component of their choice, for which they receive pay and allowances.

The day after he has received his degree on graduation from one of the Canadian Military Colleges, a Reserve Entry officer cadet is promoted to commissioned rank in the Reserve component of the Canadian Forces, provided that he has obtained complete military qualifications.

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

THE UNIVERSITY TRAINING PLAN — MILITARY (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 as prescribed in CFAO 9-12. 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.

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.

ACADEMIC COUNSELLING

At Royal Roads, members of the faculty serve as academic advisors to the cadets. These professors are available to the cadets at all 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.

A UNIVERSITY DEGREE

AND A QUEEN'S COMMISSION

ADMISSION INFORMATION

Information on ROTP and 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, K7L 2W3; or
e. Registrar, le Collège militaire royal de Saint-Jean, Québec, J0J 1R0.

Applications for admission 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 should refer to CFAO 9-13.

Serving Officers interested in the UTPO should refer to CFAO 9-40.

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.

ADMISSION TO ROYAL ROADS MILITARY COLLEGE

ADMISSION REQUIREMENTS

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

a. must be Canadian citizens:
b. are preferred to have reached their sixteenth, but not their twenty-first birthday by 1 January of the year of entrance;
c. must be single;
d. must meet the appropriate physical standards for the Canadian Forces; and
e. must possess the academic qualifications as set forth below.

NOTE — UTPM candidates should consult CFAOs

ACADEMIC QUALIFICATIONS

General

All candidates should be aware that the course requirements at a Canadian Military College 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 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 le Collège militaire royal de Saint-Jean, where a five-year course is required.

Science or Engineering

An applicant for admission to a Science or 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 a Faculty of Engineering at a university in the province in which he has completed his secondary education. These levels at present are:

British Columbia	Grade XII
Alberta	Grade XII
Saskatchewan	Grade XII
Manitoba	Grade XII
Ontario	Grade XIII
Quebec	CEGEP 1, or equivalent (normally 14 credits will be required)
New Brunswick	Grade XII
Nova Scotia	Grade XII
Prince Edward Island	Grade XII
Newfoundland	First year university, or equivalent

Specific course requirements at this level include standing in the following subjects:

English or French
Mathematics
Physics
Chemistry

NOTES: — 1. In most provinces, one matriculant level course in mathematics is required. In Alberta, Math 31 is required as well as Math 30. In Ontario, candidates require at least two of the following mathematics courses: algebra, calculus or functions and relations. In Saskatchewan, both Algebra 30 and Geometry/Trigonometry 30 are preferred.

2. In New Brunswick, specific subjects offered for RRMC admission must be at the 121 or 122 level, with 121 level courses preferred.

3. Superior candidates may be admitted lacking one of English, physics or chemistry.

Arts

An applicant for admission to an Arts program at Royal Roads Military College must have completed high school graduation at a level satisfactory to the college, with credits acceptable for admission to a university in the province in which he is completing his secondary education. These levels at present are:

British Columbia	Grade XII
Alberta	Grade XII
Saskatchewan	Grade XII
Manitoba	Grade XII
Ontario	Grade XIII
Quebec	CEGEP 1 or equivalent (normally 14 credits will be required)
New Brunswick	Grade XII
Nova Scotia	Grade XII
Prince Edward Island	Grade XII
Newfoundland	First year university, or equivalent

All candidates must have obtained credits, in the year *prior* to high school graduation, in the following subjects:

English
Mathematics
Physics and Chemistry (or a course in science leading to final year high school courses in physics or chemistry)

Specific course requirements for admission to Arts at RRMC include high school graduation with credits in the following subjects:

English
Mathematics

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 and Math 31 preferred. In Ontario, where three courses are offered, functions and relations or calculus is required as a minimum. In Saskatchewan, Algebra 30 is required and Geometry/Trigonometry 30 preferred.

3. In New Brunswick, specific subjects offered for RRMC admission must be at the 121 or 122 level, with 121 courses 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.

PHYSICAL 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.

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.

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 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.

SUMMER TRAINING

The summer term, which must be taken by all officer cadets who successfully complete the academic terms, is spent in practical military training with the element in which they are enrolled. During the summer term, cadets will receive pay and allowances as prescribed. The summer period is approximately nine weeks long.

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 QR&Os. The current annual rates, which are subject to change, are:

a. $800.00 in respect of tuition, clothing, books, instruments, drawing materials, dry cleaning, and incidental expenses:
b. a fee of approximately $2,000 each year to defray the costs of meals and accommodation; and
c. an annual Recreation Club fee of $60.00.

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 Queen's Regulations and Orders:

a. annual college fee of $800.00, to defray the costs of tuition, clothing, books, instruments, drawing materials, dry cleaning, laundry, and incidental expenses;
b. a fee of approximately $2,000 each year to defray the costs of meals and accommodation;
c. an annual Recreation Club fee of $60.00;
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:

each year $1,600 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, extra messing charges and charges levied for special functions at a rate prescribed by the Mess Constitution.

Transportation

An officer cadet of the Regular Forces proceeding to his home on 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&O.

SCHOLARSHIPS & LOANS

Scholarships

Applicants under the Reserve Entry Training Plan 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.

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.

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 candidates at any of the three military colleges.

The purpose of the scholarship is to attract outstanding candidates to the college 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.

Application forms and further information may be obtained from:

The Secretary-Treasurer
RMC Club of Canada
Royal Military College of Canada
Kingston, Ontario
K7L 2W3

or from the representative of the Branch of the RMC Club of Canada in your area. Applications must be submitted by April 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 amounts prescribed in QR&O in respect of 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.

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 has 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 applicants, complete with supporting documents is February 1.

MEDALS, AWARDS AND PRIZES

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

The RMC Club Award, presented for 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 for the best second year engineering classification officer cadet.

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

The Navy League of Canada Award, presented for the best second year sea operations classification officer cadet.

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

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

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

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

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

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

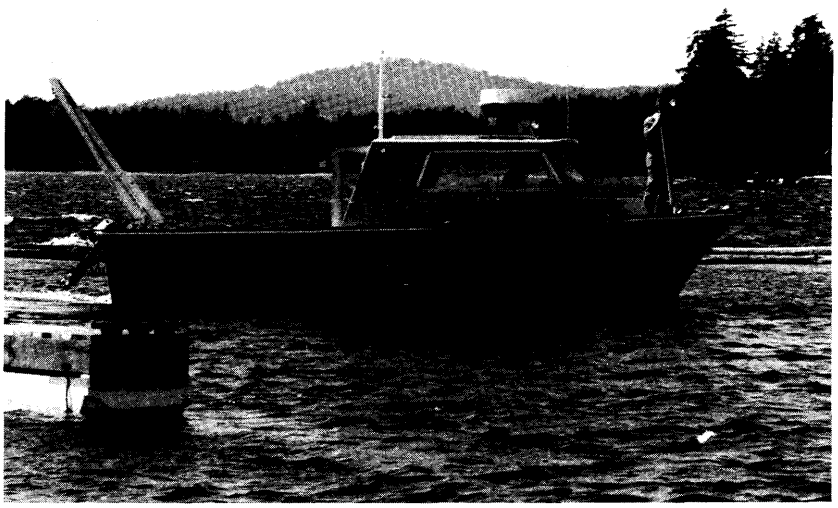
Academic book prizes are awarded annually to officer cadets who achieve the highest standing in the disciplines of mathematics, science, engineering, chemistry, physics, chemical and biological oceanography, French, computer science, history, political science, English, philosophy and the humanities-social 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.

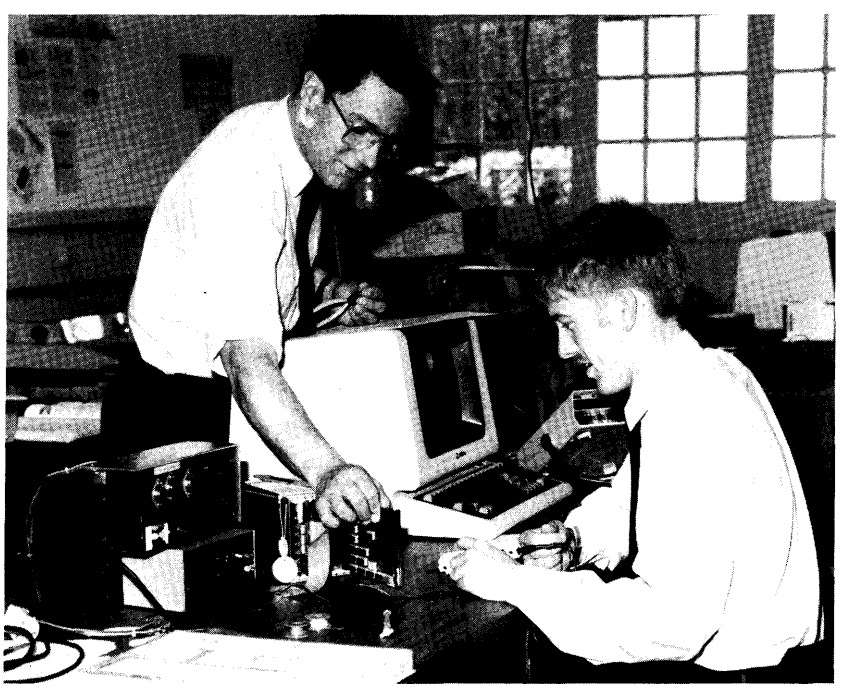
Certificates

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

THE CURRICULUM

CANADIAN MILITARY COLLEGE DEGREE PROGRAMS

Officer cadets may begin their degree studies at any one of the three Canadian Military Colleges. Cadets wishing a BSc degree program in Physics and Oceanography, in Physics and Computer Science or in General Science may complete their final two years of studies at Royal Roads Military College. Cadets wishing a BA degree program in Military and Strategic Studies may also complete their final two years of studies at RRMC. Cadets enrolled in other degree programs must complete their final two years of studies at Royal Military College or le Collège militaire royal de Saint-Jean.

The Canadian Military Colleges hold membership in the Association of Universities and Colleges of Canada. The degree programs are fully accredited. The Engineering degree programs meet the standards laid down by the Canadian Council of Professional Engineers.

SELECTION OF PROGRAM OF STUDY

Officer cadets at Royal Roads Military College 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. Each cadet will be assigned an Academic Advisor who can advise him on the academic requirements for the various programs of study. The programs of study which are acceptable to the different Military Officer Classifications are listed in Table 1.

THE ROYAL ROADS MILITARY COLLEGE ACADEMIC PROGRAM

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

In the first year 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 leads to a degree of Bachelor of Science, or Bachelor of Engineering, as well as a Bachelor of Arts, or Bachelor of Administration.

