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# **The Royal Military College Handbook 1977**

**THE ROYAL MILITARY COLLEGE OF AUSTRALIA  
DUNTROON  
AUSTRALIAN CAPITAL TERRITORY**

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**ADDENDUM NO 2**

*Degree Rules and Programmes of Study*

**Military requirements for the degrees of Bachelor of Arts in Military Studies and Bachelor of Science in Military Studies**

SCHEDULE M

1. All candidates for either degree shall undertake a common programme of training in the subjects listed under the broad headings of Military Art, Military Science and Military Technology and the programme shall extend over four years.

2. During each of the first three years, the requirements of the programme shall, in the main, be completed in a five-week period prior to the commencement of the academic year and in a three-week period after the end of that academic year. However continuation training shall extend over the whole of the 30-week academic year.

3. The fourth year shall be devoted entirely to the military training programme and shall extend over a period of 47 weeks

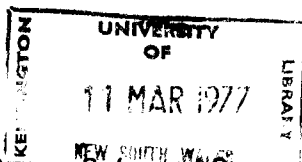
4. The individual subjects contained in the programme of military requirements are:

(a) *Military Art*

- (i) Physical Education—Theory of physical training applied to physical endurance, battle efficiency, general gymnastics and sport.
- (ii) Military Law—History, principles and practices of Military Law.
- (iii) Military Administration—Personnel, stores and finance in a theatre of operation; a study of logistic support.
- (iv) Tactics—A study of the defence, withdrawal and attack phases of war and counter-revolutionary operations.
- (v) Organization and Management—Staff duties, training and intelligence.

(b) *Military Science*

- (i) Arms Training—A detailed study of weapons support and facilities available from various branches of the Army—armour, artillery and nuclear support, Army aviation, military engineering, signals.
- (ii) Topography—An advanced study of the principles of map and airphoto reading, position finding and navigation.



### *Degree Rules and Programmes of Study*

- (iii) Field Projects—The application of the principles of tactics to the command of an infantry platoon; field exercises.
- (iv) Military Experience—Attachment to a training unit to obtain practical military experience.

#### (c) *Military Technology*

- (i) Military Weapons—Design, operation and maintenance of infantry weapons, firepower of current Army weapons.
- (ii) Research and Development—Preparatory lectures and directed reading—visits and attachments to research and development establishments, Army Design Establishment, selected research institutions and industries.

### **Military requirements for the degrees of Bachelor of Engineering in the Faculty of Military Studies, Bachelor of Arts with Honours and Bachelor of Science with Honours in the Faculty of Military Studies**

#### SCHEDULE ME

1. All candidates for the degree shall undertake a programme of training in the subjects listed under the broad headings of Military Art, Military Science and Military Technology and the programme shall extend over four years.
2. During each of the four years, the main requirements of the programme shall be completed in a five-week period prior to the commencement of the academic year and in a three-week period after the end of that academic year. However, continuation training shall extend over the whole of the 30-week academic year.
3. The individual subjects contained in the programme of military requirements are:

#### (a) *Military Art*

- (i) Physical Education—Theory of physical training applied to physical endurance, battle efficiency, general gymnastics and sport.
- (ii) Military Law—History, principles and practices of Military Law.
- (iii) Military Administration—Personnel, stores and finance in a theatre of operation; a limited study of logistic support.
- (iv) Organization and Management—Staff duties, training and intelligence.



## *Degree Rules and Programmes of Study*

### *(b) Military Science*

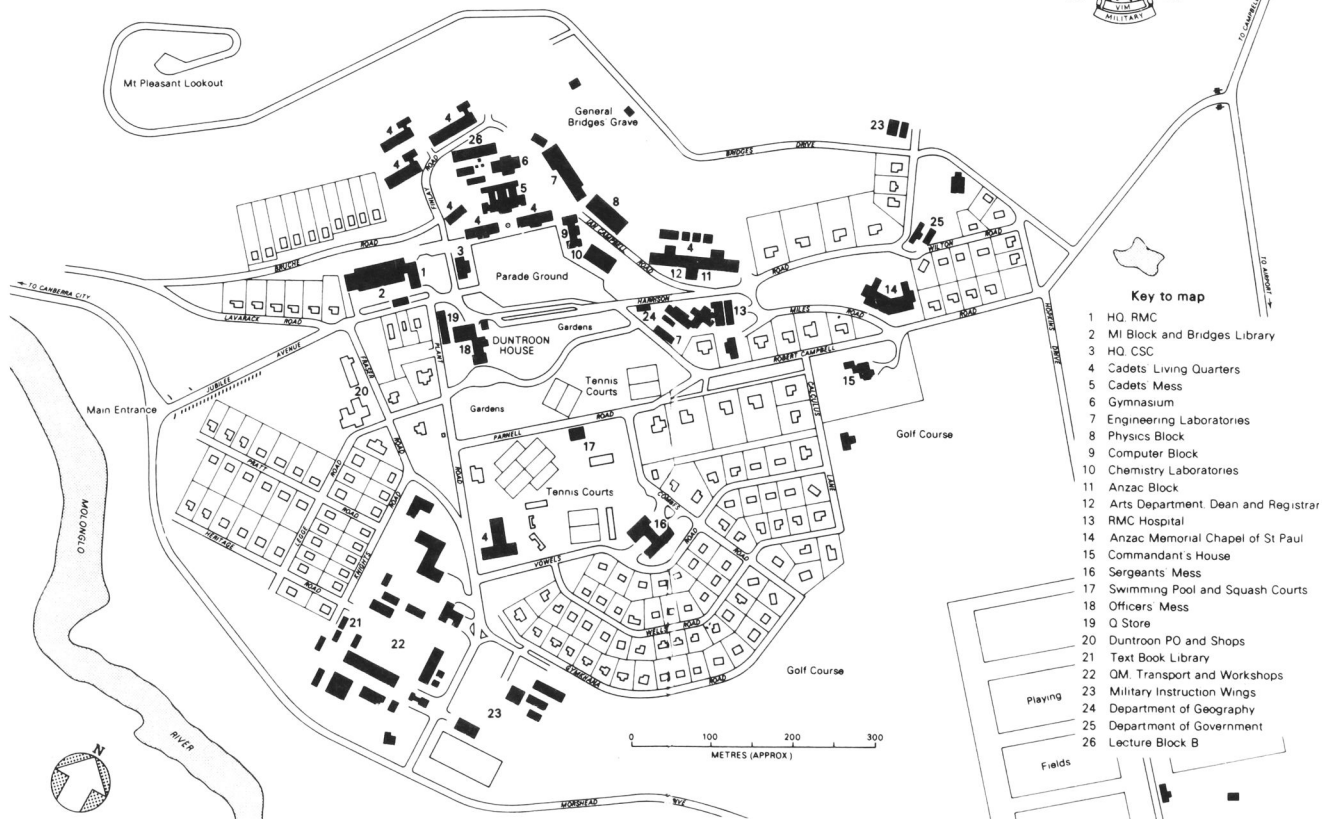
- (i) **Arms Training**—Knowledge of weapons support and facilities available from various branches of the army—armour, artillery, army aviation, military engineering, signals.
- (ii) **Field Projects**—The application of the principles of tactics to the command of an infantry platoon field exercises.

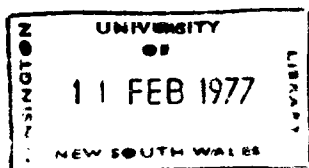
### *(c) Military Technology*

**Military Weapons**—Design, operation and maintenance of infantry weapons, firepower of current Army weapons.

**THE ROYAL MILITARY COLLEGE HANDBOOK 1977**

# THE ROYAL MILITARY COLLEGE OF AUSTRALIA





# **The Royal Military College Handbook 1977**

The Royal Military College is in affiliation with  
the University of New South Wales through  
the Faculty of Military Studies

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# **The Royal Military College**

## **Handbook 1977**

### **Origins and development of the Royal Military College**

The Royal Military College of Australia was opened by the Governor-General of Australia, Lord Dudley, on 27 June 1911. The idea that Australia should have its own military college received serious consideration after the federation of the six Australian colonies in January 1901. In 1902 the first commander of the Australian Military Forces, Major-General (afterwards Lieutenant-General) Sir Edward Hutton of the British Army, recommended that a military college be established along the lines of West Point in the United States of America, R.M.C. Kingston in Canada, and of the Great Public Schools of England. The Defence Act of 1909 which introduced compulsory military training for home defence also made provision for the establishment of a military college. Before the Defence Act came into operation the Government had invited Field-Marshal Lord Kitchener to visit Australia and advise it on the defences of the Commonwealth. Among the recommendations of Kitchener's comprehensive report of 1910 was that a college should be established for the training of officers of the permanent military forces. The Government then instructed Colonel (afterwards Major-General Sir) William Throsby Bridges, the Australian representative on the Imperial General Staff in London, to visit and report on military colleges in England, Canada and the United States with a view to setting up a college suited to Australian requirements. Colonel Bridges reported to the Minister for Defence in June 1910 and in the same year was appointed commandant of the proposed Military College of Australia.

The Government decided that the college should be established near Canberra, provided a suitable site could be found. Brigadier-General Bridges visited the Federal (Australian) Capital Territory and chose Duntroon, a sheep station, which had been taken up by Robert Campbell, colonial merchant and pastoralist, in 1825. The Duntroon property was first leased and then purchased by the Commonwealth Government from the Campbell family.

The first intake consisted of forty-two staff cadets, including ten from New Zealand. Although a four-year course in both military and academic work had been planned, the first class was specially graduated for service with the First A.I.F. and the N.Z.E.F. in August 1914. Forty of the 117 Australian graduates of the first four entries (1911-14) died on war service in the Great War, 1914-18, including seventeen at Gallipoli where the College's first Commandant also fell.

After the First World War Australia's RMC continued to develop and train officers for Australia's defence needs: until 1930 the College also trained officers for long service commissions in the Royal Australian Air Force. In 1931-36 the College was transferred to Victoria Barracks, Sydney, as an economy measure;

it reopened at Duntroon in February 1937. In this year the College's first permanent buildings were constructed and since then there has been a slow but continuing building program to cater for increased numbers and more varied and more demanding courses.

The course, which is conceived as a whole, comprises both military and academic studies. The duration of the course has usually been four years, but during World War II courses varied in length from six to thirty months.

By agreement with the Department of the Army in 1968 the University of New South Wales at Kensington, Sydney, established a Faculty of Military Studies at the Royal Military College. The Faculty is responsible for conducting full university courses at the College in Arts, Applied Science and Engineering leading to the award of the University's degrees of Bachelor of Arts in Military Studies, Bachelor of Arts with Honours, Bachelor of Science in Military Studies, Bachelor of Science with Honours and Bachelor of Engineering. Since its foundation over two thousand officer cadets have graduated from Australia's RMC.

\* \* \*

Duntroon is about three kilometres north-east of Capital Hill in the City. It is situated on the eastern slopes of Mount Pleasant (665 metres) overlooking the Molonglo plain; the surrounding country is undulating, well timbered, and eminently suited for military training. A variety of training environments is within a radius of 160 kilometres. The College itself occupies 150 hectares including staff quarters, playing fields, gardens and golf course. A field firing range is located nearby east of Mounts Ainslie and Majura.

The climate of the Australian Capital Territory is continental in type—hot summers and cold winters. The altitude of Canberra (590 metres) has a moderating influence on the summer temperature (January mean, 21°C) and tends to lower the winter temperature (July mean, 6°C). Relative humidity is low in summer. Canberra's average annual rainfall of 625 mm is equally distributed throughout the year, and the average rainfall variability is low. Winds are low largely owing to the protection of the mountains in the west: this fact tends to reduce the uncomfortable effects of extremes of temperature. In summary, the climate is healthy and invigorating.

## **The Charter of the Royal Military College**

The Charter of the Royal Military College is to train cadets for careers in the service of the Crown as officers in the Australian Army. Its aim is to give each cadet the knowledge necessary to fit him to enter upon such a career, and to foster in him the moral and mental qualities on which leadership depends. The course of instruction is designed to:

- (a) promote a sense of honour and loyalty, duty and responsibility; inculcate habits of discipline and soldierly conduct; and to give a correct understanding of the place of the Armed Services in the Australian nation;
- (b) provide a balanced and liberal education in the Arts and Sciences, taking into account the special needs of the Service and the aptitude of the cadet;
- (c) develop a capacity for clear and logical thought and expression;
- (d) give a sound military education in the science and principles of war; and
- (e) instruct the cadet in the military skills and techniques of modern warfare required of the junior regimental officer.

## **Affiliation with the University of New South Wales**

In 1967, the Department of the Army and the University of New South Wales agreed to co-operate in developing the Royal Military College into a separate autonomous degree-granting body within a period of ten years. The College entered into an affiliation with the University in 1968, and the University established a Faculty of Military Studies at Duntroon. The affiliation will extend past 1977 under a new agreement between the Minister for Defence and the University.