In the second year at Royal Roads Military College, programs of study are available to officer cadets leading to all of the various undergraduate degrees above, which are offered at one or other of the CMCs.

Of these, Royal Roads Military College offers, in the third and fourth years, a Bachelor of Science degree in Physics and Oceanography in either a "Combined Major" or "Honours" program of study; a Bachelor of Science degree in Physics and Computer Science in a "Combined Major" 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. Science students may enter the "General Science" program of study at the end of any semester in second, third or fourth year, with the permission of Faculty Council.

Royal Roads Military College also offers the following degrees to those considered worthy of the honour:

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

The above 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.

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 classifications upon graduation as shown in Table 1 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, and 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 the BSc degree are offered in Physics and Oceanography. 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. 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 and 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.

The course on geophysical oceanography deals particularly with the sea bed, as well as with the rest of the earth's structure. The course on aeronomy examines air-sea-ice problems, dynamics of the atmosphere and ionosphere, and problems of remote sensing. The Chemistry Department offers courses in analytical chemistry and in chemical and biological oceanography in the third year, and a course in applied thermodynamics in the fourth year. The important subject area of physical oceanography is covered by courses in descriptive and dynamic oceanography which are broadened by field work. Following second year courses in engineering graphics and mechanics of materials the Engineering Department gives a course 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 profilers and magnetometer. Data can be processed with onboard microcomputers or digitally recorded for further processing in the research laboratory.

Consult page 107 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 recommended 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.

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

Consult page 81 for 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 management; 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, 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. Consult page 81 for an index of computer science courses and page 107 for oceanography courses.

RRMC BSc DEGREES
ADMISSIONS REQUIREMENTS

General Degree in Science

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

Combined Major in Physics and Oceanography

Completion of second year in a CMC Science or Engineering program of study which includes a course in chemistry and Mathematics RR241 and Engineering RR232, or their equivalents. A weighted grade average in mathematics, science, and engineering subjects of at least D + is normally required.

Honours Degree in Physics and Oceanography

Completion of third year in the Combined Major program in Physics and Oceanography with a weighted average in courses in mathematics, science, and engineering of at least B. Students who have achieved less than second class honours may be admitted to the Honours program on a probationary basis with Faculty Council approval.

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 chemistry and Mathematics RR241 and Mathematics RR252 or their equivalents. A weighted average of at least D + is normally required in mathematics, science and engineering courses.

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 and Honours Degree in Military and Strategic Studies

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

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, K7L 2W3.

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 Honours or General courses.

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
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
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

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 conection 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

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 chairman 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 Dean of the divisions concerned.

c. **Bachelor of Science**

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 demand for precision and a powerful curiosity. With the increasing influence of scientific progress in the Canadian Forces, this kind of education is relevant to any responsible role that students may assume upon graduation.

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)**

This option is designed for students who prefer a multidisciplinary program which offers the possibility of choosing courses based on the military classification requirements or on individual preferences. The compulsory common core includes courses in physics and mathematics; optional courses are offered by the following departments: Chemistry, Engineering and Computer Science, Mathematics, Physics, and Administration Sciences.

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)**

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.

The Canadian Studies program will provide future officers with a better understanding of other Canadians for whom and with whom they will work. It is a university course leading to a BA degree and catering to particular aptitudes and interests that are of great value to future career officers in the Canadian Forces.

Methods of study include: (1) The field method: students, as members of the CMR community, are afforded the opportunity to observe CMR within the Montreal area as a microcosm of the Canadian reality and to become familiar with the interfacing of the three major components of our society. (2) The content analysis method involves the systematic, qualitative, and quantitative study of the values, beliefs, and norms of Cana-

dians made apparent through history, literature, institutions, the arts, etc. (3) The cross-cultural method is concerned with the study of cultures making it possible to analyze similarities and differences betwen English and French Canadian cultures.

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**

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

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

The unique interdisciplinary character of the BA in Military and Strategic Studies is evident. Courses include military history, science of war, international relations, defence policy, social and administration science, chemistry, physics, mathematics and psychology.

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.

TABLE 1

Military Classifications and Course Patterns Available to Members of the Regular Officer Training Plan

CLASSIFICATIONS

Legend: 1 — Preferred
2 — Desirable
3 — Acceptable
4 — Unacceptable
5 — Unacceptable
Note: refer to CFAO 9-12 for further clarification.
* — Offered at CMCs

CLASSIFICATION	ENGINEERING										SCIENCE								ARTS										MISC	
	Aerospace	Civil*	Computer*	Electrical*	Fuels and Materials*	Management*	Mechanical*	Nuclear	Physics*	Systems	Applied*	Chemistry	Computer*	General*	Geology	Math and Physics*	Physics*	Physics and Oceanography*	Canadian Studies*	Economics*	English*	French	General	Geography	History*	Mathematics	Military & Strategic Studies*	Political Science*	Administration*	Commerce*
21 Armour	3	2	2	2	2	2	1	3	2	2	2	3	2	2	2	2	2	3	2	2	2	2	2	2	2	2	1	2	2	2
22 Artillery	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
23 Infantry	3	3	3	2	3	3	2	3	3	2	2	3	3	2	3	2	2	2	2	3	2	3	3	2	2	2	2	2	2	3
31 Air Navigator	1	3	2	2	3	2	2	2	1	1	2	3	1	2	2	1	1	1	3	2	3	3	2	3	3	1	2	2	3	3
32 Pilot	2	3	2	2	3	2	2	3	2	2	2	3	2	2	3	2	2	3	3	2	3	3	3	3	3	2	2	2	3	3
33 Air Traffic Controller	2	3	1	2	3	2	2	3	2	1	2	3	1	2	3	2	2	3	3	3	1	1	3	3	2	2	2	3	2	3
64 Air Weapons Controller	2	3	1	2	3	2	4	3	2	2	2	3	1	2	3	2	2	3	3	2	3	3	3	3	3	2	2	2	3	3
71 Maritime Surface & Sub Surface	3	3	2	2	3	2	2	3	2	2	2	3	2	3	3	2	2	2	3	3	3	3	3	3	3	3	2	3	3	3
44 Maritime Engineer	3	3	3	1	3	3	1	3	2	2	3	4	3	4	4	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4
41 Aerospace Engineer	2	4	1	1	3	4	2	5	2	3	4	5	3	5	5	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5
42 Comm & Electronic Engineer	2	3	1	1	3	2	3	2	1	1	2	4	1	3	4	1	2	3	5	5	5	5	5	5	5	3	4	5	5	4
43 Land Electrical & Mechanical Engineer	4	4	3	1	3	2	1	3	2	2	3	4	3	4	4	3	3	4	5	5	5	5	5	5	5	5	5	5	5	5
45 Military Engineer	5	1	4	2	3	3	2	3	3	3	3	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5

TABLE 1: CONT'D

	Aerospace	Civil*	Computer*	Electrical*	Fuels and Materials*	Management*	Mechanical*	Nuclear	Physics*	Systems	Applied*	Chemistry	Computer*	General*	Geology	Math and Physics*	Physics*	Physics and Oceanography*	Canadian Studies*	Economics*	English*	French	General	Geography	History*	Mathematics	Military & Strategic Studies*	Political Science*	Administration*	Commerce*
69 Logistics	5	5	3	5	4	3	5	5	5	4	5	5	2	4	5	5	5	5	2	1	5	5	3	3	3	3	2	3	1	1
81 Security	3	3	2	2	3	3	3	3	2	2	2	3	2	3	3	2	2	3	3	3	2	2	3	3	2	3	2	2	2	3
68 Personnel Administration	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3	3	3	3	2	2	3	3	3	3	3	3	2	2	1	1

RRMC PROGRAM OUTLINES

Tables 2 to 14 outline the programs of study available at Royal Roads Military College.

Corresponding course descriptions can be found on pages 75 to 122.

TABLE 2

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 1950	3	0	0	4	3	0	0	4	
English RR123	Composition, Logic and Linguistics	2	0	0	2	2	0	0	2	
History RR113	European History to 1945	3	0	0	4	3	0	0	4	4
Political Science RR 102	Introduction to Political Science	—	—	—	—	3	0	0	4	
MLM RR111	Psychology of the Individual	3	0	0	4	—	—	—	—	
MLM 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
Arts Elective		—	—	—	—	(3)	(0)	(0)	(4)	7
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. Deferred to second year for cadets transferring 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.
7. With the permission of Faculty Council if timetabling permits.

TABLE 3

First Year — Degrees in Science or Engineering

Course	Description	First Semester				Second Semester				Notes
		Lect	Tut	Lab	Credits	Lect	Tut	Lab	Credits	
Language Training 1	Conversational French	0	3	2	(3)	0	3	2	(3)	1,2
Language Training 1A	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1,3
English RR003	Composition, Logic and Author Study, Utopian Literature	(3)	(1)	(0)	(3)	(3)	(1)	(0)	(3)	4
English RR103	Introduction to Logic, Grammar and Composition, Utopian Literature	3	1	0	4	3	1	0	4	
MLM 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 RR112	Introduction to Computer Programming	—	—	—	—	2	0	2	4	
Physics RR101	Mechanics	4	1	3	5	—	—	—	—	
Physics RR112	Electricity and Magnetism	—	—	—	—	4	1	3	5	
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. Taken in lieu of English RR103 by cadets who require extra grammar and composition instruction.

TABLE 4A

Second Year — Degrees in Arts or Administration
(Students who have completed first year in Arts/Administration — TABLE 2)

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 RR211	Major Twentieth Century Authors	3	0	0	4	—	—	—	—	
English RR222	Canadian Literature	—	—	—	—	3	0	0	4	
History RR113	European History to 1945	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	4
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)	5
Political Science RR213	Introduction to International Politics	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	6
MLM RR111	Psychology of the Individual	(3)	(0)	(0)	(4)	—	—	—	—	4
MLM RR212	Social Psychology	—	—	—	—	3	0	0	4	7
Mathematics RR203	Calculus, Linear Algebra: Probability and Statistics; Operations Research	3	2	0	4	3	2	0	4	
Computer Science RR102	Introduction to Computer Programming	—	—	—	—	(1)	(0)	(1)	(2)	4
Physics RR221	Elementary Mechanics	3	0	3	4	—	—	—	—	8
Physics RR232	Elementary Electricity and Magnetism	—	—	—	—	3	0	1½	4	
Arts Elective		(3)	(0)	(0)	(4)	—	—	—	—	
Arts Elective		—	—	—	—	(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	6½	24	9

TABLE 4A CONT'D.

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 if not completed in first year.
5. Required for entry to BAdm degree program (CMR).
6. Optional, but recommended for cadets intending to remain at RRMC in the Military and Strategic Studies program.
7. Not required if completed in first year.
8. A student who has passed Physics RR101 will be credited with Physics RR221.
9. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 4B

Second Year — Degrees in Arts or Administration
(Students who have completed first year in Science/Engineering — TABLE 3)

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 RR211	Major Twentieth Century Authors	3	0	0	4	—	—	—	—	
English RR222	Canadian Literature	—	—	—	—	3	0	0	4	
History RR113	European History to 1945	3	0	0	4	(3)	(0)	(0)	(4)	4
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)	5
Political Science RR102	Introduction to Political Science	—	—	—	—	3	0	0	4	6
Political Science RR213	Introduction to International Politics	(3)	(0)	(0)	(4)	(3)	(0)	(0)	(4)	7
MLM RR111	Psychology of the Individual	(3)	(0)	(0)	(4)	—	—	—	—	4
MLM RR212	Social Psychology	—	—	—	—	3	0	0	4	
Mathematics RR203	Calculus, Linear Algebra: Probability and Statistics; Operations Research	3	2	0	4	3	2	0	4	
Computer Science RR102	Introduction to Computer Programming	—	—	—	—	(1)	(0)	(1)	(2)	4
Physics RR221	Elementary Mechanics	(3)	(0)	(3)	(4)	—	—	—	—	8
Physics RR232	Elementary Electricity and Magnetism	—	—	—	—	(3)	(0)	(1½)	(4)	9
Arts Elective		(3)	(0)	(0)	(4)	—	—	—	—	
Arts Elective		—	—	—	—	(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	5	20	18	5	5	24	10

TABLE 4B CONT'D.

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 if not completed in first year.
5. Required for entry to BAdm degree program (CMR).
6. Required if Political Science RR213 is not selected as an elective.
7. Optional, but recommended for cadets intending to remain at RRMC in the Military and Strategic Studies program.
8. A student who has passed Physics RR101 will be credited with Physics RR221.
9. A student who has passed Physics RR112 will be credited with Physics RR232.
10. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 5

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 RR202	Modern Europe	—	—	—	—	3	0	0	4	
Economics RR201	Economics for Engineers	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	—	—	—	—	4
Arts Elective		—	—	—	—	(3)	(0)	(0)	(4)	4
MLM 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 RR201	Electricity	4	1	3	5	—	—	—	—	
Physics RR212	Modern Physics	—	—	—	—	4	1	3	5	
Chemistry RR212	Engineering and Physical Chemistry	—	—	—	—	4	1	3	5	
Chemistry RR242	Engineering Chemistry Laboratory	—	—	—	—	(0)	(0)	(3)	(1)	9
Computer Science RR201	Computer Applications	2	0	2	3	—	—	—	—	
Engineering RR232	Mechanics of Materials	—	—	—	—	(3)	(0)	(2)	(4)	5
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		14	5	11	17	17	6	11	21	

TABLE 5 CONT'D.

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. Optional, but recommended 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. Required in lieu of Chemistry RR212 by those students who transfer to the General Science program at the end of the first semester with a standing in Chemistry RR201.

TABLE 6

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 RR202	Modern Europe	—	—	—	—	3	0	0	4	
Economics RR201	Economics for Engineers	3	0	0	4	—	—	—	—	
MLM 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	—	—	—	—	
Mathematics RR252	Linear Algebra	—	—	—	—	2	1	0	2	
Physics RR201	Electricity	4	1	3	5	—	—	—	—	
Physics RR212	Modern Physics	—	—	—	—	4	1	3	5	
Chemistry RR201	Engineering Chemistry	4	1	0	4	—	—	—	—	
Chemistry RR242	Engineering Chemistry Laboratory	—	—	—	—	(0)	(0)	(3)	(1)	5
Computer Science RR201	Computer Applications	2	0	2	3	—	—	—	—	
Engineering RR232	Mechanics of Materials	—	—	—	—	3	0	2	4	
Engineering RR263	Engineering Graphics and Descriptive Geometry	2	0	1	2	3	0	1	4	6
PE RR203		0	0	2	0	0	0	2	0	
Drill RR203		0	0	1	0	0	0	1	0	
Total		20½	6½	11	24	21	6	11	26	

TABLE 6 CONT'D.

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.
5. Required of those in Honours Science.
6. Second semester of EG 263 not required of cadets in the Honours Science program. A final grade in EG 261 will be given.

TABLE 7

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
MLM 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	5
Political Science RR321	Irregular Warfare	(3)	(0)	(0)	(4)	—	—	—	—	6
Political Science RR332	Arms Control	—	—	—	—	(3)	(0)	(0)	(4)	6
Political Science RR343	Modern Strategic Thought 1815 to present	3	0	0	4	3	0	0	4	
Political Science RR441	Canadian Foreign Policy	3	0	0	4	—	—	—	—	5
History RR302	Technology and War, 1914 to present	—	—	—	—	3	0	0	4	
History RR343	The Military in the Modern World	3	0	0	4	3	0	0	4	
Elective		3	0	0	4	3	0	0	4	7
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	8

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.
5. Offered in alternate years commencing 1982-83.
6. Offered in alternate years commencing 1983-84.
7. 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 or fourth years, 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.
8. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

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
MLM 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 RR301	Differential Equations	3	0	0	4	—	—	—	—	
Physics RR332	Electromagnetic Wave Propagation	—	—	—	—	3	0	3	4	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR361	Acoustics	2	0	0	3	—	—	—	—	
Physics RR371	Electronics and Microcomputers	3	0	3	4	—	—	—	—	
Chemistry RR301	Analytical Methods	2	0	4	4	—	—	—	—	
Oceanography RR301	Descriptive Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR322	Biological Oceanography	—	—	—	—	2	0	1	3	
Oceanography RR332	Chemical Oceanography	—	—	—	—	3	0	2	4	
Oceanography RR341	Practical Oceanography	0	0	3	1	—	—	—	—	1
Computer Science RR301	Introduction to Computer Science	4	0	2	5	—	—	—	—	
Computer Science RR312	Numerical Analysis	—	—	—	—	3	0	0	4	
Computer Science RR322	Microcomputer Systems	—	—	—	—	2	0	4	4	
Computer Science RR332	Organization of Programming Language	—	—	—	—	3	0	1	4	
Engineering RR312	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										6

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 minimum 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, French RR212, 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 MLM; 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.

TABLE 9

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 Trg III	Conversational French	0	3	2	(3)	0	3	2	(3)	1, 2
Language Trg IIIA	Conversational French	(0)	(1)	(2)	(0)	(0)	(1)	(2)	(0)	1, 3
MLM RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	3	0	0	4	4,5
Mathematics RR301	Differential Equations	3	0	0	4	—	—	—	—	
Physics RR332	Electromagnetic Wave Propagation	—	—	—	—	3	0	3	4	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR361	Acoustics	2	0	0	3	—	—	—	—	
Physics RR371	Electronics and Microcomputers	3	0	3	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 Systems	—	—	—	—	2	0	4	4	
Computer Science RR332	Organization of Programming Language	—	—	—	—	3	0	1	4	
Science Elective		3	0	0	4	—	—	—	—	6
Science Elective		—	—	—	—	(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		18	3	10	24	17	3	13	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 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, French RR212, 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. Arts electives may be taken in either semester.
6. Three science electives worth at least 10 units of credit must be taken during the third and fourth years. Science electives may be taken in either semester.

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
MLM RR311	Leadership and Management Theories and Techniques	3	0	0	4	—	—	—	—	
Arts Elective		(3)	(0)	(0)	(4)	3	0	0	4	4,5
Mathematics RR241	Probability and Statistics	(2½)	(½)	(0)	(3)	—	—	—	—	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	4	
Physics RR352	Intermediate Mechanics	—	—	—	—	3	0	0	4	
Physics RR361	Acoustics	2	0	0	3	—	—	—	—	
Physics RR371	Electronics and Microcomputers	3	0	3	4	—	—	—	—	
Chemistry RR301	Analytical Methods	2	0	4	4	—	—	—	—	
Oceanography RR301	Descriptive Oceanograrphy	3	0	0	4	—	—	—	—	
Oceanography RR322	Biological Oceanography	—	—	—	—	2	0	1	3	
Oceanography RR332	Chemical Oceanography	—	—	—	—	3	0	2	4	
Oceanography RR341	Practical Oceanography	0	0	3	1	—	—	—	—	1
Engineering RR312	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		16	3	15	24	21	3	13	28	

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, French RR212, 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. Arts electives may be taken in either semester.
6. Required if not completed in second year.

Table 11

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
MLM RR402	Challenges in Leadership	—	—	—	—	3	0	0	4	
History RR411	America as a World Power	3	0	0	4	—	—	—	—	
History RR421	Twentieth Century Naval History	3	0	0	4	—	—	—	—	
History RR432	China and Japan in the Twentieth Century	—	—	—	—	3	0	0	4	
History RR443	Honours Thesis	(0)	(3)	(0)	(4)	(0)	(3)	(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 RR302	Crisis and War in International Relations	—	—	—	—	3	0	0	4	5
Political Science RR321	Irregular Warfare	(3)	(0)	(0)	(4)	—	—	—	—	6
Political Science RR332	Arms Control	—	—	—	—	(3)	(0)	(0)	(4)	6
Political Science RR441	Canadian Foreign Policy	3	0	0	4	—	—	—	—	5
Elective		3	0	0	4	—	—	—	—	
Elective		—	—	—	—	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		15	3	5	20	15	3	5	20	8

TABLE 11 CONT'D.

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. Offered in alternate years commencing 1982-83.
6. Offered in alternate years commencing 1983-84.
7. 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, 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.
8. Semester course loadings of less than 20 or more than 24 units of credit require the prior approval of Faculty Council.