The Faculty of Military Studies is responsible for conducting courses at the College in Arts, Applied Science and Engineering, leading to the award of the University's degrees of Bachelor of Arts in Military Studies (BA(Mil)), Bachelor of Arts with Honours (BA), Bachelor of Science in Military Studies (BSc (Mil)), Bachelor of Science with Honours (BSc) and Bachelor of Engineering (BE).

## **Australian Defence Force Academy**

In March 1974 the Minister for Defence announced that the Government had decided to establish the Australian Defence Force Academy at Duntroon and that this would replace the existing separate service colleges. The development of the Royal Military College and the Faculty of Military Studies will now be towards this goal.

## **The Interim Council of the Royal Military College**

The Interim Council of the Royal Military College advises the University and the Military Board on facilities required for instruction at Duntroon, and on other matters relating to the College, including any action which might be taken to promote the objects and interests of the College and the University.

### **Membership 1977**

#### *Chairman*

Major-General R. A. HAY, CB, MBE, idc, psc, psc (US),  
Commandant, Royal Military College

#### *Members*

Mr N. J. ATTWOOD, BCom *Melb.*, First Assistant Secretary, Personnel  
Administration and Policy, Department of Defence

Professor F. W. AYSCOUGH, BSc *Syd.*, MSc *N.S.W.*, CEng, FICHEME,  
ARACI,

Head, School of Chemical Technology, University of New South Wales

Mr P. J. BOWLER, BA Dip Ed, *Syd.*,  
Assistant Secretary, Department of Education

Professor J. C. BURNS, MSc *N.Z.*, BA *Camb.*, PhD *Manc.*,  
Dean of the Faculty of Military Studies,

Professor H. BURTON, CBE, BA *Qld.*, MA *Oxon. & Melb.*, Hon LLD *Qld.*,  
FACE, FASSA,  
Emeritus Professor of the Australian National University

Mr J. D. CASHMAN, BE *N.S.W.*, MSc BA *A.N.U.*,  
Member elected by the Royal Military College Academic Staff

Colonel J. M. CHURCH, DSO, psc,  
Director of Army Training, Department of Defence (Army Office)

Colonel A. CLUNIES-ROSS, MBE, jssc, psc, psc (US),  
Director of Military Art, Royal Military College

The Honourable Mr Justice R. W. FOX,  
Senior Judge of the Supreme Court of the Australian Capital Territory

Professor E. P. GEORGE, BSc PhD *Lond.*, DSc *N.S.W.*, FInstP, FAIP,  
Head, School of Physics, University of New South Wales

Professor H. E. GREEN, ME *Adel.*, PhD *Ohio State*, CEng, FIEAust,  
FIREE Aust., SMIEEE, jssc,  
Chairman of the Faculty of Military Studies

Mr H. B. S. GULLETT, MC, BA *Oxon.*

Mr Lewis LUXTON, CBE, MA *Camb.*, psc

Professor D. M. McCALLUM, BA *Syd.*, MA BPhil *Oxon.*,  
Head, School of Political Science, University of New South Wales

Professor D. W. McELWAIN, ED, MA *NZ & Melb.*, PhD *Lond.*, FBPSS, FAPSS,

Professor of Psychology, University of Queensland

Professor R. H. MYERS, CBE, MSc PhD *Melb.*, Hon. LLD *Strath.* FIM, FRACI, FAIM, MAusIMM,

Vice-Chancellor, University of New South Wales

Colonel R. K. G. PORTER, OBE, jssc, G,

New Zealand Defence Liaison Staff

Professor C. G. F. SIMKIN, MA DipSocSc *N.Z.*, DPhil *Oxon.*,

Professor of Economics, University of Sydney

Dr W. H. SMITH, BSc(Econ) MPhil *Lond.*, PhD *A.N.U.*,

Member elected by the Royal Military College Academic Staff

Professor R. STREET, PhD, DSc, *Lond.*, FAIP, FInstP, MIEE,  
Director, Research School of Physical Sciences, Australian National University

Professor R. E. VOWELS, ME *Adel.*, SMIEEE, CEng, FIEAust, MIEE,

Pro-Vice-Chancellor, University of New South Wales

Major-General J. WHITELOW, CBE, psc

Chief of Personnel, Department of Defence (Army Office)

Professor A. H. WILLIS, DSc (Eng) *Lond.*, CEng, FIMechE, FIEAust, MemASAE, WhSc,

Pro-Vice-Chancellor, University of New South Wales

#### *Secretary*

Mr R. W. O. PUGH, BE *Syd.*, BA *A.N.U.*, psc

Registrar, Royal Military College

## **Terms of Reference for the Interim Council of the Royal Military College (January 1968)**

1. There shall be an Interim Council of the Royal Military College, and it shall replace the Standing Committee on the Royal Military College Curriculum.

2. The Interim Council of the Royal Military College shall consist of:

The Commandant, as chairman,

The Director of Military Art,

The Director of Training Policy,

Five professors nominated by the Minister for the Army from universities other than the University of New South Wales,

A nominee of the Minister for Education and Science,

The Secretary, Department of the Army,

A representative of the Minister for Defence,

A military member of the Military Board (to be nominated by the Military Board),

A representative of the New Zealand Army (to be nominated by the CGS of the New Zealand Army),

Five members of the University of New South Wales (to be nominated by the University after receiving the advice of the Professorial Board),

Not more than three persons prominent in civil life other than in the academic field (to be nominated by the Military Board),

Two members of the teaching staff of the College selected by the teaching staff of lecturers, senior lecturers, associate professors and professors at the College and elected in the manner prescribed in section 29 of Chapter 11 of the By-Laws made under the Technical Education and University of New South Wales Act, 1949 as amended by subsequent acts or under any act repealing that section,

The Vice-Chancellor of the University of New South Wales or on his nomination a Pro-Vice-Chancellor in his place,

The Dean of the Faculty of Military Studies,

Not more than two other members co-opted by the Interim Council for such period not exceeding two years at a time as that Council may determine.

Members of the Interim Council other than those who hold office *ex officio* shall normally hold office for a period not exceeding two years at a time.

3. The Interim Council shall advise the University and the Military Board:

(a) on facilities required for instruction at the College,

(b) on other matters relating to the College, including any action which might be taken to promote the objects and interests of the College and the University.

It shall report annually to the University and to the Military Board on activities at the College.

4. The Interim Council shall have the following functions:

- (a) With regard to the courses presented by the Faculty of Military Studies of the University of New South Wales:
  - (1) It shall receive reports from the Faculty and make relevant recommendations to the Military Board.
  - (2) It shall examine the courses of instruction at the Royal Military College in relation to the Military Board's policy on the College.
  - (3) It shall invite the attention of the Faculty to such aspects of the Military Board's policy on the Royal Military College as may affect the academic courses, and request reports where necessary.
- (b) It shall examine all other courses of instruction at the Royal Military College in relation to the Military Board's policy on the College.
- (c) It shall examine such other matters as are referred to it by the Military Board, the Council of the University of New South Wales, the Faculty of Military Studies and the Commandant.

5. The Interim Council shall recommend any variations in the educational qualifications for entry to the Royal Military College, after consultation with the University of New South Wales.

6. The Interim Council shall meet twice a year, normally in the fourth week of March and the fourth week of September, and on such other occasions as may be considered necessary.

7. There shall be an Executive Committee of the Interim Council which shall act on the Interim Council's behalf and function under such delegations as the Interim Council shall deem it appropriate to make. All decisions and actions taken by the Executive Committee will be reported to the Interim Council out of session. The Executive Committee will normally meet in the first week of February, of June and of August, and on such other occasions as may be considered necessary.

8. The Executive Committee shall consist of:

- The Commandant, as chairman,
- The Director of Military Art,
- The Dean of the Faculty of Military Studies,
- One of the five professors from universities other than the University of New South Wales,
- The Military member from the Military Board,
- The representative of the New Zealand Army,
- The Vice-Chancellor of the University or on his nomination a Pro-Vice-Chancellor in his place,
- One of the members from the University of New South Wales.

9. The Interim Council shall have power to appoint sub-committees for specified purposes, but appointment of sub-committees shall not in any way affect the authority of the Interim Council to advise the University and the Military Board on any matter relating to the College.



10. The Interim Council from time to time shall make recommendations to the Military Board regarding its own powers and functions.

11. At an appropriate time within the next ten years, the Interim Council shall make recommendations to the Military Board regarding the creation of the Council of the Royal Military College and the advancement of the Royal Military College to degree-granting status in its own right.

### **Rules of Procedure for the Interim Council of the Royal Military College (January 1968)**

1. The Interim Council shall meet normally in the fourth week of March and the fourth week of September, and on such other occasions as may be considered necessary. Ordinarily meetings will be convened on two months' notice. Extraordinary meetings may be called by the Chairman on one month's notice; and he shall call an extraordinary meeting on the written requisition of any four members, which requisition shall state the objects of the meeting. All papers relevant to a meeting will be dispatched to members two weeks beforehand.

2. The Commandant, or, in his absence, the officer administering command of the Royal Military College, shall preside at meetings of the Interim Council.

3. All questions before the Interim Council shall be decided by a majority vote by the members present. The Chairman shall have a vote and in case of equality of votes, a second or casting vote. At any meetings of the Interim Council, ten members shall form a quorum.

4. The proceedings of the Interim Council shall be presented as a report. The report shall be circulated in draft to the members for confirmation after the meeting, and upon their approval shall be signed by the Chairman as the true report of the meeting.

5. The Registrar of the Royal Military College shall be Secretary of the Interim Council and shall be responsible for the preparation and dispatch of all material relevant to its meetings, and for the reproduction of the Interim Council's reports.

6. The Executive Committee of the Interim Council shall meet normally in the first week of February, June and August of each year, and on such other occasions as may be considered necessary. Meetings will be convened on one month's notice, and all papers relevant to the meeting dispatched two weeks beforehand.

7. The Commandant, or, in his absence, the officer administering command of the Royal Military College, shall preside at meetings of the Executive Committee.

8. All questions before the Executive Committee shall be decided by a majority vote by the members present. The Chairman shall have a vote and, in the case of equality of votes, a second or casting vote. At any meeting of the Executive Committee five members shall form a quorum.

9. The proceedings of the Executive Committee shall be recorded as minutes. The minutes shall be circulated in draft to members for confirmation after each meeting and, upon their approval, shall be signed by the Chairman as a true record of the meeting.

10. The minutes of the Executive Committee shall be circulated to all members of the Interim Council as soon as practicable after each meeting.

11. At its meetings in February and August the Executive Committee shall decide upon the agenda for the plenary meetings of the Interim Council immediately following. The Registrar of the Royal Military College shall be the Secretary of the Executive Committee and be responsible for preparing the agenda as directed by the Executive Committee.

12. Any business which requires the attention of the Interim Council out of session will normally be dealt with by correspondence. The Secretary will be responsible for the conduct of such business as directed by the Executive Committee or the Commandant. Whenever expedient, memoranda should be in the form of circulars and brief minutes, over the Secretary's signature.

## **Staff of the Royal Military College**

### **COMMANDANT**

Major-General R. A. HAY, CB, MBE, idc, psc, psc (US)

### **MILITARY STAFF**

#### *Deputy Commandant and Director of Military Art*

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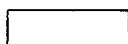
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# RMC CALENDAR 1977

Term	Week	Month	Dates	Class		
				4	3	2 & 1 ME 1 (Sched M)
1	0	Jan	17-22			
	1		23-29			
	2	Jan-Feb	30- 5			
	3		6-12			
	4		13-19			Orientation Tour 11-18 Feb
	5		20-26			
	6	Feb-Mar	27- 5			
	7		6-12			
	8		13-19			
	9		20-26			
	10	Mar-Apr	27- 2			
	11		3- 9			
	12		10-16		Easter Leave 7-13 Apr 77	
	13		17-23			ARTY/MOR Trg
	14		24-30			
	15	May	1- 7			
	16		8-14			Defensive Ops Ex
UNSW Recess	17		15-21	Visit FF Units		Leave
2	18		22-28		Leave/Studies	
	19	May-Jun	29- 4			
	20		5-11			
	21		12-18			
	22		19-25			
UNSW Mid-Year Recess	23	Jun-Jul	26- 2		Mid-Year Exams—Engr/Sc 27 Jun-5 Jul	
	24		3- 9			
	25		10-16			
	26		17-23			IMT Ex



Academic Studies



Military Studies

# RMC CALENDAR 1977

Term	Week	Month	Dates	Class			
				4	3	2 & 1 ME	1 (Sched M)
2	27		24-30				
	28	Jul-Aug	31- 6				
	29		7-13				Offensive Ops Ex 4-12 Aug
	30		14-20				Leave
	31		21-27		Leave/Studies		
UNSW Recess	32	Aug-Sept	28- 3				
	33		4-10				
	34		11-17				
	35		18-24				
	36	Sept-Oct	25- 1				Special Ops Ex Land Warfare Centre Ex Canungra 25 Sept-17 Oct
	37		2- 8				
	38		9-15				
	39		16-22				
3	40		23-29				Staff Duties Ex
	41	Oct-Nov	30- 5		Studies/Examinations		Tele Battle
	42		6-12				FD Trg Prep
	43		13-19				
	44		20-26			Field Training	
	45	Nov-Dec	27- 3				
	46		4-10		Preparation for Graduation		
	47		11-17		Graduation		