TABLE 12

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
MLM RR402	Challenges in Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	(3)	(0)	(0)	(4)	4
Mathematics RR401	Complex Analysis	3	0	0	4	—	—	—	—	
Mathematics RR412	Signal Processing	—	—	—	—	3	0	0	4	
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	3	4	—	—	—	—	
Chemistry RR401	Applied Thermodynamics	3	0	0	4	—	—	—	—	
Oceanography RR401	Geophysics and Geology	3	0	0	4	—	—	—	—	
Oceanography RR412	Aeronomy	—	—	—	—	3	0	0	4	
Oceanography RR431	Practical Oceanography	0	0	3	1	—	—	—	—	5
Oceanography RR442	Practical Oceanography	—	—	—	—	0	0	3	1	5
Oceanography RR451	Introduction to Dynamic Oceanography	3	0	0	4	—	—	—	—	
Oceanography RR462	Advanced Dynamic Oceanography	—	—	—	—	3	0	0	4	
Computer Science RR401	Interfacing Computers and Peripherals	2	0	4	4	—	—	—	—	
Computer Science RR412	Operating Systems	—	—	—	—	3	0	1	4	
Computer Science RR422	Topics in Computer Science	—	—	—	—	3	0	0	4	
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total										6

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, French RR212, or any 300 or 400 level course offered in economics, French, history, literature, philosophy or political science as timetable permits.
5. Final grade based on semester's work; no end-of-semester examination.
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 MLM

TABLE 13

Fourth 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 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
MLM RR402	Challenges in Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	—	—	—	—	4
Arts Elective		—	—	—	—	3	0	0	4	4
Mathematics RR401	Complex Analysis	3	0	0	4	—	—	—	—	
Mathematics RR412	Signal Processing	—	—	—	—	3	0	0	4	
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	3	4	—	—	—	—	
Computer Science RR401	Interfacing Computers and Peripherals	2	0	4	4	—	—	—	—	
Computer Science RR412	Operating Systems	—	—	—	—	3	0	1	4	
Computer Science RR422	Topics in Computer Systems	—	—	—	—	3	0	0	4	
Science Elective		3	0	0	4	—	—	—	—	5
Science Elective		—	—	—	—	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		17	3	12	24	21	3	6	28	

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, French RR212, 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. Three science electives worth at least 10 units of credit must be taken over the third and fourth years.

TABLE 14

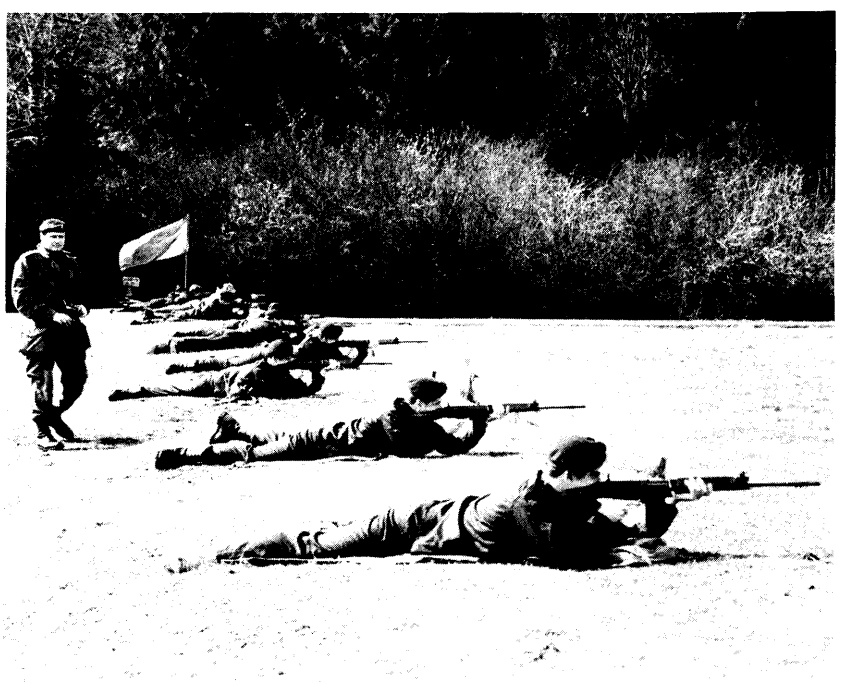
Fourth Year — Combined Major/Honours Degree in Physics and Oceanography

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
MLM RR402	Challenges in Leadership	—	—	—	—	3	0	0	4	
Arts Elective		3	0	0	4	—	—	—	—	5
Arts Elective		—	—	—	—	3	0	0	4	5
Mathematics RR401	Complex Analysis	3	0	0	4	—	—	—	—	
Mathematics RR412	Signal Processing	—	—	—	—	3	0	0	4	
Physics RR421	Quantum Mechanics	3	0	0	4	—	—	—	—	
Physics RR432	Applied Nuclear Physics	—	—	—	—	3	0	0	4	
Physics RR441	Solid State Physics	3	0	3	4	—	—	—	—	
Chemistry RR401	Applied Thermodynamics	3	0	0	4	—	—	—	—	
Oceanography RR401	Geophysics and Geology	3	0	0	4	—	—	—	—	
Oceanography RR412	Aeronomy	—	—	—	—	3	0	0	4	
Oceanography RR431	Practical Oceanography	0	0	3	1	—	—	—	—	6
Oceanography RR442	Practical 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	
Oceanography RR483	Oceanography Project	(0)	(1)	(3)	(4)	(0)	(1)	(3)	(4)	7
Oceanography RR492	Oceanography Seminar	—	—	—	—	0	0	2	0	
PE RR403		0	0	2	0	0	0	2	0	
Drill RR403		0	0	1	0	0	0	1	0	
Total		21	3	11	29	18	3	10	25	

TABLE 14 CONT'D.

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. Required if not completed in second year.
5. Arts electives are Political Science RR102, French RR212, 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. Final grade based on semester's work; no end-of-semester examination.
7. Required of cadets in the honours program only.

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 RR101: Mechanics **(4,1,3,5/-,-,-,-)**

This is a one semester course in mechanics offered by the Department of Physics in the first semester in the first year. The course meets four times each week for lectures, once for tutorials, three times for laboratory periods, and carries five units of credit.

MATHEMATICS RR203: Calculus, Linear Algebra, Probability and Statistics, Operations Research **(3,2,0,4/3,2,0,4)**

This is a year course in modern algebra 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 RR111 is the first semester of the History RR113 course).

DEPARTMENT OF CHEMISTRY

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

Professor — M.G. Robinson, BSc, PhD, MCIC

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

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

Special Lecturer — Major S.E. Lipin, CD, rmc, BEng, MSc

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, *Problems for General Chemistry and Qualitative Analysis (4th Ed.)*

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 (2nd Ed.)*

CHEMISTRY RR201: Engineering Chemistry **(4,1,0,4/-,-,-,-)**

A course intended for cadets electing an Engineering, Honours Science, or Engineering Physics program in the third year.

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 RR212: Engineering and Physical Chemistry (-,-,-,-/4,1,3,5)

This course is taken by those students who have elected the General Science program.

The lecture section of this course is essentially the same as that described under Chemistry RR201.

However, cadets taking this program are required to accompany the lectures by an appropriate laboratory practice.

Selected fundamental experiments in physical chemistry will be allocated, illustrating such aspects of the coursework as phase rule, electrode potential, heats of reaction, distillation, etc.

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

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

This course is identical to the laboratory part of Chemistry RR212 and is required of students in Honours Science and of those students in General Science who have successfully completed Chemistry RR201 in the first semester.

CHEMISTRY RR301: Analytical Methods (2,0,4,4/-,-,-,-)

The objective of this course is to introduce students to analytical procedures and data analysis.

Lectures will deal with the theory underlying classical and modern analytical methods. These include volumetric, gravimetric and complexometric procedures; spectrophotometric; electroanalytical and chromatographic methods.

Laboratory work will be divided into two parts. Redox, precipitation and EDTA titrations will be utilized to develop manipulative skill. Considerable emphasis will be placed on time-budgeting and dove-tailing of experiments. The second part of the lab will focus on instrumental methods including polarography; VIS, UV and infrared spectroscopy; chromatography. Several of the instruments will be interfaced with a microprocessor. Emphasis will be on the exploitation of this interface for optimum instrumental

application and data analysis. These experiments will be applied to "real" problems such as pollutants in marine samples (water and fish), naval boiler contamination, etc.

Skoog & West, *Fundamentals of Analytic Chemistry (3rd Ed.)*
Harris, *Quantitative Chemical Analysis*

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 liquification 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.)*

OCEANOGRAPHY RR322: 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*
Sumich, *Introduction to the Biology of Marine Life (2nd Ed.)*

OCEANOGRAPHY RR332: 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 RR322 and Oceanography RR332. 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*

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

COMPUTER SCIENCE

Royal Roads Military College does not have a separate Department of Computer Science. Computer science courses are offered by various Departments as indicated below:

COURSE	DEPARTMENT
Computer Science RR102 Introduction to Computer Programming	Mathematics
Computer Science RR122 Introduction to Computer Programming	Mathematics
Computer Science RR201 Computer Applications	Engineering
Computer Science RR301 Introduction to Computer Systems	Mathematics
Computer Science RR312 Numerical Analysis	Mathematics
Computer Science RR322 Microcomputer Systems	Physics
Computer Science RR332 Organization of Programming Languages	Engineering
Computer Science RR401 Interfacing Computers and Peripherals	Math/Physics
Computer Science RR412 Operating Systems	Mathematics
Computer Science RR422 Topics in Computer Science	Engineering

See departmental sections of calendar for detailed course descriptions.

DEPARTMENT OF ENGINEERING

Associate Professor and Head of Department — E.R. Chappell, rmc, BSc, MA Sc, 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, MCSE, PEng

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

PHYSICS RR101: Mechanics **(4,1,3,5/-,-,-,-)**

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

This course is taught jointly by the Departments of Engineering and Physics.

Statics topics include forces in a plane, forces in space, equivalent systems of forces, equilibrium of rigid bodies in two and three dimensions, centroids and centres of gravity, analysis of structures, forces in beams, and friction. Vector algebra is used.

Beer & Johnston, *Vector Mechanics for Engineers - Statics (4th Ed.)*

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 - SI Version*
Beer & Johnston, *Vector Mechanics for Engineers - Statics (3rd 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.

Gieseche, Mitchell, Spencer, Hill, Loving & Dygdon, *Engineering Graphics (3rd Ed.)*
Rogers, *Graphic Science Problems Book*

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.

Gieseche, Mitchell, Spencer, Hill, Loving & Dygdon, *Engineering Graphics (3rd Ed.)*
Rogers, *Graphic Science Problems Book*

ENGINEERING RR312: 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; 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 and demonstrations of flow phenomena.

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

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.

Davis & Hoffman, *FORTRAN 77: A Structured Discipline Style (2nd Ed.)*
Rice, *Numerical Methods, Software and Analysis*

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

Language 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.

Gorgono, *Programming in PASCAL*
Pratt, *Programming Languages, Design and Implementation*

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

In 1984-85 the topic will be Interactive Computer Graphics.

The content will include point and line drawing displays, two dimensional transformation, 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*

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, FRHistS

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

Associate Professor — J.A. Bayer, BA, MA, PhD

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

Associate Professor — A.G. Martel, BA, MA, PhD, (on leave of absence 1984-85)

Special Lecturer — Major R.H. Clark, CD, BA, MA

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

HISTORY RR113: European History to 1945 **(3,0,0,4/3,0,0,4)**

For first year Arts students or for second year Arts students who did not complete it in first year.

A survey of European civilization from the fall of Rome to the Twentieth Century with emphasis upon economic, political, and social changes; military organization and techniques; the impact of new ideas upon states; the relation of new concepts to conflicts within and between states, and their resolution.