Academic Studies



Military Studies

## Principal Dates in 1977

### January—

17 . . . . .	First Class and NCOs from Second Class return from leave
18 . . . . .	Remainder of Second Class, Third Class and Fourth Class repeats return from leave
19 . . . . .	New Entry marches in
24 . . . . .	Military training begins
26 . . . . .	Executive of the Professorial Board meets

### February—

1 . . . . .	Professorial Board meets
2 . . . . .	Academic Timetable Committee meets
4 . . . . .	Bridges Memorial Library Committee meets
4 . . . . .	Timetable Committee meets
4 . . . . .	Dean's Advisory Committee meets
11 . . . . .	Higher Degree Committee meets
11 . . . . .	Executive of the Faculty of Military Studies meets
11-18 . . . . .	First Class visit to combined demonstration
11 . . . . .	Fourth Class applications for academic courses due
13-27 . . . . .	Akabri cadets visit RMC
16 . . . . .	Computer Committee meets
23 . . . . .	Executive of the Professorial Board meets
24 . . . . .	Executive of the Interim Council meets
25 . . . . .	Fourth Class enrolments in academic courses
26 . . . . .	Inter-Service Colleges swimming competition at Point Cook
27 . . . . .	Commencement Dinner Officers' Mess
27 . . . . .	Commencement Church Service
28 . . . . .	Academic year begins
28-4 March . . . . .	First Class Engineering and Signals exercise

### March—

1 . . . . .	Professorial Board meets
2 . . . . .	Arts Committee meets
4 . . . . .	Dean's Advisory Committee meets
4 . . . . .	Bridges Memorial Library Committee meets
8-9 . . . . .	DMA's Board of Studies for Second, Third and Fourth Classes
11 . . . . .	Higher Degree Committee meets
11 . . . . .	Faculty of Military Studies meets
12 . . . . .	Five Way Athletic meeting
14 . . . . .	Canberra Day Public Holiday
16 . . . . .	Engineering Committee meets
17 . . . . .	Interim Council meets

17 . . . . .	Military Studies Examinations Committee meets— Study Area 1
19 . . . . .	Inter-Company Athletic meeting
21-22 . . . . .	DMA's Board of Studies—First Class
23 . . . . .	Science Committee meets
23-25 . . . . .	School Careers Advisers visit
24-25 . . . . .	Chapel Benefit Display—1812 Overture
26 . . . . .	ISCAM at RMC
29 . . . . .	Inter-Company cross-country run
30 . . . . .	Executive of the Professorial Board meets
31 . . . . .	Last day for course changes
30-1 April . . . . .	1/77 Schoolboys visit
April—	
1 . . . . .	Dean's Advisory Committee meets
5 . . . . .	Professorial Board meets
7 . . . . .	Bridges Memorial Library Committee meets
7-13 . . . . .	Easter leave
7-13 . . . . .	Fourth Class recreation camp
15 . . . . .	Higher Degree Committee meets
15 . . . . .	Executive of the Faculty of Military Studies meets
18-22 . . . . .	Artillery/Mortar exercise at Holsworthy—First Class
20-22 . . . . .	2/77 Schoolboys visit
25 . . . . .	ANZAC Day public holiday
27 . . . . .	Executive of the Professorial Board meets
May—	
3 . . . . .	Professorial Board meets
3-6 . . . . .	1/77 Headmasters visit
6 . . . . .	Dean's Advisory Committee meets
6 . . . . .	Bridges Memorial Library Committee meets
7 . . . . .	CSC Drill competition
9-13 . . . . .	Field Exercise—Defensive Operations—First Class
13 . . . . .	Higher Degree Committee meets
13 . . . . .	Executive of the Faculty of Military Studies meets
14 . . . . .	First term ends
15-21 . . . . .	Fourth Class visits Field Force units
16-21 . . . . .	UNSW recess
23 . . . . .	Second term begins for First Class
24 . . . . .	Military Studies Examinations Committee meets— Study Area 2
30 . . . . .	Second academic term begins
June—	
1 . . . . .	Executive of the Professorial Board meets
1 . . . . .	Computer Committee meets
3 . . . . .	Higher Degree Committee meets

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3	. . . . .	Faculty of Military Studies meets
3	. . . . .	Bridges Memorial Library Committee meets
7	. . . . .	Professorial Board meets
7-10	. . . . .	2/77 Headmasters visit
10	. . . . .	Dean's Advisory Committee meets
11	. . . . .	Queen's Birthday parade and ball
13	. . . . .	Queen's Birthday holiday
15	. . . . .	Arts Committee meets
16	. . . . .	Executive of the Interim Council meets
20-23 July	. . . . .	UNSW mid-year recess
22	. . . . .	Engineering Committee meets
27-5 July	. . . . .	Study and examinations for Applied Science and Engineering courses
29	. . . . .	Executive of the Professorial Board meets
29	. . . . .	Science Committee meets
29	. . . . .	RMC Review
30	. . . . .	Bridges Memorial Library Committee meets
July—		
1	. . . . .	Dean's Advisory Committee meets
5	. . . . .	Professorial Board meets
11-23	. . . . .	UNSWR visit RMC
13-14	. . . . .	DMA's mid-year review—Arts
15	. . . . .	Executive of the Faculty of Military Studies meets
15	. . . . .	Higher Degree Committee meets
20-21	. . . . .	DMA's mid-year review—Engineering and Science
27	. . . . .	Executive of the Professorial Board meets
27	. . . . .	Arts Committee meets
August—		
1	. . . . .	Last day for withdrawal from subjects for Fourth Class
2	. . . . .	Professorial Board meets
3	. . . . .	Engineering Committee meets
5	. . . . .	Dean's Advisory Committee meets
5	. . . . .	Bridges Memorial Library Committee meets
5-12	. . . . .	Field Exercise—Offensive Operations at Holsworthy—First Class
10	. . . . .	Science Committee meets
12	. . . . .	Higher Degree Committee meets
12	. . . . .	Faculty of Military Studies meets
13	. . . . .	Second academic term ends
14	. . . . .	All Classes proceed on leave and studies
15	. . . . .	CDFS Conference at RMC
16-20	. . . . .	CGS Exercise at RMC
19-3 September	. . . . .	Visit to Akabri
21	. . . . .	First Class return from leave

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22 . . . . .	Military Studies Examinations Committee meets— Study Areas 3 and 5
24-25 . . . . .	DMA's Board of Studies—First Class and selected students
29-3 September	UNSW recess
31 . . . . .	Executive of the Professorial Board meets
September—	
2 . . . . .	Bridges Memorial Library Committee meets
3 . . . . .	First Class Schedule ME, Second, Third and Fourth Classes return from leave
5 . . . . .	Third academic term begins
5-9 . . . . .	First Class field exercise
6 . . . . .	Professorial Board meets
7 . . . . .	Computer Committee meets
8 . . . . .	Executive of the Interim Council meets
9 . . . . .	Higher Degree Committee meets
9 . . . . .	Executive of the Faculty of Military Studies meets
16 . . . . .	Dean's Advisory Committee meets
21 . . . . .	Last day for applications for academic courses for 1978
24-25 . . . . .	Visit to Hawkesbury Agricultural College
25-17 October	LWC course at Canungra—First Class
26 . . . . .	Military Studies Examination Committee meets— Study Area 4
28 . . . . .	Executive of the Professorial Board meets
October—	
3 . . . . .	Labour Day holiday
4 . . . . .	Professorial Board meets
6 . . . . .	Interim Council meets
7 . . . . .	Dean's Advisory Committee meets
7 . . . . .	Bridges Memorial Library Committee meets
14 . . . . .	Higher Degree Committee meets
14 . . . . .	Executive of the Faculty of Military Studies meets
20-21 . . . . .	DMA's Board of Studies Second, Third and Fourth Classes
21 . . . . .	Lectures end for Arts students
22 . . . . .	CSC Battle Fitness Competition
24 . . . . .	Study period begins for Arts students
25 . . . . .	Lectures end for Science and Engineering students
26 . . . . .	Study period begins for Science and Engineering students
26 . . . . .	Computer Committee meets
26 . . . . .	Executive of the Professorial Board meets
26-27 . . . . .	Indoor Exercise TAC, SD, ML and PA—First Class
31-11 November	Academic examinations



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### November—

1	. . . . .	Professorial Board meets
2-4	. . . . .	First Class telephone battle
4	. . . . .	Dean's Advisory Committee meets
4	. . . . .	Military Studies Examinations Committee meets— Study Area 6
4	. . . . .	Bridges Memorial Library Committee meets
7-8	. . . . .	DMA's Board of Studies—First Class
10	. . . . .	Military Examination and Appointments Committee meets
7	. . . . .	DMA's Board of Studies First Class meets
11	. . . . .	Tri-Service Remembrance Day parade
11	. . . . .	Higher Degree Committee meets
11	. . . . .	Faculty of Military Studies meets
12	. . . . .	Academic year ends
14-2 December		Annual field training exercise
25	. . . . .	Examinations Committee meets
30	. . . . .	Executive of the Professorial Board meets

### December—

2	. . . . .	CSC returns from annual field training
5-6	. . . . .	DMA's Board of Studies for selected students
6	. . . . .	Professorial Board meets
6	. . . . .	Commandant's Board of Studies meets
8	. . . . .	CSC Banner parade
8	. . . . .	Presentation of prizes and sporting trophies
9	. . . . .	Last day for submission of changes for academic course applications
11	. . . . .	Church parade
12	. . . . .	Presentation of military and academic prizes
13	. . . . .	Graduation parade and ball
14	. . . . .	Graduates leave RMC
15	. . . . .	Leave begins for other classes

## **The Royal Military College Course**

The Royal Military College course comprises both military and academic studies. The course is conceived as a whole; that is, a cadet must pass in both his military and academic studies to graduate from the College. He must also meet the standards required in the qualities of leadership.

The military curriculum is planned to achieve the best balance between the short-term requirements of a junior regimental officer and the broader foundation necessary for those who will progress to the higher ranks of the Army.

Each cadet follows one of the three academic courses, Arts, Applied Science or Engineering. Cadets are allotted to these courses on the basis of their matriculation studies, and as far as possible in accordance with their preferences.

The duration of the Arts course is four years. It is possible that the honours course will be extended to five. The pass course in Applied Science occupies four years, the honours course five. The Engineering courses are of five years' duration, except that students who were admitted before 1975 may complete their courses in four years.

## **The Degrees of BA(Mil), BSc(Mil) and BE of the University of New South Wales**

These degrees of the University are awarded to students in the Faculty of Military Studies who qualify in the prescribed courses. The degree of Bachelor of Arts in Military Studies (BA(Mil)) applies to the Arts Course, the degree of Bachelor of Science in Military Studies (BSc(Mil)) to the Applied Science Course, and Bachelor of Engineering (BE) to the Engineering Course.

The first students were enrolled in the Faculty in 1968, and the degrees were conferred by the University for the first time in 1971.

Selected students may be enrolled for the degrees of Bachelor of Arts with Honours (BA) and Bachelor of Science with Honours (BSc) in the faculty of Military Studies.

## **The Diploma of Military Studies of the Royal Military College**

The Royal Military College awarded the Diploma of Military Studies (Dip Mil Stud) to cadets who, having ceased to be students in the Faculty of Military Studies, completed the prescribed military curriculum and one of the academic courses in Arts, Applied Science or Engineering at diploma level.

The Diploma was introduced in 1968, and awarded retrospectively to graduates of the College from the previous year. The graduates of the College in 1967, 1968, 1969 and 1970 who completed their courses at the higher level were awarded the Diploma of Military Studies with Merit (Dip Mil Stud (Merit)).

## Educational Qualifications for Entry to the Royal Military College

To be qualified educationally for entry to the Royal Military College a candidate must:

- (a) meet the matriculation requirements of the University of New South Wales, and
- (b) meet the subject prerequisites for one of the degree courses in the Faculty of Military Studies.