Second year Arts students who have completed their first year in Science and Engineering will cover the period up to the French Revolution in the first semester and then write a final examination in HISTORY RR111; or, if timetabling permits, they may continue into the second semester and write a final examination in HISTORY RR113 at the end of the second semester.

Rothrock, *Europe: A Brief History, Vols. 1 & 2*
Palmer & Colton, *A History of the Modern World*

HISTORY RR202: Modern Europe **(-,-,-,-/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: 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.

Finlay & Sprague, *The Structure of Canadian History (2nd Ed.)*
Kerr, *A Historical Atlas of Canada*
Morton, *The Kingdom of Canada*

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

A survey of technological innovation since the Great War with emphasis on the development and adaptation of communications, computers, detection techniques, explosives, and weapons systems. Examples will be drawn from colonial conflicts, World War II, Korea, and Vietnam. Some attention will be devoted to contemporary developments and trends.

HISTORY RR343: The Military in the Modern World **(3,0,0,4/3,0,0,4)**

An examination of the military as an institution in modern life. Beginning with the army of Napoleon, and its revolutionary and eighteenth-century antecedents, we follow the changing structure and role of military organizations as they develop through the nineteenth and twentieth centuries. Included are such themes as the creation of general staffs, the military in politics, the military in the 'third world', conscription and volunteer armies, the growth of professional ideals, the role of technology and ideology, and men in battle.

Perlmutter, *The Military and Politics in Modern Times*
Huntington, *The Soldier and the State*
Gooch, *Armies in Europe*
Keegan, *The Face of Battle*
Bienan, *Armies and Parties in Africa*
Keegan & Darracott, *The Nature of War*

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*
Williams, *The Tragedy of American Diplomacy (2nd 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 & Nimitz, *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 Transition*

HISTORY RR443: Honours Thesis **(0,3,0,4/0,3,0,4)**

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 by the end of 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.

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*

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 (4th 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 (4th 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 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 (3rd Cdn. Ed.)*

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

An introduction to the principal concepts, ideas and methods of modern political science as applied to the contemporary Canadian political system.

vanLoon & Whittington, *The Canadian Political System: Environment, Structure and Process (3rd Ed.)*

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, 1945-1975 (4th Ed.)*
Stoessinger, *Crusaders & Pragmatists: Movers of Modern American Foreign Policy*
Nogee, *Soviet Foreign Policy Since W.W.II*

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.

Morgenthau, *Politics Among Nations*

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.

POLITICAL SCIENCE RR332: 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.

Barton & Weiler, *International Arms Control: Issues and Agreements*

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

A survey of strategic thought from Clausewitz to present day with emphasis on post 1945 developments in nuclear strategy.

Earle, *Makers of Modern Strategy*
Freedman, *The Evolution of Nuclear Strategy*

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.

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*

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ELECTIVES

The following courses may be taken by cadets in third and fourth year as an Arts elective, and by cadets 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 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*

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 Bol-

shevik 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*

HISTORY RR362: The Origins of the First World War (-,-,-,-/3,0,0,4)

A study of the policies and problems that propelled the Great Powers of Europe into war in 1914. Special attention will be given to the connections between strategic plans and diplomatic policies, and the extent to which these plans arose from technological and political change.

Offered on demand. Prerequisite: consent of the instructor.

Taylor, *The Struggle for Mastery in Europe*
Bosworth, *Italy and the Approach of the First World War*
Steiner, *Britain and the Origins of the First World War*
Lieven, *Russia and the Origins of the First World War*
Berghann, *Germany and the Approach of War in 1914*

ECONOMICS RR312: 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.

Ruggere, *The Canadian Economy - Problems and Policies (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.

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.

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*

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

DEPARTMENT OF LITERATURE AND PHILOSOPHY

Professor and Head of Department — G.A. Morgan, BA, MA (Phil), MA (Lit), PhD, MNI, CMMC

Assistant Professor — M.S. Madoff, AB, PhD

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

ENGLISH RR003: Composition Logic and Author Study, Utopian Literature **(3,1,0,3/3,1,0,3)**

For first year Science and Engineering students considered weak in English grammar and composition.

Part I: Composition, Logic and Linguistics: study of major authors from Chaucer to Shakespeare (First Semester).

This part of the course includes review and practice of the principles of clear and accurate expression, through an introduction to traditional formal logic and to the history and structure of English, with frequent composition assignments drawn from these studies. Tutorials will be devoted to guided practice in composition. Study of selected works by major authors from Chaucer to Shakespeare will provide subjects for oral and written composition.

Two essays and frequent short assignments are required from each cadet.

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 organization of the individual citizen. Students examine Utopian thought as expressed in six or seven works, by authors ranging from Plato to Burgess. Tutorials will be devoted to continued composition practice, including frequent short assignments and preparation and revision of major essays.

Two essays and frequent short assignments are required from each cadet.

Glazier, *The Least You Should Know About English*
Little, *Critical Thinking and Decision Making*
Francis, *History of English*
Holman, *A Handbook of Literature (4th Ed.)*
Miller, *A Canticle for Leibowitz*
Chaucer, *Canterbury Tales: A Dual Language Edition*
Morrison, *The Portable Chaucer (revised 1975)*
Shakespeare, *The Tempest*
Shakespeare, *Coriolanus*
Marlowe, *Doctor Faustus*
Plato, *The Republic*
More, *Utopia and a Dialogue of Comfort*
Morris, *News from Nowhere*
Zamiatin, *We*
Swift, *Gulliver's Travels and Other Writings*
Orwell, *1984*
Huxley, *Brave New World*
Shelley, *Frankenstein*
Burgess, *A Clockwork Orange*

ENGLISH RR103: Logic, Grammar and Composition, Utopian Literature **(3,1,0,4/3,1,0,4)**

For first year Science and Engineering students.

Part I: Logic and Linguistics: Survey of English Literature from Chaucer to Marlowe (First Semester).

This part of the course includes a review of the principles of clear and accurate expression with a study of major authors from Chaucer to Marlowe.

Two essays and other exercises are required from each cadet.

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, More and Bacon, 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 cadet.

Glazier, *The Least You Should Know About English*
Little, *Critical Thinking and Decision Making*
Francis, *History of English*
Holman, *A Handbook to Literature (4th Ed.)*
Miller, *A Canticle for Leibowitz*
Chaucer, *Canterbury Tales: A Dual Language Edition*
Morrison, *The Portable Chaucer (revised 1975)*
Shakespeare, *The Tempest*
Shakespeare, *Coriolanus*
Marlowe, *Doctor Faustus*
Plato, *The Republic*
More, *Utopia and a Dialogue of Comfort*
Morris, *News from Nowhere*
Zamiatin, *We*
Swift, *Gulliver's Travels and Other Writings*
Orwell, *1984*
Huxley, *Brave New World*
Shelley, *Frankenstein*
Burgess, *A Clockwork Orange*

ENGLISH RR113: English Literature 1100-1950 **(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" and of Milton.

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, essays of Gibbon and Burke, poetry by Blake and the Romantics, the novels of Conrad and Joyce, and the advanced modern poetry of Hopkins, Jones, and Thomas.

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

Holman, *A Handbook to Literature (4th Ed.)*
Chaucer, *Canterbury Tales: A Dual Language Edition*
Warhaft, Woodbury & O'Flaherty ed., *English Poems 1250-1800*
Marlowe, *Doctor Faustus*
Shakespeare, *Hamlet*
Mallory, *Le Morte d'Arthur*
Thomas, *Collected Poems - New Directions*
Price ed., *The Restoration and the 18th Century*
Swift, *Gulliver's Travels*
Joyce, *A Portrait of the Artist as a Young Man*
Hopkins, *Poems & Prose* (Gardner ed.)
Bloom & Trilling ed., *Romantic Prose and Poetry*
Conrad, *The Nigger of the Narcissus*
Jones, *Introducing David Jones* (Mathias ed.)
Cawley, ed., *Everyman and Medieval Miracle Plays*

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.

Glazier, *The Least You Should Know About English*
Little, *Critical Thinking and Decision Making*
Francis, *History of English*

ENGLISH RR211: Major Twentieth Century Authors (3,0,0,4/-,-,-,-)

A survey of recent English literature, its provenance and prospects. Emphasis will be placed on Yeats, Eliot, Jones among the poets, on Shaw and Pinter among the playwrights, on Waugh, Greene, and Wilder among the novelists.

Two essays will be required.

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

Geddes, *Twentieth Century Poetry and Poetics (2nd Ed.)*
Shaw, *Saint Joan*
Pinter, *The Caretaker*
Waugh, *Scoop*
Greene, *The Power and the Glory*
Wilder, *Theophilus North*
Chesterton, *The Everlasting Man*
Jones, *Introducing David Jones* (Mathias ed.)

ENGLISH RR222: Canadian Literature **(-,-,-,-/3,0,0,4)**

A study of themes and forms adopted by English authors in Canada, from Haliburton and Service to Birney, Richler and Buckler; problems of Canadian vis-a-vis British and United States literature.

Two essays will be required.

Cadets working towards an Honours BA in English must obtain 66 percent in English RR211 and English RR222 and a general average of 60 percent.

Klinck & Watters, *Canadian Anthology (3rd Ed.)*
Richler, *The Apprenticeship of Duddy Kravitz*
Birney, *Turvey*
MacLennan, *Two Solitudes*

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ELECTIVES

The following courses may be taken by cadets in third and fourth years as an Arts elective, and by cadets 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).

ENGLISH RR301: Literature of Canada **(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 cadet.

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*
Aquin, *Blackout*
Blais, *Mad Shadows*
MacLennan, *Barometer Rising*
Geddes & Bruce, *Fifteen Canadian Poets*

ENGLISH RR312: Literature of War **(-,-,-,-/3,0,0,4)**

This course is a study of view of war in Western literature from Homeric epic to modern novel. The literatures of tribal, classical, feudal, and industrial cultures will be examined and compared, with particular reference to ethical problems and concepts of heroism.

Two essays and one oral report are required from each cadet.

Offered on demand. Prerequisite: consent of the instructor.