**Subject Prerequisites**—A candidate must achieve appropriate levels of attainment in the Higher School Certificate courses shown in order to be eligible to enrol in the respective subjects of the BA(Mil), BSc(Mil) and BE courses in the Faculty of Military Studies:

<i>N.S.W. Higher School Certificate Prerequisite</i>		
<i>Faculty subject</i>	<i>Subject</i>	<i>Level of attainment</i>
<b>BA(Mil) Course</b>		
1405 History I	3 unit English	1, 2, 3 or 4
	or 2 unit English	1, 2 or 3
	or 2 unit A English	1 or 2
1507 English I	3 unit English	1, 2 or 3
	or 2 unit English	1, 2 or 3
1131 Mathematics IA	4 unit Mathematics	1, 2, 3, 4 or 5
1132 Mathematics IB	or 3 unit Mathematics	1, 2 or 3
	or 2 unit Mathematics	1 or 2
<b>BSc(Mil) Course</b>		
*1521 English A		
*1131 Mathematics IA	4 unit Mathematics	1, 2, , 4 or 5
	or 3 unit Mathematics	1, 2 or 3
*1132 Mathematics IB	or 2 unit Mathematics	1 or 2
*1203 Physics I	2 or 4 unit Science	1, 2 or 3
*1306 Chemistry I	(including Physics or Chemistry)	
<b>BE Course</b>		
1521 English A		
*1131 Mathematics IA	4 unit Mathematics	1, 2, 3, 4 or 5
	or 3 unit Mathematics	1, 2 or 3
*1132 Mathematics IB	or 2 unit Mathematics	1 or 2
	(i) 2, 3 or 4 unit Mathematics	As for Mathematics, above
*1273 Physics I	(ii) 2 or 4 unit Science (including Physics or Chemistry)	1, 2 or 3
	2 or 4 unit Science (any strand)	1, 2 or 3
*1303 Chemistry	2 or 4 unit Science (including Physics)	1, 2 or 3
*1708 Engineering I	or 2 unit Industrial Art	1, 2 or 3
	or 3 unit Industrial Art	1, 2, 3 or 4

Where \* indicates subjects which are compulsory in the relevant degree courses.

### **Candidates from other States**

In general, a candidate who completes his secondary education in a State other than New South Wales will meet the above requirements if he qualifies for admission to an appropriate faculty in a university in that State, although his admission to the Faculty of Military Studies will be subject to the approval of the Professorial Board.

### **The Bridges Memorial Library**

The Bridges Memorial Library is named after the founder and first Commandant of the College. The library supports the undergraduate and post-graduate courses and research conducted by the Faculty of Military Studies. The collections have been developed to cover these aspects and there are particularly strong holdings in Military Studies and American history. The total stock comprises 102,229 books, 1190 microfilms, 13,060 microfiche and a wide range of pamphlets, cassettes, films, slides and record discs. Subscriptions are carried for 2515 serial titles.

Most students will find that in the course of their studies they will spend a considerable amount of their time in the Library. It is important that a student understands how the Library works so that he can use it to the best advantage.

New students are introduced to the resources and facilities of the Library during Orientation Week. This includes formal lectures, guided tours and a printed guide, which is available at the Circulation Desk. For further information on the Library and its collections, students should consult the Reader Adviser's Unit.

During first and second terms the Reader Adviser's Unit gives tutorials to all classes on the use of bibliographical aids and on specific subjects relating to set essay topics.

Any of the books in the Library may be referred to by students and most may be borrowed, provided that Library rules are observed. A student may also take his own books into the Library and read them.

Research students from other universities are welcome to use the resources of the Library.

### **The Computer Centre**

The Computer Centre, in addition to supporting requirements for course work in computer science for the science and engineering degree streams, provides computing services for teaching and research staff. Current equipment includes two central processors, a Digital Equipment Corporation PDP 11/45 with 240 Kbyte core storage and a Honeywell DDP 516 with 32 Kbyte core, with a full range of peripherals including four 7 Mbyte disks and two magnetic tape drives. An interactive terminal system is being installed with consoles distributed throughout the College. The centre also provides program preparation

services and desk calculator facilities for general use. The facilities of the Computer Centre are available for use by all students and staff of the College and it also supports courses in computing conducted in local high schools.

### **Student Counsellor**

The Student Counsellor provides an individual counselling service to cadets in the areas of academic, personal and motivational problems. In particular he is available:

- (a) to assist Fourth Class cadets in the transition from secondary school environment to a tertiary level;
- (b) to assist Fourth Class cadets in the transition from civilian to military life;
- (c) to advise all cadets on study techniques and on individual problems of approach to academic work;
- (d) in conjunction with the military staff, to assist in personal problems of cadets where these problems are affecting progress;
- (e) in conjunction with the academic staff, to advise cadets in courses and subjects in relation to their own abilities and vocational goals.

In addition to the above functions the Student Counsellor participates in the selection of cadets for the College and undertakes research into student performance and related subjects.

(See Information for Students on back pages.)

# The Military Organisation

## **The Military Staff**

The military staff of the College may be classified into four groups:

**Office of the Commandant:** The staff in this group includes the Director of Military Art, who is also the Deputy Commandant; the Student Counsellor; Chaplains and the Co-ordination Staff of the College.

**Corps of Staff Cadets:** The staff in this group consists of the Commanding Officer, Corps of Staff Cadets; Company Commanders and other officers and non-commissioned officers who are responsible for the command and administration of the Corps. Many of these officers are also Military Instructors. The function of the Corps will be described later.

**Military Training Wing:** The staff in this group consists of the Chief Instructor, subject instructors and supporting staff: this group is responsible for the conduct of military studies at the College. Military studies are conducted in conjunction with the Corps of Staff Cadets staff.

**Administration:** The staff in this group includes the Staff Officer Grade 1 (Administration) and the personnel and logistics staff of the College. This group provides support for the army staff and administrative support for the College as a whole.

## **The Corps of Staff Cadets**

The Corps of Staff Cadets is an organisation which provides an environment for the development of officer qualities in cadets and for some military instruction. Cadets proceed from their Corps barracks to military and academic studies.

The Corps of Staff Cadets is organised on a battalion basis, consisting of a Battalion Headquarters and a number of companies, each company comprising cadets from all classes. In addition to the regular army staff referred to above, the senior cadet appointments within the battalion are filled by members of the graduating class (First Class) who are largely responsible for the detailed day-to-day running of the Corps. Battalion Headquarters is staffed by a Battalion Sergeant-Major, a Battalion Quartermaster Sergeant, a President of the Mess Committee, a Sports Co-ordinator and a number of cadets of Second Class who assist and understudy these persons. Battalion Headquarters is responsible for the administration and discipline of the Corps as well as the co-ordination and administration of all sporting and social activities in which the Corps is involved.

Each company consists of a Company Headquarters and a number of platoons. Company Headquarters is staffed by a Company Sergeant-Major, Company Quartermaster Sergeant (both cadets of First Class) and two cadets of Second Class who assist and understudy these cadets. This Headquarters is responsible for the administration and discipline of the company.

A cadet of First Class commands each platoon, each of which has three sections, and is responsible to the Company Sergeant-Major for its efficiency. The section is the basic unit within the Corps. It is commanded by a cadet of First Class and contains cadets from each of the other three classes.



# THE MILITARY STUDIES PROGRAM

## Introduction

The Royal Military College course comprises both military and academic studies. In order to graduate, a cadet must pass in both his military studies which are prescribed in the Degree rules, and his academic studies. He must also demonstrate that he possesses the qualities required of an officer, particularly the capabilities of leadership. The military studies curriculum is designed to train and educate cadets to meet these requirements, as well as develop the cadets' officer qualities. The military curriculum reflects the need for assessment in this process.

During the first three years of the college program, military studies are scheduled in conjunction with academic studies. The fourth year, except for engineering and honours students, is devoted entirely to military studies and this program is known as Schedule M. A special program is conducted for engineering students and honours students in arts and science courses in the fourth year and this is known as Schedule ME.

## First Class Curriculum

The full-time military studies curriculum is designed to complete the military instruction at the College, and to prepare cadets for first appointment as Lieutenants in the Australian Army. In order to undertake military studies in this year a cadet must have satisfactorily completed the first three years' part-time military studies and his academic studies.

The program for First Class Schedule M program is structured into six study areas, as follows:

### STUDY AREA 1

**Military Studies—Orientation.** This is an introductory study area. Its scope includes testing and revision of previous military instruction, evaluation of cadet's oral and written communication skills, and orientation to instructional methods and techniques. The study area includes an introduction to unit organisations, characteristics and roles, tactical decision making and battle procedure. Visits and training undertaken at other military establishments contribute to this study area.

The topics scheduled for strategic studies are aimed at providing students with a background of relevant strategic and national considerations affecting Australia.

### STUDY AREA 2

**Tactics and Operations 1—Defensive Operations.** This is the first of three study areas which constitute the tactics and operations series in the program. Cadets should have satisfactorily completed Study Area 1 before entry to this study area. Tactics and Operations 1 deals with the principles of the defence and withdrawal phases of war, the employment of supporting arms and services and logistic considerations applicable to these phases, as well as

appropriate operational planning and command and control techniques. It includes both indoor and outdoor instruction, tutorial exercises and practical field exercises.

A parallel program complements this area of study. It contains student exercises and presentations including case studies of past campaigns, exercises and presentations in the defensive and withdrawal phases of war and exercises and presentations in relevant staff duties techniques.

#### STUDY AREA 3

**Tactics and Operations 2—Offensive Operations.** This is the second of three study areas which constitute the tactics and operations series, and follows the Defensive Operations study area. Before commencing this study area, cadets should have satisfactorily completed Study Area 2. Tactics and Operations 2 deals with the principles of the advance and attack phases of war, and introduces the pursuit. This unit deals with the employment of supporting arms and services, and logistic considerations applicable to the advance and attack phases of war. It also includes appropriate operational planning, and command and control techniques. The program includes indoor and outdoor instruction, tutorial exercises and practical field exercises.

A parallel program complements this area of study. It includes student exercises and presentations in the advance and attack phases of war, and exercises and presentations in relevant staff duties techniques.

#### STUDY AREA 4

**Tactics and Operations 3—Special Operations.** This is the final study area in the tactics and operations series, and it follows the study area on Offensive Operations. Before commencing this study area cadets should have satisfactorily completed Study Area 3. Tactics and Operations 3 deals with subjects including United Nations peace-keeping operations, aid to the civil power, counter-guerilla warfare, low intensity operations and special tactical and logistic considerations that arise in warfare in certain climates, terrain and vegetation. It also deals with the employment of supporting arms and services, logistics, health and legal considerations in these circumstances. It involves use of visiting lecturers in specialist fields and includes practical field exercises at the Land Warfare Centre, Canungra.

A parallel program complements this area of study. It includes student exercises and presentations involving case studies of past and present United Nations peace-keeping operations and other relevant matters. The Strategic Studies topics in this study area will be relevant to special operations.

#### STUDY AREA 5

**Military Administration.** This study area is designed to correlate studies in administration and management. Having regard to the particular administrative requirements of defensive, offensive and special operations (Study Areas 2, 3 and 4 above), this study area embraces the general study of logistics, administration in peace and war, military law, intelligence and staff duties techniques. It includes both indoor and outdoor instruction, tutorial exercises and visits to administrative units.

## *The Military Studies Program*

A parallel program complements this area of study. It includes student administrative exercises and presentations in administrative techniques, and an introduction to modern management methods. Study Area 5 is divided into appropriate sections and scheduled as blocks in the program throughout the year.

### **STUDY AREA 6**

**General Military Studies.** The scope of this study area comprises three areas, the first being the subject of training. The other groups are individual development subjects such as character training, communication skills, current affairs, leadership, service etiquette, and skill subjects such as army health, drill, military history, physical training, methods of instruction, strategic studies and topography. The subject of training is scheduled as a block in the program, but the nature of the other subjects in this study area necessitates that they be scheduled regularly throughout the year.

### **Schedule M Program**

The Schedule M Program has been designed to meet the military art, science and technology requirements of the Degree rules. Study Areas 1, 2, 3 and 4 are scheduled in numerical order and constitute the framework of the program for First Class in 1977. Study Area 5 is divided into appropriate sections and scheduled as modules between the framework Study Areas. Study Area 6 is scheduled through the year providing parallel, complementary instruction to the remaining study areas. Course design includes provision for testing, assessment, and revision of instruction.

### **Schedule ME Program**

The program for Schedule ME and Schedule M for the first five weeks and the end of year field training is the same. The program for the remainder of the year involves elements of a number of the normal Schedule M subjects which are grouped to meet the military art, science and technology requirements of the degree rules.

### **Junior Class Curricula**

The military studies during the first three years of the College program are scheduled in conjunction with academic studies. Each class has a concentrated period of full-time military study at the beginning and the end of each year, and some military work is programmed during each week of the academic terms. The provisional allotment of time to military subjects in 1977 is shown below.

The military studies program for the first three years embraces recruit training, infantry initial employment training and section commander training. In addition, cadets are instructed in subjects to promote their officer development.

A Fourth Class cadet (a cadet in his first year at the College) is oriented to the College requirements and commences his recruit training. By the end of his year as a cadet in Third Class, he will have been trained to 'trained soldier standard' and completed infantry initial employment training. As a cadet in Second Class he will be trained to the standard of an infantry section commander and

provided with basic instruction in preparation for his year of full-time military studies. Instruction is scheduled to achieve these levels as indicated below.

<i>Class</i>	<i>Level of Training</i>	<i>Training Week</i>	<i>Content</i>
4	Orientation . . . . .	5	Introduction to service life. Administrative requirements completed.
4	Recruit . . . . .	42	Army recruit training completed.
3	Trained soldier . . . . .	45	Infantry initial employment training completed.
2	Infantry section commander . . . . .	5	Infantry section commander course and special RMC requirements at this level completed.
2	First Class pre-entry . . . . .	45	Introduction to First Class course and practice in section commander's role.

## Allotment of Military Periods

The military instructional time allocated to subjects is shown below. A description of subjects is given later. Periods are of fifty minutes' duration. The table below does not include time spent by the Corps of Staff Cadets on rehearsals for, and the conduct of, ceremonial parades, inter-company competitions, College orientation and sporting activities. Nor does it include attachments to other units, tours, leave, military interest activities, administration etc. and end-of-year field training.

<i>Subject</i>	<i>Class</i>				
	<i>4</i>	<i>3</i>	<i>2</i>	<i>1(M)</i>	<i>1(ME)</i>
Armour . . . . .	..	..	..	6	5
Army Health . . . . .	25	..	..	14	..
Artillery . . . . .	..	..	..	43	4
Character Training . . . . .	6	6	25	15	1
Communication Skills . . . . .	..	17	5	18	10
Current Affairs . . . . .	10	13	5	..	..
Drill and Ceremonial . . . . .	60	20	31	33	16
Infantry . . . . .	36	70	140	5	5
Intelligence . . . . .	..	..	..	14	..
Leadership Theory . . . . .	..	9	12	13	13
Logistics . . . . .	..	..	..	15	13
Management . . . . .	..	..	..	22	..
Methods of Instruction . . . . .	..	15	22	18	..
Military Engineering . . . . .	10	..	..	11	4
Military History . . . . .	..	..	..	53	3
Military Law . . . . .	..	..	3	28	15
Peace Administration . . . . .	..	..	..	61	27
Physical and Recreational Training . . . . .	58	40	21	65	22
Service Etiquette . . . . .	5	..	..	10	10
Staff Duties . . . . .	..	4	..	104	59
Strategic Studies . . . . .	..	..	..	35	7
Signals . . . . .	..	28	18	10	5
Tactics . . . . .	5	..	..	346	18
Topography . . . . .	1	42	45	10	..
Training . . . . .	..	..	..	32	..
Weapon Training . . . . .	58	73	48	47	12

## Engineer Students and Honours Students

At present, engineering students and honours students in other courses are required to complete the same military studies as other students during their

## *The Military Studies Program*

first three years at the College. In their final year of academic studies they complete the Schedule M program for five weeks before the commencement of the academic term; part-time military studies during the academic term; and three weeks field training with the remainder of the Corps at the completion of the academic year. After graduation, these cadets are required to attend a further period of instruction at a prescribed course (in 1976 known as the Graduate Engineer Military (GEM) Course at the Land Warfare Centre, Canungra).

Engineering students and honours students in science who entered the College from 1975 onwards will complete the same military studies as other students during their first three years, followed by one year full-time military study. After graduation, these students will return to the College as officer undergraduates to complete their academic studies.

The position of honours students in other courses has yet to be resolved.

### **Military Subjects**

The individual subjects in the military requirement for the degree may be classed in three groups.

#### **Tactics, Operations and Training**

*Armour.* The syllabus covers the organisation, roles, tasks and characteristics of armoured units employed in a Task Force operational situation; direction of armoured fighting vehicle firepower; a combined infantry/armour practical field exercise and the employment of armour in operations. It is a major component of Study Areas 2, 3 and 4.

*Artillery.* Topics covered are the organisation, roles, tasks and characteristics of artillery units employed in a Task Force operational situation; the theory and practice of fire control; and the employment of artillery in operations. It is a major component of Study Areas 2, 3 and 4.

*Infantry.* This subject deals with the theory and practice of operational techniques at platoon and company level. It also examines, in detail, the employment of infantry in operations. It is a major component in Study Areas 2, 3 and 4. Exercises in platoon and company operational techniques are used to develop the officer qualities of command and leadership. These exercises are conducted for all classes.

*Intelligence.* Topics covered are the organisation and roles of intelligence units and headquarters staff within the division; the intelligence process within the unit and unit security. It is taught during Study Areas 2 and 3.

*Military Engineering.* This subject covers the organisation, roles, tasks and characteristics of engineer units within the division. It deals with the employment of engineers in support of infantry operations and also includes instruction in basic field defences. It is taught during Fourth Class and in Study Areas 2, 3 and 4 of First Class.

*Signals.* Instruction covers the theory and practice of radio telephone procedure and operation of communication equipments at unit level. It also covers

the organisation, roles, tasks and characteristics of RA Sigs units in the division and examines the employment of these units and communication electronic equipment in various operations. It is taught during Third and Second Class and in Study Areas 2, 3 and 4 of First Class.

*Tactics.* This subject provides graduates with the knowledge required to plan and conduct operations to infantry company level. Instruction is based on infantry operations with supporting arms and services, and will cover all phases of war and other operations. It includes practical field exercises and is taught during Study Areas 1, 2, 3 and 4.

*Topography.* This subject covers the theoretical and practical aspects of navigation over varying terrain by day and night. It includes map reading, air photo reading and the topographical aspects of operational planning. Instruction is programmed throughout the four years of the course.

*Training.* Instruction covers the design and conduct of training activities at sub-unit level. It is complemented by the subject Methods of Instruction. Training is programmed as part of Study Area 6.

*Methods of Instruction.* This subject deals with the knowledge and techniques necessary to organise, supervise and conduct instruction. It complements the subject of Training and is taught in the last three years of the course.

*Weapon Training.* This subject covers the handling, firing and employment of the weapons of a rifle company; it covers the characteristics and employment of the weapons of the infantry support company and trains the graduate to plan and conduct range practices for selected infantry weapons. Instruction is programmed throughout the four years of the course.

## **Military Administration**

*Army Health.* Instruction in this subject provides cadets in Fourth Class with the knowledge and skills of first aid. Instruction to First Class provides a knowledge of health services in the army and enables them to supervise health measures at unit level. It is taught during Study Area 6.

*Communication Skills.* This subject develops the oral and written communication skills required of a junior regimental officer. It is programmed during the last three years of the course.

*Logistics.* Studies in this subject cover the maintenance and resupply system which supports unit operations in a divisional environment. It is taught in conjunction with the Tactics series and is programmed in Study Area 5.

*Military Law.* This subject provides the graduate with the knowledge required to apply Military Law as a junior officer. It also includes an introduction to the law of war, particularly the Geneva Convention. It is programmed in Study Area 5.

*Peace Administration.* Instruction in this subject will cover administration of personnel, procedures for unit stores management and unit financial accounting. It is a major component in Study Area 5.

## *The Military Studies Program*

**Staff Duties.** This subject introduces operational and non-operational staff skills and techniques required to deal with staff matters in a unit. It is a major component of Study Area 5.

### **Officer Development**

**Character Training.** This subject provides a foundation for character development as part of the overall program of developing officer qualities. It includes discussions on human relationships, attitudes towards issues which are important to military life and the practical application of basic religious principles. It is programmed throughout the four years of the course.

**Current Affairs.** This subject assists the cadet to understand the significance of events in Australia's areas of interest and encourages the cadet to discuss these events in both formal and informal groups. It is programmed throughout the first three years of the course.

**Drill and Ceremonial.** Instruction in this subject enables the cadet to participate in College parades and to perform those drill and ceremonial duties required of a regimental officer. The subject promotes a sense of discipline and *esprit de corps* and is programmed throughout the four years of the course.

**Leadership Theory.** This subject will provide instruction in the theories and practice of leadership, and guidance will be provided with problems that a graduate may encounter in leading men, both within the Corps of Staff Cadets environment, and during commissioned service. Instruction is designed to complement other studies, such as those in Character Training, which are conducted to promote officer development.

In addition to the formal training received in the area of officer development, a cadet must practically demonstrate that he has the personal characteristics required of a leader in order to be commissioned.

**Military History.** This subject has been included to complement instruction in Tactics and Leadership and provide a military educational base for officer development and post-graduate military studies. The program is developed around case studies of past military campaigns.

**Strategic Studies.** This subject develops from the subject of Current Affairs. It provides an understanding of the military, political and geographical significances of selected areas that could affect the defence of Australia.

**Management.** This subject will provide a theoretical basis for instruction in decision making and military administration.

**Physical and Recreational Training.** This subject is designed to develop and maintain a high standard of 'all round' physical fitness. Training is oriented towards the development of physical skills required by a graduate. In addition, instruction will be given on the organisation of sports meetings and on coaching. Instruction is programmed through the four years of the course.

**Service Etiquette.** This subject is designed to develop an appreciation of the manner and etiquette which facilitate ease and pleasantness in any company,

and to familiarise cadets with mess customs and procedures. The syllabus is designed to make cadets aware of their social responsibilities both within and outside the service.





# **The Faculty of Military Studies of the University of New South Wales**

## **Organisation and Functions**

In 1967, the University of New South Wales and the Department of the Army agreed to co-operate in developing the Royal Military College into a separate autonomous degree-conferring body within a period of ten years.\* To this end, the University established the Faculty of Military Studies at the College.

The Faculty of Military Studies is one of the ten faculties constituted by the Council of the University in accordance with Chapter IV of the By-laws made under the University of New South Wales Act, 1968. (The Act and By-laws are quoted in Section A of the University Calendar.) It exercises its powers and performs its duties under the authority of the Professorial Board of the University. It is particularly charged with the responsibility of advising the Interim Council of the Royal Military College, the Professorial Board and the Council of the University on the development of courses suitable to the needs of the College and leading to the granting by the University of the degrees of BA (Mil), BSc (Mil), BA, BSc and BE in the Faculty.

The Faculty of Military Studies consists of the Dean, the Commandant, the professors, associate professors, senior lecturers and lecturers appointed by the University, the Director of Military Art, the Director of Army Training, certain of the Heads of Schools at the University whose disciplines are relevant, the Registrar of the University, the Faculty Secretary, such other persons with appropriate qualifications as the Council may appoint (these include the Commanding Officer of the Corps of Staff Cadets, the Chief Instructor of the Military Training Wing, the Company Commanders and the Student Counsellor) and three students elected by the students enrolled in the Faculty. The Dean is appointed by Council. The Chairman is elected by the Faculty from among its professors for a two-year period.

The Faculty supervises teaching and examining in the subjects for which it is responsible, and it is concerned with encouraging scholarship and research. It deals with business raised by departments and by individual members, and it also reports on matters referred to it by the Professorial Board, the Vice-Chancellor, the Council and the Interim Council of the College. Its decisions, reached by simple majority voting, are transmitted in the form of resolutions to the Professorial Board (and, where appropriate, to the Interim Council).

The Faculty of Military Studies usually meets four times each year. Further meetings may be called by the Registrar of the University, after consulting the Dean and Chairman. Agenda papers are distributed before each meeting and minutes after it; copies go to every Faculty member. The quorum for a meeting is one-third of the members, excluding those members granted leave of absence by the Vice-Chancellor; it is important, therefore, for members to seek leave if they are unable to attend a meeting.

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\* The affiliation of the College with the University will extend past 1977 under a new agreement between the Minister for Defence and the University.

To expedite its business, Faculty may appoint *ad hoc* sub-committees. There are also several standing committees of Faculty charged with particular functions.

The Executive Committee comprises the Chairman of Faculty, the Dean, the Associate Registrar of the University, Heads of Departments in the Faculty and Chairmen of the Degree Committees of Faculty, all *ex officio*, the Pro-Vice-Chancellor, the Commandant, the Director of Military Art, three Heads of Schools at Kensington, professors in the Faculty who are not heads of departments, the Chairman of the Standing Education Committee and the Faculty Secretary, all appointed by Faculty, and three members elected by Faculty for a two-year term. It usually meets six times each year to consider all Faculty business and to make recommendations on the agenda to the meetings of Faculty. It has authority to transmit decisions on urgent matters directly to the Professorial Board subject to their being reported to the next meeting of Faculty. The agenda for Executive Committee meetings is sent in advance to all members of the Faculty, and any member who wishes may attend a meeting, although he cannot vote. Executive Committee minutes are sent to all members of Faculty also.

The Higher Degree Committee consists of the Chairman of Faculty, the Dean, all professors who are members of Faculty, the Registrar of the University *ex officio*, and six members nominated by Faculty. It meets several times a year, and attends to matters relating to higher degrees in accordance with the policies agreed by the Professorial Board. When questions of policy arise, the Higher Degree Committee makes its recommendations to Faculty.

The Examinations Committee consists of the Chairman of Faculty, the Dean, all the academic teaching members of Faculty, the Director of Military Art, the Registrar of the University and the Faculty Secretary. The Committee reviews the annual examination results of all undergraduate students in the Faculty. It transmits its decisions to the University for entry into the students' records, and makes relevant recommendations to the Commandant.

The Faculty of Military Studies has set up three Degree Committees (the Arts Committee, the Science Committee and the Engineering Committee) to enable members to give greater and more concentrated consideration to the courses in which they are primarily concerned. The Degree Committees each meet three times or more during the year, and they report to Faculty through the Executive Committee.