Raffael, *Beowulf*
Moncrieff, *The Song of Roland*
Mallory & Graves, *Le Morte d'Arthur*
Ford, *Parade's End*
Hemmingway, *A Farewell to Arms*
Groves, *Goodbye To All That*
Waugh, *Men At Arms*
Heller, *Catch-22*

Spenser, *Faerie Queene, Selections*
Gardner, *Up the Line to Death*
Vonnegut, *Slaughterhouse Five*
Sassoon, *Memoires of an Infantry Officer*
Enford, *Conduct Unbecoming*
Remarque, *All Quiet on the Western Front*
Maro, *The Aeneid*
Hasek, *Good Soldier Svejk and His Fortunes in the W.W.*
Homer, *The Iliad*
McArgue, *Little Victories, Big Defeats*
Crane, *Red Badge of Courage*
Marlowe, *Tamburlaine the Great, Pts. 1 & 2*

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 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*
Label & Paquette, *Le Quebec par ses Textes Litteraires (1534-1976)*

PHILOSOPHY RR301: Introduction to Philosophy **(3,0,0,4/-,-,-,-)**

A survey of the problems of knowledge, nature, morals, and politics. Philosophers studied range from Plato to Marx, Aristotle to Bertolanffy. The latter part of the course deals with recent varieties of political philosophy. Frequent discussion is encouraged.

Offered on demand. Prerequisite: consent of the instructor.

Fackone & Scherer, *Logic and Logical Thinking*
Bambrough, *The Philosophy of Aristotle*
Buchanan, *The Portable Plato*
Danto & Morgenbesser, *Philosophy of Science*
Lawton & Bishop, *Living Philosophy, 1977*

PHILOSOPHY RR412: Perspectives in Philosophy **(-,-,-,-/3,0,0,4)**

Contemporary ideas of knowledge and action are traced from sources leading to Comte and Nietzche, as two extremes. Various types of current synthesis are examined in lectures and seminars. Topics include cybernetics, neuro-psychology, relativity, ontology, analogical concept, ecology of knowledge, ethics.

Offered on demand. Prerequisite: consent of the instructor.

Bochenski, *Contemporary European Philosophy (1974)*
Bambrough, *The Philosophy of Aristotle*
Cave, *The Philosophy of Nietzsche*
Piaget, *Structuralism*
Wolff, *The Great Works of Philosophy*
White, *Age of Analysis*

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

Associate Professor — F. Milinazzo, BSc, PhD

Associate Professor — R.C. Snell, BSc, MSc, PhD, (on leave of absence 1984-85)

Associate Professor — M.J. Wilmut, ndc, BSc, MA, PhD

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

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

Assistant Professor — W. Babinchuk, BSc, MSc

Assistant Professor — P. Smart, BSc, BEd, MEd, MPA, PhD

Special Lecturer — Captain D.L. Christensen, rmc, 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 I (4th Ed.)*
Ayres, *Theory & Problems of Differential and Integral Calculus*

MATHEMATICS RR203: Calculus, Linear Algebra, Probability and Statistics, Operations Research (3,2,0,4/3,2,0,4)

For second year Arts students.

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

Bittinger & Crown, *Finite Mathematics, A Modelling Approach*
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 Stoke's Theorems, and infinite series.

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

Thomas & Finney, *Calculus with Analytic Geometry (5th Ed.)*
Bronson, *Modern Introductory Differential Equations*
Zill, *A First Course in Differential Equations with Applications*

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 with Analytic Geometry (5th Ed.)*
Bronson, *Modern Introductory Differential Equations*
Zill, *A First Course in Differential Equations with Applications*

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

For second year Engineering students; optional for General Science students.

Basic concepts of probability, including discrete and continuous frequency 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, regression analysis, 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.

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

Anton, *Elementary Linear Algebra (3rd Ed.)*
Lipschultz, *Linear Algebra*

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 approval of the Department.

Spiegel, *Fourier Analysis*
Bronson, *Modern Introductory Differential Equations*
O'Neil, *Advanced Engineering Mathematics*

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

Differentiability of functions of a complex variable; analytic functions; Cauchy-Reimann 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.

O'Neil, *Advanced Engineering Mathematics*

MATHEMATICS RR412: Signal Processing **(-,-,-,-/3,0,0,4)**

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

Prerequisite: Mathematics RR301, RR401.

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

For first year Arts or Administration students.

Introduction to 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 will be discussed briefly.

Chou, *Computer Programming in BASIC*

COMPUTER SCIENCE RR122: An Introduction to Computer Programming and Numerical Analysis **(-,-,-,-/2,0,2,4)**

For first year Science or Engineering students.

An introduction to programming and problem solving on a computer. FORTRAN and elements of structured programming, de-bugging, basic concepts of system hardware, numerical methods such as root finding and quadrature.

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

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 approval of the Department.

Tannenbaum, *Structured Computer Organization*
Zarella, *Systems Architecture*
Zarella, *Operating Systems - Concepts and Principles*
Leventhal, *808A-8085 Assembly Language Programming*
Zaks, *CP/M Handbook*

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.

Gerald, *Applied Numerical Analysis (2nd Ed.)*
Cress, Dirksen & Graham, *FORTRAN IV with WATFIV*
Burden, Farres & Reynolds, *Numerical Analysis (2nd Ed.)*

COMPUTER SCIENCE RR401: Interfacing Computers and Peripherals **(2,0,4,4/-,-,-,-)**

The application of hardware and software concepts from previous courses to problems involved with adding peripherals such as floppy disks, DMA controller, GPIB, video monitors and digital motors to computer systems will be discussed. Small individual projects will be undertaken.

Prerequisite: Computer Science RR322.

Winkle & Prosser, *The Art of Digital Design*

COMPUTER SCIENCE RR412: 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 approval of the Department.

Colingaert, *Operating System Elements - A User Perspective*
Peterson & Silberschatz, *Operating System Concepts*

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

DEPARTMENT OF MILITARY LEADERSHIP AND MANAGEMENT

Special Lecturer and Head of Department — Major G.D. Resch, CD, BA, MA

Special Lecturer — Major A.T. Malcolm, CD, BA, MA

MILITARY LEADERSHIP AND MANAGEMENT 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.

Landy, *Psychology - The Science of People*

MILITARY LEADERSHIP AND MANAGEMENT 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.

Wrightsman & Deaux, *Social Psychology in the Eighties*

MILITARY LEADERSHIP AND MANAGEMENT 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.

Whetten & Cameron, *Developing Management Skills*

MILITARY LEADERSHIP AND MANAGEMENT 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 personnel and organizational issues, concerns and challenges they must deal with as military officers. Proceeding from a comprehensive review of military ethics and professionalism, the course examines the military personnel system as a reflection of the military ethos. The contribution of personnel policies to the maintenance of motivation, morale and cohesion is studied in seminar. Leadership challenges posed by the nature of continuous military operations as well as changes in society are examined. Opportunity is provided for students to improve their leadership skills through the medium of an interpersonal skills workshop.

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

OCEANOGRAPHY

Royal Roads Military College does not have a separate Department of Oceanography. Oceanography courses are offered by various departments as indicated below:

COURSE	DEPARTMENT
Oceanography RR301 Descriptive Oceanography	Physics
Oceanography RR322 Biological Oceanography	Chemistry
Oceanography RR332 Chemical Oceanography	Chemistry
Oceanography RR341 Practical Oceanography	Physics
Oceanography RR401 Geophysics and Geology	Physics
Oceanography RR412 Aeronomy	Physics
Oceanography RR431 Practical Oceanography	Physics
Oceanography RR442 Practical Oceanography	Physics
Oceanography RR451 Introduction to Dynamic Oceanography	Physics
Oceanography RR462 Advanced Dynamic Oceanography	Physics
Oceanography RR483 Oceanography Project	Physics
Oceanography RR492 Oceanography Seminar	Physics

See departmental sections of calendar for detailed course descriptions.

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, BSc, MSc, PhD (attending NDC 1984/85)

Associate Professor and Acting Head of Department — M.J. Press, BSc, MSc, PhD

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

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

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

Assistant Professor — H. Jorch, BSc, MSc, PhD

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

Laboratory exercises are designed to supplement and illustrate the work discussed in the lecture courses, and to provide training in methods of measurement and experiment design. Satisfactory laboratory work must be achieved in order to obtain pass standing.

PHYSICS RR101: Mechanics **(4,1,3,5/-,-,-,-)**

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

Newtonian mechanics of particles and rigid bodies are studied, using vector methods and simple applications of integral and differential calculus. The course is taught with the help of members of the Engineering Department, who emphasize engineering statics. (see Engineering Course Descriptions.)

Halliday & Resnick, *Physics - Part I & II (3rd Ed.)*
Beer & Johnston, *Vector Mechanics for Engineers - Statics (4th Ed.)*

PHYSICS RR112: Electricity and Magnetism **(-,-,-,-/4,1,3,5)**

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

Electrostatics, direct current electricity, magnetism and elementary current induction are studied using vector methods and elementary calculus.

Halliday & Resnick, *Physics - Part I & II (3rd Ed.)*

PHYSICS RR201: Electricity **(4,1,3,5/-,-,-,-)**

For second year cadets taking the Science or Engineering programs of study.

AC circuits, including series and parallel resonant circuits, are analyzed using Kirchhoff's laws and phasors methods. The transient response of simple circuits is analyzed. Electric and magnetic fields in free space and matter are studied. An introduction is made to Maxwell's equations.

Prerequisites: Physics RR101, RR112, Mathematics RR113.

Halliday & Resnick, *Physics - Part I & II (3rd Ed.)*
Durney, Harris & Alley, *Electric Circuits - Theory & Engineering Applications*
Edmunster, *Electric Circuits (2nd Ed.)*

PHYSICS RR212: Modern Physics **(-,-,-,-/4,1,3,5)**

For second year students taking the Science or Engineering programs of study.

About half of the course is devoted to a general study of oscillations and waves. The remainder is devoted to modern physics as developed by Einstein, De Broglie, Heisenberg, Bohr, and Schrodinger.

The laboratory deals with experiments demonstrating the ideas and techniques of modern physics. Use is made of computers in the laboratory to facilitate the measurement and analysis of data.

Prerequisites: Physics RR101, RR112, and Mathematics RR113.

French, *Vibrations & Waves*
Weidner & Sells, *Elementary Modern Physics (3rd Ed.)*

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

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.

Bauche & Frederick, *Technical Physics (2nd Ed.)*
Epstein & Hewitt, *Thinking Physics - Part I & II*

PHYSICS RR232: Elementary Electricity and Magnetism **(-,-,-,-/3,0,3,4)**

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, electric 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.

Bauche & Frederick, *Technical Physics (2nd Ed.)*
Epstein & Hewitt, *Thinking Physics - Part I & II*

PHYSICS RR332: Electromagnetic Wave Propagation **(-,-,-,-/3,0,3,4)**

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 RR201, RR212.

Brown, Sharp, 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 RR101, Mathematics RR223 or 233.

Fowles, *Analytical Mechanics (3rd Ed.)*

PHYSICS RR361: Acoustics **(2,0,0,3/-,-,-,-)**

This course deals with the creation, propagation, reflection and absorption of acoustic waves in homogeneous or horizontally layered media, sound ducts and real oceans. Applications to communication, exploration geophysics, and particularly to underwater detection and surveillance are discussed.

Prerequisites: Physics RR212, Mathematics RR301.*

Kinsler & Frey, *Fundamentals of Acoustics (2nd Ed.)*
Urich, *Principles of Underwater Sound (3rd Ed.)*
Seto, *Acoustics*

(* May be taken concurrently.)

PHYSICS RR371: Electronics and Microcomputers **(3,0,3,4/-,-,-,-)**

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 and 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 and 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 RR201.

Diefenderfer, *Principles of Electronic Instrumentation (2nd Ed.)*
Leventhal & Walsh, *Microcomputer Experimentation with the Int. SDK-85*

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.

Foster & Wright, *Basic Nuclear Engineering (4th Ed.)*
Burcham, *Elements of Nuclear Physics 1979 (with corrections 1981)*

PHYSICS RR441: Solid State Physics **(3,0,3,4/-,-,-,-)**

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 bonds, p-n junction, magnetic and dielectric properties, super conductivity.

Prerequisites: Physics RR201, RR212.

Rosenberg, *The Solid State*

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 Ed.)*
Knauss, *Introduction to Physical Oceanography*
Beer, *Environmental Oceanography*

OCEANOGRAPHY RR341: Practical 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.

OCEANOGRAPHY RR401: Geophysics and Geology **(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: gravimetry and the interpretation of gravity anomalies; the earth's rotation, tides, and the shape of the earth; geomagnetism and paleomagnetism; geothermal studies; marine geophysics and geophysical prospecting.

Prerequisites: 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 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 applications.

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

OCEANOGRAPHY RR431: Practical Oceanography **(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.

Prerequisite: Oceanography RR301 or consent of the Department.

OCEANOGRAPHY RR442: Practical 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 Dynamic Oceanography (2nd Ed.)*
Lemehaute, *An Introduction to Hydrodynamics & Water Waves*
von Schwind, *Geophysical Fluid Dynamics for Oceanographers*

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 Dynamic Oceanography (2nd Ed.)*
Lemehaute, *An Introduction to Hydrodynamics & Water Waves*
von Schwind, *Geophysical Fluid Dynamics for Oceanographers*

OCEANOGRAPHY RR483: Oceanography Project (0,1,3,4/0,1,3,4)

Fourth year cadets in the Honours 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. A written report is required.

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 officer cadets in the Honours program.

COMPUTER SCIENCE RR322: Microcomputer Systems (-,-,-,-/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 landshaking, 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 RR401: Interfacing Computers and Peripherals (2,0,4,4/-,-,-,-)

The application of hardware and software concepts from previous courses to problems involved with adding peripherals such as floppy disks, DMA controller, GPIB, video monitors and digital motors to computer systems will be discussed. Small individual projects will be undertaken.

Prerequisite: Computer Science RR322.

Lisia & Zaks, *Microcomputer Interfacing Techniques (2nd Ed.)*
Winkle & Prosser, *The Art of Digital Design*

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

DÉPARTEMENT DE LA LANGUE SECONDE

Professeur agrégé. Chef de département et directeur de langue seconde — C. Tchalékian, BSc, MA, PhD.

Conseiller pédagogique — (to be appointed)
Chargés de cours — A. Allard, BA, MA
— N. Arnold, BA, DipEd
— M. Connor, BA
— A. Hadley, BA, DipEd
— L. Hof, BA, BSc, MA, MEd
— J. Robichaud, BA, Licence (théologie)
— A. Tétreault, BA
— J. van Campen, BA, BSW, MA

Pour enseigner la langue seconde, les méthodes de base employées sont Dialogue Canada et les Ateliers.

Les cours de langue sont offerts en chacune des quatre années. Chaque élève suit cinq périodes de langue par semaine au cours des deux sessions.

Première année	Cours de langue I
Deuxième année	Cours de langue II
Troisième année	Cours de langue III
Quatrième année	Cours de langue IV

Royal Roads Military College utilise les méthodes suivantes pour noter et accréditer les cours de français langue seconde:

(a) Notes: L'attitude, l'effort et le progrès relatif seront notés en employant l'échelle militaire habituelle de A, B, C +, C, C −, D, F. Ces notes seront soumises à l'Escadre Militaire et feront partie du dossier de l'éducation de l'élève au Collège.

(b) Crédit: Pour chaque série de quinze leçons de Dialogue Canada complétée de façon satisfaisante, il sera accordé un crédit académique de trois unités. Cette mesure objective de progrès académique sera inscrite sur le bulletin académique de l'élève. La note sera reportée comme "crédit" (CR), soutenu, si disponibles, par les scores de l'élève aux tests de compétence des FC dans les catégories, de compréhension auditive, expression orale, compréhension de l'écrit, et expression écrite.

Les élèves-officiers qui ont atteint le niveau fonctionnel bilingue ne suivent que trois périodes de langue par semaine. Les élèves-officiers francophones sont dispensés de suivre les cours de langue.

Courses in language training have the aim of bringing the cadet to the level of "functional bilingualism", as measured by CF Language Proficiency (LP) tests; that is, test scores of at least 3 in listening comprehension and 1 in speaking, with a total test score of at least 10 overall for four skills, including reading and writing. The scale of scores runs from 0 to 5 with the latter corresponding to native-like fluency. Individuals who are "functionally bilingual" should be quite able to conduct military business of a general nature in the second language. Nevertheless, each "functionally bilingual" student will be given the opportunity to progress to the "integral" level.

The method used in language training courses is an audio-visual approach using *Dialogue Canada* and les *Ateliers*. All cadets are tested in second-language competence on entry and will be placed in appropriate sections of 6 to 10 students. Cadets will advance at their own pace and will be moved to more or less advanced sections as required.

Language training courses are designated by year only, with all cadets in first year being enrolled in Language Training I, second year cadets in Language Training II, etc. For cadets who have reached the "functionally bilingual" level, advanced courses meeting fewer periods per week are available (Language Training IA, IIA, etc.).

Language Training I	Conversational French	(0,3,2,0)/(0,3,2,0)
Language Training IA	Conversational French	(0,1,2,0)/(0,1,2,0)
Language Training II	Conversational French	(0,3,2,0)/(0,3,2,0)
Language Training IIA	Conversational French	(0,1,2,0)/(0,1,2,0)
Language Training III	Conversational French	(0,3,2,0)/(0,3,2,0)
Language Training IIIA	Conversational French	(0,1,2,0)/(0,1,2,0)
Language Training IV	Conversational French	(0,3,2,0)/(0,3,2,0)
Language Training IVA	Conversational French	(0,1,2,0)/(0,1,2,0)

Royal Roads Military College uses the following grading and accreditation procedures for second language training courses:

(a) **Grades:** Attitude, effort and relative progress in SLT courses will be graded using the usual military scale of A, B, C+, C, C−, D, F. These grades will be submitted to the Military Wing and will become part of the training record of the cadet at the college.

(b) **Credit:** For each fifteen lessons of Dialogue Canada satisfactorily completed, three units of academic credit will be granted. This objective measure of academic achievement will appear on the cadet's academic transcript. The grade will be reported as "credit" (CR) bolstered, if available, by the cadet's scores on the CFLP tests of listening, speaking, reading, and writing.

Par surcroît le département de la langue seconde offre les cours à crédit mentionnés ci-dessous:

In addition, the Department of Second Language Training offers advanced courses carrying credit as described below:

FRANÇAIS RR212: Cours de grammaire et de composition **(-,-,-,-/3,0,0,4)**

Destiné aux élèves-officiers de deuxième année en lettres qui désirent, en troisième année s'orienter vers les lettres, avec specialisation.

Le cours comprend une révision de grammaire et la lecture de plusieurs contes québécois. Des thèmes sont soumis au cours de l'année.

Offert sur demande. Pré-requis: Niveau fonctionnel ou accepté par le professeur.

FRENCH RR212: Grammar and Composition **(-,-,-,-/3,0,0,4)**

This course is designed for second year Arts students who intend to proceed with an Honours degree and who have attained a reasonable fluency in their second language.

The course content includes a review of grammar, some readings of French-Canadian short stories and some "thèmes" to translate into French. The course is conducted entirely in the second language.

Offered on demand. Prerequisite: Functional level or consent of the instructor.

Carlut & Meiden, *French for Oral & Written Review (2nd Ed.)*
Lacoursière, Provencher & Vaugeois, *Canada-Quebec: Synthese Historique*

FRANÇAIS RR311: Cours de grammaire **(3,0,0,4/-,-,-,-)**

Destiné aux élèves-officiers de deuxième année en lettres, de troisième et de quatrième année.

Le cours comprend une révision approfondie de la grammaire, la lecture des auteurs Canadien-Français, des compositions et des thèmes. Bref, le candidat accroitra sa compétence en la seconde langue, en pratiquant la compréhension et l'expression orales.

Offert sur demande. Pré-requis: accepté par le professeur.

FRENCH 311: Advanced Grammar and Composition **(3,0,0,4/-,-,-,-)**

For second year Arts, third and fourth year students. This course is offered to students who have attained, or who are close to attaining "functional" levels of bilingualism.

The course consists of an in-depth review of grammar, readings of short stories by French-Canadian writers, compositions and "thèmes".

Offered on demand. Prerequisite: consent of the instructor.

Nemni & Ouillard, *Les Ensembles*
Balas & Rice, *Qu'est-ce qui se passe*
Therid & Burks, *Temoins du Monde Francaise*
Brearly & McBride, *Nouvelles du Quebec*
Metford & Metford, *Entriens*

DRILL

Officer in Charge of Drill — Captain J.D. Slater, rmc, BEng.

Drill Sergeant Major — Master Warrant Officer L.P. Baumgarten, CD

Drill Instructor — Sergeant J.O. Boucher, CD

Drill Instructor — Sergeant S.M. Gobuty, CD

Bandmaster — Petty Officer 1st Class G.R. Bruner, 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.R. Schilds, CD
Physical Education Officer — Captain H.G. Pronk, CD, BSc
Chief Instructor — Master Warrant Officer R.M. Buckley, CD
Physical Education and Recreation Instructors:
— Warrant Officer W.E. Sears, CD
— Sergeant J.P.Y. Tremblay, CD
— Corporal (W) 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.

Miller & Allen, *Fitness: A Lifetime Commitment (2nd Ed.)*
Deitman, Barrow, Frey & Wade, *Comprehensive Manual of Foundation and Physical Education Activities For Men and Women*

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.