## **Membership of the Faculty of Military Studies**

### *Dean*

Professor J. C. BURNS, MSc *N.Z.*, BA *Camb.*, PhD *Manc.*

### *Chairman*

Professor H. E. GREEN, ME *Adel.*, PhD *Ohio State*, C Eng, FIEAust., FIREEAust., SMIEEE, jssc

### *Faculty Secretary*

Mr R. W. O. PUGH, BE *Syd.*, BA *A.N.U.*, psc

The professors, associate professors, senior lecturers and lecturers of the Faculty at Duntroon; the following members of the College:

Major-General R. A. HAY, CB, MBE, idc, psc, psc (US)

Colonel A. CLUNIES-ROSS, MBE, jssc, psc, psc (US)

Lieutenant-Colonel R. J. MOYLE, jssc, psc, RAAC

Major A. HARKNESS, BA *A.N.U.*, psc, pl, RAA

Major R. K. HILL, MC, RAAC

Major K. G. GALLAGHER, RA Inf

Major K. A. NIQUET, RA Sigs

Judith A. WING, BA *Syd.*, ALAA

Lieutenant-Colonel D. E. PATERSON, RA Inf

Lieutenant-Colonel H. F. BUCKHAM, BCom, Dip. Psych *Qld.*, MAPsS,  
AA Psych Corps

three student members elected by the students in the Faculty,

Colonel J. M. CHURCH, DSO, psc

Director of Army Training

and the following members of the University of New South Wales at  
Kensington:

Professor M. W. ALLEN, BE, *Adel.*, PhD *Syd.*, CEng, FIREE, MIEE,  
MIEEE

Professor F. W. AYSCOUGH, BSc *Syd.*, MSc *N.S.W.*, CEng, FIChemE,  
ARACI

Head, School of Chemical Technology

Professor R. A. A. BRYANT, ME *N.S.W.*, ASTC, CEng, FIMechE,  
FIEAust, AFRAeS

Head, School of Mechanical and Industrial Engineering

Professor V. T. BUCHWALD, BSc., PhD *Lond.*, FIMA

Head, School of Mathematics

Professor F. K. CROWLEY, MA PhD *Melb.*, DPhil *Oxon.*, FAHA,

Head, School of History

Professor E. P. GEORGE, BSc PhD *Lond.*, DSc *N.S.W.*, FInstP, FAIP,

Head, School of Physics

Professor I. K. LEE, BCE, MEng Sc., PhD *Melb.*, FIEAust., MASCE,  
MAIMM

Head, School of Civil Engineering

Professor J. A. MABBUTT, MA *Cantab.*

Head, School of Geography

Professor D. M. McCALLUM, BA *Syd.*, MA BPhil *Oxon.*,

Head, School of Political Science

Professor H. MUIR, BMetE *Melb.*, ScD *M.I.T.*, FIM, MAustIMM,

Head, School of Metallurgy

*Faculty of Military Studies*

Professor H. J. OLIVER, MA *Syd.*, FAHA

Head, School of English

Professor N. G. RIMMER, MA *Camb.*, AM *Harv.*, FRHistS

Professor J. S. SHANNON, DIC, PhD *Lond.*, DSc *Adel.*, FRACI

Head, School of Chemistry

Professor R. H. MYERS, CBE, MSc PhD *Melb.*, Hon. LLD *Strath.* FIM,

FRACI, FAIM, MAusIMM,

Vice-Chancellor

Professor A. H. WILLIS, DSc(Eng) *Lond.*, CEng, FIMechE, FIEAust,

MemASAE, WhSc,

Pro-Vice-Chancellor

Mr K. L. JENNINGS, BA MEd *Syd*

Registrar of the University

Mr J. M. GANNON, ASTC, ARACI,

Associate Registrar of the University

## **Undergraduate Courses**

### **Arts**

Undergraduate courses are offered in Economics, English, Geography, Government, History and Mathematics. The courses in arts lead to the degree of Bachelor of Arts in Military Studies (BA(Mil) ) at the pass level and the degree of Bachelor of Arts (BA) at the honours level.

A candidate for the pass degree must complete nine qualifying courses selected in accordance with the rules, and must complete a prescribed program of military studies. A pass student of merit may be permitted to transfer to an honours program in his second year in departments which offer honours courses.

### **Applied Science**

The applied science course comprises Chemistry, Mathematics and Physics, and includes general studies courses in English and History. Students must also complete a prescribed program of military studies. The course leads to the degree of Bachelor of Science in Military Studies (BSc (Mil) ) at the pass level and the degree of Bachelor of Science (BSc) at the honours level.

The first year is common for all students, the second allows some choice of topics within the disciplines, and in the third year each student majors in one of the disciplines and takes either one or both of the others as minor subjects. A pass student of merit may be admitted to honours candidature; he will complete the military studies in the fourth year and his honours program in the fifth.

### **Engineering**

Three courses are offered: civil engineering, electrical engineering and mechanical engineering. Electrical engineering provides for specialisation in either communications or power. The courses lead to the degree of Bachelor of Engineering (BE), which may be awarded as a pass degree or as an honours degree. Each of these three courses has been granted full recognition by the Institution of Engineers Australia and in addition the electrical engineering course has been recognised by the Institution of Radio and Electronics Engineers, Australia, and by the Institute of Electrical and Electronics Engineers.

The program of engineering subjects, Mathematics, Physics and Chemistry is prescribed for each course. There is also a component of general studies with courses in English, Geography and History. Students must also complete a prescribed program of military studies.

Engineering students are allotted to their courses on admission to the Faculty and generally are expected to remain in those courses. The first year program is common, however, and changes from one branch of engineering to another may be possible at the end of the first year.

The duration of the course is five years; the fourth year consists of military studies only.

## **Rules governing the award of the degree of Bachelor of Arts in Military Studies**

*These rules apply to all students enrolling as first year students in 1977 and subsequent years.*

*An amendment to any rule which relates to courses of study that may be taken by candidates shall not apply to a candidate who, before the amendment takes effect, has completed one or more approved courses unless:*

- (a) the candidate elects that the amendment shall apply to him, and adopts a revised and approved course of study; or*
- (b) the Faculty determines otherwise.*

1. The degree of Bachelor of Arts in Military Studies shall be conferred as a pass degree.

2. No person shall be permitted to enrol in any qualifying course for the degree of Bachelor of Arts in Military Studies at the same time as he is enrolled for any other degree or diploma in this University or elsewhere.

3. Where, in the following Rules, reference is made to the requirement that a candidate shall complete a course, the requirement shall be construed as meaning that the candidate shall:

- (a) attend such lectures, seminars and tutorials as may be prescribed in that course; and
- (b) perform satisfactorily in such exercises, laboratory work, essays, thesis and examinations as may be prescribed in that course.

4. A candidate may not enrol in a Course II of a subject until he has completed the appropriate Course I of that subject; and a candidate may not enrol in a Course III of a subject until he has completed the appropriate Course II of that subject.

5. A candidate for the degree of Bachelor of Arts in Military Studies shall be required to complete both the academic requirements of the degree, as specified in Rule 7, and the military requirements of the degree, as specified in Rule 8.

6. The academic requirements specified in Rule 7 shall be completed over the first three years of the candidate's course and the military requirements specified in Rule 8 shall be completed over all four years of the candidate's course. In special circumstances, an extension of time of one year may be granted to the candidate in which to complete either or both of the academic and military requirements.



## *Degree Rules and Programs of Study*

7. *Academic Requirements.* A candidate shall complete nine qualifying courses which shall include:

- (a) courses in at least three of the subjects—
  - Economics
  - English
  - Geography
  - Government
  - History
  - Mathematics A
  - Mathematics B
- (b) at least one major,
- (c) either two sub-majors or a second major,
- (d) eight courses in all from Schedule A1,
- (e) electives from Schedule A2 to the value of one course,

where a major is a sequence of a Course I, a Course II and a Course III of one subject and a sub-major is a sequence of a Course I and a Course II of one subject, the choice of courses within or supplementary to a major or sub-major being subject to approval by the Head of Department concerned, *provided that* every student shall complete the course History I and a History II course as a sub-major or as part of a major.

8. *Military Requirements.* A candidate shall complete the program of training in the military requirements as set out in Schedule M.

9. Upon sufficient cause being shown, Faculty may, in particular cases, vary the requirements of Rules 3, 4 and 7, provided that any proposed variation shall be initiated by a recommendation from a Head of Department concerned.

### SCHEDULE A1

<i>Subject</i>	<i>Course</i>
Economics . . .	1609 Economics I
	2610 Economics IIA
	2611 Economics IIB
	3610 Economics IIIA
	3611 Economics IIIB
English . . .	1507 English I
	2507 English II
	3507 English III
	1508 Australian Literature
Geography . . .	1953 Geography I
	2953 Geography II
	3953A Geography IIIA
Government . . .	1001 Government I
	2001 Government II
	3021 Government III

<i>Subject</i>		<i>Course</i>	
History	. . . . .	1405	History I
		2407	History IIA
		2409	History IIB
		3408	History IIIA
		3410	History IIIB
Mathematics A	. .	1131	Mathematics IA
		2131	Mathematics IIA
		3131	Mathematics IIIA
Mathematics B	. .	1132	Mathematics IB
		2132	Mathematics IIB
		3132	Mathematics IIIB
SCHEDULE A2			
Chemistry	. . .	1306	Chemistry I
Physics	. . . . .	1203	Physics I
Science	. . . . .	1806	Science A

**Rules governing the award of the degree of Bachelor of Arts with Honours in the Faculty of Military Studies**

*These rules apply to all students who enrol as first year students in 1973 or in subsequent years.*

*An amendment to any rule which relates to courses of study that may be taken by candidates shall not apply to a candidate who, before the amendment takes effect, has completed one or more approved courses unless:*

- (a) the candidate elects that the amendment shall apply to him and adopts a revised and approved course of study; or*
- (b) the Faculty determines otherwise.*

1. The degree of Bachelor of Arts with Honours in the Faculty of Military Studies shall be conferred in the following categories:

Honours Class I

Honours Class II Division 1

Honours Class II Division 2

2. No person shall be permitted to enrol in any qualifying course for the degree of Bachelor of Arts with Honours in the Faculty of Military Studies at the same time as he is enrolled for any other degree or diploma in this University or elsewhere.

3. A person on whom the pass degree of Bachelor of Arts or Bachelor of Arts in Military Studies has been conferred shall not be admitted to candidature for the degree of Bachelor of Arts with Honours in the Faculty of Military Studies.

4. Where, in the following rules, reference is made to the requirement that a candidate shall complete a course, the requirement shall be construed as meaning that the candidate shall:

- (a) attend such lectures, seminars and tutorials as may be prescribed in that course; and
- (b) perform satisfactorily in such exercises, laboratory work, essays, thesis and examinations as may be prescribed in that course.

5. A recognised candidate for honours shall complete ten qualifying courses as specified in Rule 9 in four years of study, and shall follow the prescribed Schedule ME of military work and show that he has attained the required standards. In special circumstances an extension of time of one year may be granted to a candidate in which to complete the requirements for the degree.

6. A candidate may not enrol in a Course II of a subject until he has completed the appropriate Course I of that subject; and a candidate may not enrol in a Course III of a subject until he has completed the appropriate Course II of that subject.

7. A student seeking recognition as a candidate for this degree shall choose either one or, with the approval of the relevant Heads of Departments, two subjects from the following as his subjects of special study:

Economics  
English  
Geography  
Government  
History  
Mathematics

8. A student who has enrolled for the degree of Bachelor of Arts in Military Studies shall be recognised as transferring to candidature for the degree of Bachelor of Arts with Honours in the Faculty of Military Studies provided that, by the end of his first year of enrolment for the degree of Bachelor of Arts in Military Studies he has completed or is deemed to have completed Course I of four subjects, that he has completed any other course or courses taken during that first year, that he has obtained a pass in Course I of the subject or subjects chosen for special study at a level determined by the Head(s) of the Department(s) concerned, that he has applied in writing to the Head(s) of the Department(s) concerned, and that the application has been approved by Faculty. Application to transfer to candidature for the degree of Bachelor of Arts with Honours may be made up to the end of the first week of second term in a student's second year of study provided that the student is already enrolled in the relevant pass course(s).

9. (1) If a candidate selects *one* subject for special study he shall complete the ten qualifying courses in one of the following combinations:

Either—

- (a) Courses I, IIA and IIB each supplemented by additional honours work, IIIA and IIIB each supplemented by additional honours work, and IVH of the subject chosen for special study, together with one sub-major and one single course chosen from Schedule A1, and one course chosen from Schedule A2,

or (with the approval of the Head of the Department offering the subject of special study)—

- (b) Courses I, either of IIA or IIB each supplemented by additional honours work, IIIA and IIIB each supplemented by additional honours work, and IVH of the subject chosen for special study, together with two sub-majors chosen from Schedule A1 and one course chosen from Schedule A2,

## *Degree Rules and Programs of Study*

where a sub-major is an approved sequence of a Course I and a Course II of one subject, and a single course is a Course I of a subject,

*provided that*

- (i) every candidate shall complete the course History I (except for those taking history honours, candidates are not required to take a History II course)
- (ii) the ten qualifying courses are, except with Faculty approval, completed according to the following time schedule:

First year: A Course I of the subject of special study; a Course I of each of two other subjects chosen from Schedule A1; and the course chosen from Schedule A2.

Second year: Either:

Courses IIA and IIB of the subject of special study (each supplemented by additional honours work) and a Course II of one other subject;

OR

Course IIA or IIB of the subject of special study, supplemented by additional honours work, and a Course II of each of two other subjects chosen from Schedule A1;

Third year: Courses IIIA and IIIB of the subject of special study, each supplemented by additional honours work;

Fourth year: Course IVH of the subject of special study.

- (iii) to qualify for enrolment in course IVH a candidate shall have met all the academic requirements of the first three years and shall have obtained passes at credit level or better in all courses taken in the subject of special study.

9. (2) If the candidate selects two subjects for special study, he shall complete the ten qualifying courses in accordance with the following combination:

A Course I, a Course II (supplemented by additional honours work) and a Course III (supplemented by additional honours work) of each of the subjects chosen for special study, a Special Combined Course IVH embracing the same two subjects, together with a sub-major or two single courses chosen from Schedule A1, and one course chosen from Schedule A2, where a sub-major is as defined in Rule 9 (1) and where the choice among options in a subject is subject to the approval of the Head of Department concerned.

ADDENDUM No 1

*Degree Rules and Programmes of Study  
provided that*

- (i) every candidate shall complete the course History I (except for those taking History honours, candidates are not required to take a History II course) ;
- (ii) the ten qualifying courses are, except with Faculty approval, completed according to the following time schedule :
  - First year : A Course I of each of the subjects chosen for special study, a Course I of a third subject chosen from Schedule A1, and the course chosen from Schedule A2.
  - Second year : A Course II (together with prescribed additional honours work) of each of the subjects of special study, and a Course II of the subject constituting the sub-major or a Course I of a fourth subject chosen from Schedule A1.
  - Third year : A Course III (together with prescribed additional honours work) of each of the subjects chosen for special study.
  - Fourth year : Special Combined Course IVH.
- (iii) to qualify for enrolment in the Special Combined Course IVH a candidate shall have met the same requirements as for Course IVH in Rule 9 (1).

10. There shall be no re-examination of the fourth-year courses.

11 (1) A candidate for the degree of Bachelor of Arts with Honours in the Faculty of Military Studies who has successfully completed the academic requirements of the first three years but who withdraws from or fails to meet the academic requirements of the fourth year shall be deemed to have met the academic requirements for the degree of Bachelor of Arts in Military Studies.

(2) A candidate for the degree of Bachelor of Arts with Honours in the Faculty of Military Studies who at any stage in the second or third year withdraws or fails to meet the honours requirements may be required by Faculty to transfer to the programme for the degree of Bachelor of Arts in Military Studies and shall take such courses as Faculty may determine.

12. Upon sufficient cause being shown, Faculty may in particular cases vary the requirements of Rules 4, 6, 8, 9 and 10, provided that any variation shall be initiated by a recommendation from a Head of Department concerned.

SCHEDULE A1

<i>Subject</i>	<i>Course</i>
Economics . . . .	1609 Economics I
	2610 Economics IIA
	2610H Economics IIA (Honours)
	2611 Economics IIB
	2611H Economics IIB (Honours)
	3610 Economics IIIA
	3610H Economics IIIA (Honours)
	3611 Economics IIIB
	3611H Economics IIIB (Honours)
English . . . .	4610H Economics IV (Honours)
	1507 English I
	2507 English II
	3507 English III
Geography . . . .	1508 Australian Literature
	1953 Geography I
	2953 Geography II
	2963 Geography II (Honours)
	3953A Geography IIIA
	3953B Geography IIIB
	3963 Geography III (Honours)
Government . . . .	4953 Geography IV (Honours)
	1001 Government I
	2001 Government II
	2031 Government II (Honours)
	3021 Government III
	3031 Government IIIA (Honours)
	3032 Government IIIB (Honours)
History . . . . .	4032 Government IV (Honours)
	1405 History I
	2407 History IIA
	2408 History IIAH
	2409 History IIB
	3408 History IIIA
	3409 History IIIA (Honours)
	3410 History IIIB
	3412 History IIIB (Honours)
Mathematics . . . .	4405 History IV
	1131 Mathematics IA
	1132 Mathematics IB
	2131 Mathematics IIA
	2132 Mathematics IIB

## *Degree Rules and Programs of Study*

### *Subject*

### *Course*

2135	Mathematics IIA (Honours)
2136	Mathematics IIB (Honours)
3138	Mathematics IIIA (Honours)
3139	Mathematics IIIB (Honours)
4131	Mathematics IV

### SCHEDULE A2

Chemistry	.	.	.	1306	Chemistry I
Physics	.	.	.	1203	Physics I
Science	.	.	.	1806	Science A



## **Rules governing the award of the degree of Bachelor of Science in Military Studies**

1. The degree of Bachelor of Science in Military Studies shall be conferred as a pass degree.
2. No person shall be permitted to enrol in any qualifying course for the degree of Bachelor of Science in Military Studies at the same time as he is enrolled for any other degree or diploma in this University or elsewhere.
3. Where, in the following Rules, reference is made to the requirement that a candidate shall complete a course, the requirement shall be construed as meaning that the candidate shall:
  - (a) attend such lectures, seminars and tutorials as may be prescribed in that course;
  - (b) perform satisfactorily in such exercises, laboratory work, essays and thesis (if any) as may be prescribed in that course; and
  - (c) pass the examination or examinations in that course.
4. A candidate shall not enrol in a course until he satisfies all prerequisite and corequisite conditions for that course, as specified by the appropriate department.
5. A major in a subject shall consist of Course II of value 8 points, and Course III of value 12 points in one of the subjects of Chemistry, Computer Science, Mathematics or Physics.
6. A candidate for the degree of Bachelor of Science in Military Studies shall be required to complete both the academic requirements of the degree, as specified in Rule 8, and the military requirements of the degree, as specified in Rule 9.
7. The academic requirements specified in Rule 8 shall be completed over the first three years of the candidate's course and the military requirements specified in Rule 9 shall be completed over all four years of the candidate's course. In special circumstances an extension of time of one year may be granted to a candidate in which to complete either or both of the academic and military requirements.
8. *Academic Requirements.* A candidate shall complete the following:
  - (a) three courses chosen from Schedule S4, having regard to the conditions that:
    - (i) English A is a prerequisite for English B; and
    - (ii) all students are required to complete History C Part II;
  - (b) the courses specified in Schedule S1;
  - (c) EITHER—two courses chosen from Schedule S2, one course chosen from Schedule S2A, one course chosen from Schedule S3, and either

## Degree Rules and Programs of Study

one more course chosen from Schedule S2A, or one course chosen from Schedule S3A, or two courses chosen from Schedule S3B;

OR

one course chosen from Schedule S2, three courses chosen from Schedule S2A, one course chosen from Schedule S3, and either one course chosen from Schedule S3A or two courses chosen from Schedule S3B;

*subject to the following:*

- the choice of courses from Schedules S2 and S3 must provide a major as defined in Rule 5;
- a candidate shall complete a Chemistry course chosen from Schedule S2 or S2A;
- a candidate shall complete a Physics course chosen from Schedule S2 or S2A;
- a candidate shall not take both the courses Mathematics II and Computer Science II;
- a candidate shall not take both Course II and Course IIA of a subject;
- a candidate shall not take more than one of Course III, Course IIIA and Course IIIB of a subject.

### SCHEDULE S1

1306	Chemistry I
1131	Mathematics IA
1132	Mathematics IB
1203	Physics I

*Point  
Value*

### SCHEDULE S2

2310	Chemistry II	8
2180	Computer Science II	8
2130	Mathematics II	8
2210	Physics II	8

*Point  
Value*

### SCHEDULE S2A

2311	Chemistry IIA	4
2181	Computer Science IIA	4
2131	Mathematics IIA	4
2211	Physics IIA	4

*Point  
Value*

### SCHEDULE S3

3303	Chemistry III	12
3180	Computer Science III	12
3120	Mathematics III	12
3203	Physics III	12

		<i>Point Value</i>
SCHEDULE S3A		
3304	Chemistry IIIA . . . . .	4
3181	Computer Science IIIA . . . . .	4
3121	Mathematics IIIA . . . . .	4
3204	Physics IIIA . . . . .	4

		<i>Point Value</i>
SCHEDULE S3B		
3305	Chemistry IIIB . . . . .	2
3182	Computer Science IIIB . . . . .	2
3122	Mathematics IIIB . . . . .	2
3205	Physics IIIB . . . . .	2

SCHEDULE S4	
1521	English A
2521	English B
1413	History C Part I
1413	History C Part II

9. *Military Requirements.* A candidate shall complete the program of training in the military requirements as set out in Schedule M.
10. Upon sufficient cause being shown, Faculty may, in particular cases, vary the requirements of Rules 3, 5 and 8, provided that any proposed variation shall be initiated by a recommendation from a Head of Department concerned.

### **Programs of study for the Degree of BSc(Mil)**

#### *Alternative A*

First Year . . .	PI	QI	RI	SI	G Studies Subject
Second Year . .	PII	QII	RIIA	G Studies Subject	
Third Year . . .	PIII	(i)	G Studies Subject		

where (i) is SIIA, or QIIIA, or RIIA, or QIIIB and RIIB

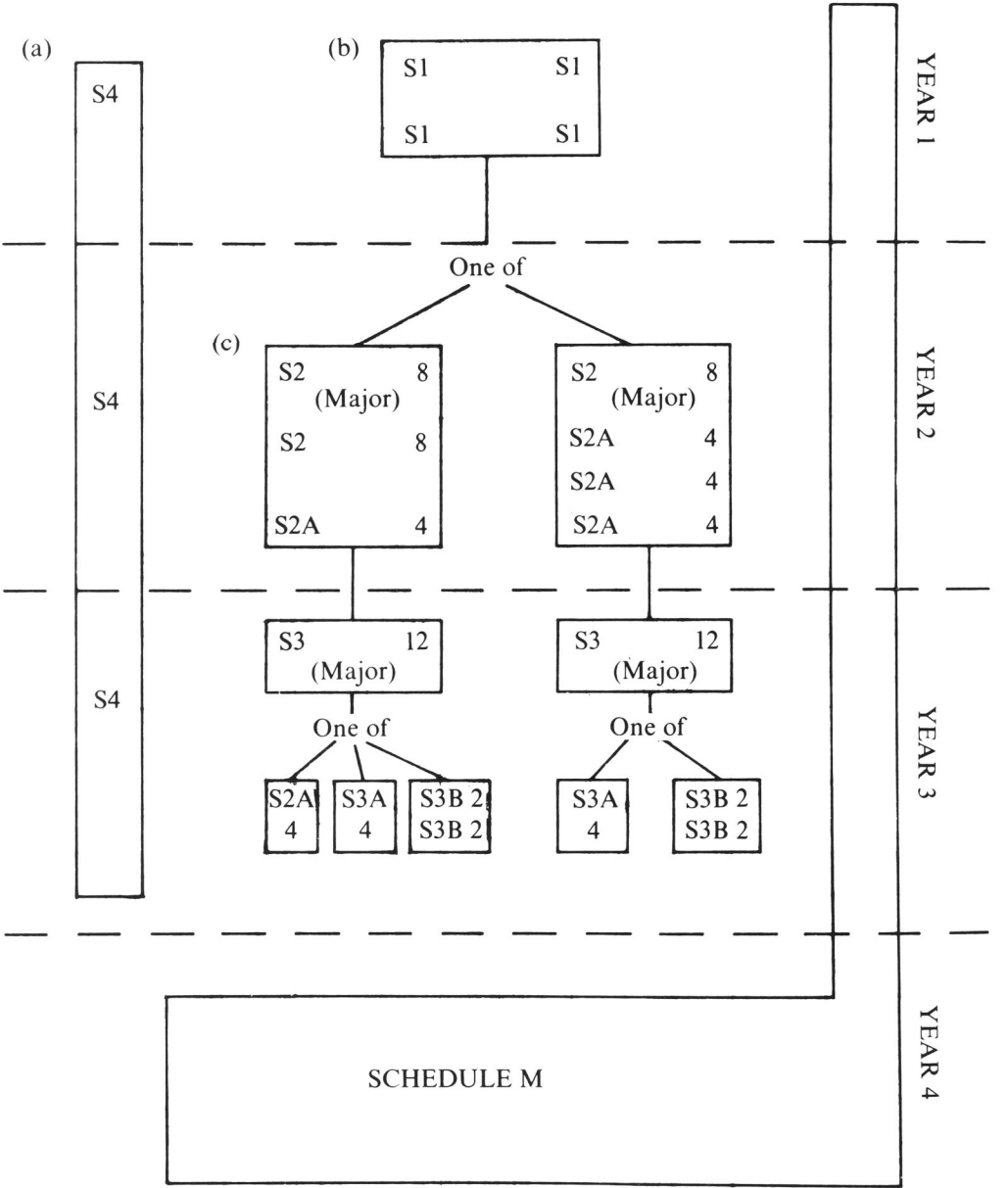
#### *Alternative B*

First Year . . .	PI	QI	RI	SI	G Studies Subject
Second Year . .	PII	QIIA	RIIA	SIIA	G Studies Subject
Third Year . . .	PIII	(i)	G Studies Subject		

where (i) is QIIIA, or QIIIB and RIIB

where P, Q, R and S represent the four subjects Chemistry, Computer Science, Mathematics and Physics.