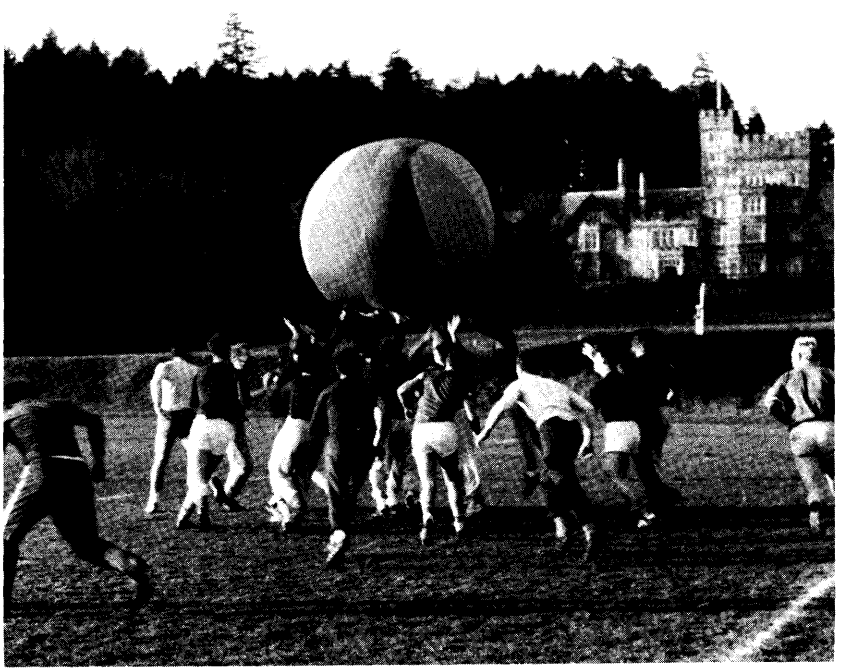
The recreational phase continues the compulsory participation in three intramural sports (one of which must be new to the cadet). Cadets also become involved in the leadership and management of the various recreation clubs at the college, ranging in scope from a camera club to a scuba club. Approximately 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, golf, volleyball, and aquatics. 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.


Royal
Roads



ACADEMIC REGULATIONS

DEFINITIONS

Student: a member of the Canadian Forces attending Royal Roads Military College to study full time for a 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 — Military (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.

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.

Elective: a course selected by the student from several designated offerings to fulfill requirements of an approved 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 term or year in which the course is scheduled, together with the normal academic workload of that term 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 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 the supplemental examination is passed.

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).
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 complete their final two years at either RMC or CMR.

DEGREES

Royal Military College of Canada

4. A degree of Bachelor of Arts, Science or Engineering, as appropriate, shall be granted by the Royal Military College of Canada to a student who has successfully completed his final year at that institution.

Collège militaire royal de Saint-Jean

5. On the recommendation of the authorities at le Collège militaire royal de Saint-Jean, a degree of Bachelor of Arts, Science, or Administration, as appropriate, shall be granted by l'Université de Sherbrooke to a student who has successfully completed his final year at le Collège militaire royal de Saint-Jean. CMR will also, in its own name, grant a graduation certificate of academic and military qualifications to a student of that college who has earned his bachelor's degree and his commission as an officer in the Canadian Forces.

Royal Roads Military College

6. A degree of Bachelor of Science or Arts, as appropriate, shall be granted by Royal Roads Military College to a student who has successfully completed his final year at that institution.

7. A student who completes his final year with first class honours standing will have his degree script inscribed "With Distinction" (see Academic Regulations 24 and 26).

8. 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 years of his program of studies at that institution.

THE PROGRAMS OF STUDY

General Limitations

9. 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.

Required Courses, Royal Roads Military College

10. In the first year, a student at RRMC is required to take all of the courses prescribed in the calendar under "First Year — Degrees in Arts or Administration" or "First Year — Degrees in Science or Engineering".

11. In the second year, a student at RRMC is required to take all of the courses prescribed in the calendar under one of the following:
— "Second Year — Degrees in Arts or Administration";
— "Second Year — General Degree in Science";
— "Second Year — Engineering/Honours Science Degrees";

12a. In the third year, a student at RRMC is required to take all of the courses prescribed in the calendar under one of the following:
— "Third Year — General/Honours Degree in Military and Strategic Studies";
— "Third Year — General Degree in Science";
— "Third Year — Combined Major Degree in Physics and Computer Science";
— "Third Year — Combined Major Degree in Physics and Oceanography".

12b. In the fourth year, a student at RRMC is required to take all of the courses prescribed in the calendar under one of the following:
— "Fourth Year — General/Honours Degree in Military and Strategic Studies";
— "Fourth Year — General Degree in Science";
— "Fourth Year — Combined Major Degree in Physics and Computer Science";
— "Fourth Year — Combined Major/Honours Degree in Physics and Oceanography".

13. Admission into the degree programs completed at RRMC requires the satisfactory completion of second year at any CMC with the following prerequisites:

— General Degree in Science

any CMC Science or Engineering program of study which includes a course in chemistry.

— Combined Major in Physics and Oceanography

any CMC Science or Engineering program of study which includes courses in chemistry and Mathematics RR241, and Engineering RR232, or their equivalents. A weighted grade average of at least D+ 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 chemistry and Mathematics RR241 and Mathematics RR252 or their equivalents. A weighted grade average of at least D+ is required in mathematics, science and engineering courses.

— General or Honours Degree in Military and Strategic Studies

any CMC program of studies — Arts, Administration, Science or Engineering.

Honours Degree Program

14a. 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 B in third year mathematics, science and engineering subjects. Students who have achieved less than second class honours may be admitted to the Honours program on a probationary basis with Faculty Council approval.

14b. 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.

EXTRA COURSES

15. In certain years of some programs of study a student may, with the permission of the Faculty Council, register in an extra course over and above those required for the given program of study. The grade received in such a course is counted when calculating the student's overall average and class standing.

DRILL AND PHYSICAL EDUCATION

16. Courses in drill and physical education must be taken by all students in all years at all colleges.

CONTINUITY OF STUDY

17. Under normal circumstances, a student at a Canadian Military College may not postpone a semester or a year of study.

CHANGES IN REGISTRATION (RRMC)

18. Any change in registration in a program of study or in a course (including an extra course) requires the permission of the Faculty Council.

19. A student 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 he wishes to enter.

ATTENDANCE

20. Students are required to attend all classes unless placed on the voluntary attendance list by the Commandant, but must attend all laboratory sessions and class tests. Individual instructor approval must be obtained prior to missing a specific lecture or tutorial.

21. 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

22. A student who fails to maintain a satisfactory academic standing may be subject to such restrictions of privilege as may be recommended by the Faculty Council and approved by the Commandant.

23. 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 the Faculty Council.

GRADES

24. Final grades in all courses will be reported as follows:

First Class Honours	(75% and over)	graded A
Second Class Honours	(66 to 74%)	graded B
Third Class Honours	(60 to 65%)	graded C
Pass	(50 to 59%)	graded D
Failure	(40 to 49%)	graded F
Serious Failure	(less than 40%)	graded FF

25. 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

26. At the end of each year a student's numerical grade average and rank in class will be calculated by adding together, for all courses taken, the product of the numerical grade in each course times the units of credit assigned to that course and dividing the sum by the total number of units of credit carried (including any extra courses). Final grades in courses are granted by the Faculty Board, subject to confirmation by the Faculty Council. Marks obtained in supplemental examinations may not be used to advance a student's academic grade average for the semester or year.

27. To be granted pass standing for a year, and to be allowed to continue into the subsequent year, a student must obtain a final weighted grade average over the year's work of at least D. A student must obtain a final grade of at least D in each course of his program of study (other than second language training courses — see description under Department of Second Language Training); or must successfully write supplemental examinations in failed subjects (see Academic Regulations 36, 37 and 39). However, with the permission of the Faculty Council, a student

who fails to obtain a D standing in one subject may carry that course or an authorized equivalent into the subsequent year. Satisfactory progress in second language training courses is expected.

28. To be allowed to continue into the second semester of a year, a student should normally obtain a grade of at least D in each final examination written, or successfully write supplemental examinations in failed subjects (see Academic Regulations 36, 37 and 39). However, with the permission of the Faculty Council, a student who fails to obtain D standing in one subject in the first semester may carry that subject into the subsequent semester or year.

29. To complete pass standing in each semester, a student must reach a satisfactory standard in physical education and in drill, and must receive a favourable report in officer-like qualities.

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 seminars 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.

33. A student or special student may be refused permission by Faculty Council to write his final examination:

    a. in any course in which he fails to meet the requirements with regard to assignments; or

    b. in any course involving practice work in a laboratory, if this work has been unsatisfactory.

34. All instructors will 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. In the first semester of a year, a student may write supplemental examinations in not more than two subjects, or in not more than three subjects, providing that one of the failed subjects carries not more than one unit of credit.

37. In the second semester of a year, a student may write supplemental examinations in not more than two subjects, or in not more than three subjects, providing that one of the failed subjects carries not more than one unit of credit and that his grade average over the year's work in his program of study is D or better.

38. Supplemental examinations shall be written at dates and times to be specified by the 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.

39. To obtain pass standing in a supplemental examination, an officer cadet must obtain a grade of D or better, normally not including the previous term work or final examination work.

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 the 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:

    a. his overall grade average for the year is less than D;

    b. he is ineligible to write supplemental examinations in failed subjects as per Academic Regulations 36 and 37;

    c. he fails a supplemental examination and is not granted failed-credit standing or is not allowed to carry a failed course; or

    d. he fails a course he has been allowed to carry.

REPEATING A YEAR

43. 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 his own expense. Normally, a student who has failed in courses totalling as much as 50 percent of the units of credit written in the final examinations would not be considered academically eligible to repeat. Except as noted in Regulation 44, a student permitted to repeat must repeat the entire year including any courses, or their equivalent, passed in the first attempt.

44. A student who fails his year as a result of failing his work for the first semester to the degree that he is not permitted for academic reasons to enter the second semester may be permitted to repeat the first semester at his own expense.

45. A student may repeat a year only if authorized by NDHQ on the recommendation of the Faculty Council and the Commandant.

46. A student may be permitted to repeat any year, including the fourth year.

47. A student may be permitted to repeat the second year in Engineering if he has failed to qualify for Engineering as required by Academic Regulations.

48. A student may repeat a year only once during his career at a Canadian Military College.

49. A student permitted to repeat a year must do so at the first opportunity.

50. A student permitted to repeat a year must carry the equivalent work load of his full program of study.

WITHDRAWAL

51. A student who fails in more than 50 percent of the units of work written in any semester final examinations will normally be required to withdraw.

52. A student who fails a semester or year, having previously failed a semester or year, must withdraw.

53. A student 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.

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, OMM, 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	RHC	1979-1983
Captain (N) W.J.A. Draper	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 Dickens, 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