Diagrammatic representation of proposed programs of study for BSc(Mil) degree



## **Requirements for the Degree of Bachelor of Science with Honours in the Faculty of Military Studies**

1. In order to qualify for admission to this degree a candidate shall:

- (a) satisfy the academic requirements for the degree of Bachelor of Science in Military Studies without proceeding to graduation;
- (b) complete the military requirements set out in Schedule M; and
- (c) achieve an acceptable level of performance in an extra year of full-time academic study beyond that required for the degree of BSc (Mil).

2. A student wishing to proceed to an honours degree must apply to the Head of the appropriate Department when he has completed the academic requirements for the degree of Bachelor of Science in Military Studies. His admission to honours candidature is granted by Faculty on the recommendation of the Head of the Department, and will be conditional upon his completing Schedule M.

3. A suitably qualified candidate may be admitted to an honours course in one of the following:

Chemistry  
Computer Science  
Mathematics  
Physics

4. To qualify for admission to an honours course a student must have completed courses at required grades as determined by the Head of the appropriate Department prior to admission to the honours year. In order to ascertain any such special conditions a student contemplating honours is advised to consult the Head of the Department not later than the end of the second year of study.

5. An honours candidate must attend lectures, read and engage in such other work as required by the Head of the Department. He must also complete the subject 4413 History IIC or one further subject from schedule S4 for the BSc (Mil) course.

## **Rules governing the award of the degree of Bachelor of Engineering in the Faculty of Military Studies**

*Subject to the approval of the appropriate Heads of Departments, a candidate who entered the course before 1975 may elect to be governed by the rules applying to candidates entering the course in 1975 and subsequent years. A student transferring in this way who has completed the industrial visits requirement of Rule 8 (a) will not be required to satisfy the practical engineering experience requirement of Rule 8 (b).*

1. The degree of Bachelor of Engineering shall be conferred as a pass degree or as an honours degree. Honours may be awarded in the following categories:

Honours Class I

Honours Class II, Division I

Honours Class II, Division II

2. No person shall be permitted to enrol in any qualifying course for the degree of Bachelor of Engineering at the same time as he is enrolled for any other degree or diploma in this University or elsewhere.

3. Where, in the following Rules, reference is made to the requirement that a candidate shall complete a subject, the requirement shall be construed as meaning that the candidate shall:

- (a) attend such lectures, seminars and tutorials as may be prescribed in that subject; and
- (b) perform satisfactorily in such exercises, laboratory, drawing office and field work, essays and thesis, and examinations as may be prescribed in that subject.

4. Before a candidate's enrolment will be accepted for any subject, he must have completed the relevant prerequisite subjects shown in Schedules E2, E3, E4 and E5

5. A candidate shall be required to complete the academic requirements of the degree, as specified in Rule 7, and the military requirements and practical engineering experience requirements as specified in Rule 8.

6.—

- (a) A candidate who entered the course before 1975 shall be required to complete all the academic, military and practical engineering experience requirements for the degree in not more than five years.
- (b) A candidate entering the course in 1975 and subsequent years shall be required to complete all the requirements for the degree in not more than six years.

### **7. Academic Requirements:**

- (a) *Standard Program.* The candidate shall complete in the years prescribed the qualifying subjects prescribed for all engineering students and those pertaining to one particular branch of engineering as set out in Schedules E1, E2, E3 and E4. The general studies subjects are

1413 History C Part II and three others chosen from the list as set out in Schedule E5. The selection must be made so that a candidate takes both parts of at least one general studies subject.

- (b) *Non-standard Program.* Subject to the requirements of Rule 4 and time-tabling requirements and the approval of the appropriate Heads of Departments a candidate may be permitted to enrol in any one year in subjects selected from more than one of Schedules E1, E2, E3 and E4. Non-standard programs are subject to the general regulations of the Professorial Board regarding re-enrolment, and to the requirement that all subjects of Schedule E1 must be completed in the first two years of the course.

**8. Military Requirements and Practical Engineering Experience Requirements:**

- (a) *Candidates entering the degree course before 1975.* The candidate shall follow the prescribed Schedule ME of military work and show that he has attained the required standards. He will participate in visits to engineering works and establishments as prescribed by the appropriate Head of Department.
- (b) *Candidates entering the degree course in 1975 and subsequent years.* The candidate shall complete the prescribed Schedule M of military work and show he has attained the required standards. Before the completion of academic studies he shall complete a period of sixty working days of approved practical engineering experience.<sup>1</sup>

9. Upon sufficient cause being shown, Faculty may, in particular cases, vary the requirements of Rules 3, 4 and 7, provided that any proposed variation shall be initiated by a recommendation from a Head of Department concerned.

**SCHEDULE E1—THE FIRST YEAR COURSE**

*All Engineering students*

**General Studies Subject**

1131 Mathematics IA

1132 Mathematics IB

1273 Physics I

1303 Chemistry

1708 Engineering I

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**Note:**

<sup>1</sup> The sixty working days of practical experience must be done in periods of not less than twenty working days each. The recommended periods are one of twenty days in any one of the long vacations following the first, second or third year of the course and one of forty days immediately before the final academic year. A total of twenty working days from immediately before and just after any Christmas holiday period will be satisfactory provided that the work is done in the service of a single employer.

## *The Faculty of Military Studies*

### SCHEDULE E2—THE SECOND YEAR COURSE

*All Engineering students*

*Prerequisite Subjects*

General Studies subject

2131 Mathematics IIA (Calculus II, Differential Equations II) (1131)

*Civil Engineering*

2183 Computer Science IIC (Numerical Analysis II) (1131 and 1132)

2718 Engineering II (1708, 1131 and 1132)

2725 Civil Engineering I

3761 Applied Thermodynamics

*Electrical Engineering*

2185 Statistics IIC (Probability and Statistics II)

2273 Physics II (1131, 1132 and 1203 or 1273)

2746 Electrical Engineering I (1131, 1132 and 1203 or 1273)

*Mechanical Engineering*

2181 Computer Science IIA (Probability and Statistics II, Numerical Analysis II) (1131 and 1132)

2718 Engineering II (1708, 1131 and 1132)

2768 Mechanical Engineering I (1708, 1273, 1131 and 1132)

### SCHEDULE E3—THE THIRD YEAR COURSE

*All Engineering students*

General studies subject

*Civil Engineering*

2185 Statistics IIC (Probability and Statistics II)

3750 Electrical Technology (1273, 1131 and 1132)

3733 Civil Engineering II (2725, 2718)

*Electrical Engineering*

3122 Mathematics IIIB (Complex Variable III) (2131—Calculus II unit)

2183 Computer Science IIC (Numerical Analysis II) (1131 and 1132)

3748 Electrical Engineering II (2746, 2273 and 2185)

4707 Management Science (2185 or 2181)

*Mechanical Engineering*

3122 Mathematics IIIB (Complex Variable III) (2131—Calculus II unit)

3750 Electrical Technology (1273, 1131 and 1132)

3774 Mechanical Engineering II (2768, 2718 and 2181)



SCHEDULE E4—THE FOURTH YEAR COURSE

*All Engineering students*

General studies subject

*Civil Engineering*

4707 Management Science (2131)

4703C Project and Thesis (3733)

4725 Civil Engineering III (3733)

*Electrical Engineering*

4703E Project, Thesis and Specialist Lectures (3748)

4742 Electrical Engineering III (3748, 3122 and 2183)

*Mechanical Engineering*

4707 Management Science (2131)

4703M Project and Thesis (3774)

4764 Mechanical Engineering III (3774 and 3122)

SCHEDULE E5—GENERAL STUDIES SUBJECTS

1413 History C Part I

1413 History C Part II

1901A Geography A

1901B Geography B

1521 English A

2521 English B (1521)

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**ADDENDUM No 2***Degree Rules and Programmes of Study***Military requirements for the degrees of Bachelor of Arts in Military Studies and Bachelor of Science in Military Studies**

## SCHEDULE M

1. All candidates for either degree shall undertake a common programme of training in the subjects listed under the broad headings of Military Art, Military Science and Military Technology and the programme shall extend over four years.

2. During each of the first three years, the requirements of the programme shall, in the main, be completed in a five-week period prior to the commencement of the academic year and in a three-week period after the end of that academic year. However continuation training shall extend over the whole of the 30-week academic year.

3. The fourth year shall be devoted entirely to the military training programme and shall extend over a period of 47 weeks.

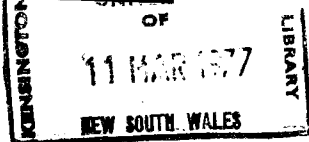
4. The individual subjects contained in the programme of military requirements are:

(a) *Military Art*

- (i) Physical Education—Theory of physical training applied to physical endurance, battle efficiency, general gymnastics and sport.
- (ii) Military Law—History, principles and practices of Military Law.
- (iii) Military Administration—Personnel, stores and finance in a theatre of operation; a study of logistic support.
- (iv) Tactics—A study of the defence, withdrawal and attack phases of war and counter-revolutionary operations.
- (v) Organization and Management—Staff duties, training and intelligence.

(b) *Military Science*

- (i) Arms Training—A detailed study of weapons support and facilities available from various branches of the Army—armour, artillery and nuclear support, Army aviation, military engineering, signals.
- (ii) Topography—An advanced study of the principles of map and airphoto reading, position finding and navigation.



### *Degree Rules and Programmes of Study*

- (iii) **Field Projects**—The application of the principles of tactics to the command of an infantry platoon; field exercises.
- (iv) **Military Experience**—Attachment to a training unit to obtain practical military experience.
- (c) ***Military Technology***
  - (i) **Military Weapons**—Design, operation and maintenance of infantry weapons, firepower of current Army weapons.
  - (ii) **Research and Development**—Preparatory lectures and directed reading—visits and attachments to research and development establishments, Army Design Establishment, selected research institutions and industries.

### **Military requirements for the degrees of Bachelor of Engineering in the Faculty of Military Studies, Bachelor of Arts with Honours and Bachelor of Science with Honours in the Faculty of Military Studies**

#### SCHEDULE ME

1. All candidates for the degree shall undertake a programme of training in the subjects listed under the broad headings of Military Art, Military Science and Military Technology and the programme shall extend over four years.
2. During each of the four years, the main requirements of the programme shall be completed in a five-week period prior to the commencement of the academic year and in a three-week period after the end of that academic year. However, continuation training shall extend over the whole of the 30-week academic year.
3. The individual subjects contained in the programme of military requirements are:
  - (a) ***Military Art***
    - (i) **Physical Education**—Theory of physical training applied to physical endurance, battle efficiency, general gymnastics and sport.
    - (ii) **Military Law**—History, principles and practices of Military Law.
    - (iii) **Military Administration**—Personnel, stores and finance in a theatre of operation; a limited study of logistic support.
    - (iv) **Organization and Management**—Staff duties, training and intelligence.

## *Degree Rules and Programmes of Study*

### **(b) *Military Science***

- (i) **Arms Training**—Knowledge of weapons support and facilities available from various branches of the army—armour, artillery, army aviation, military engineering, signals.
- (ii) **Field Projects**—The application of the principles of tactics to the command of an infantry platoon field exercises.

### **(c) *Military Technology***

**Military Weapons**—Design, operation and maintenance of infantry weapons, firepower of current Army weapons.

# **Courses Offered by Departments**

## Department of Economics

Economics I is intended to provide both a course on which further study in economics may be built, and also a self-contained unit with sufficiently broad coverage to render it suitable as a single course for a student not wishing to pursue the subject further.

A pass or honours student wishing to take a sub-major in economics will take Economics I and either Economics IIA or Economics IIB.

A pass degree student taking a sub-major in economics may take one additional Economics Course II in his second or third year (but after completing Economics I) towards his total of eight courses from Schedule A1 of the Rules for the pass degree.

A pass degree student wishing to take a major in economics will take Economics courses I, IIA and either IIIA or IIIB.

A pass degree student taking a major in economics may take one additional Economics Course II or III towards his total of eight courses from Schedule A1 of the Rules for the pass degree provided that he meets the requirements of Rules 4 and 7 of those Rules.

An honours student wishing to major in this subject may take Economics courses I, IIA, IIB, IIIA, IIIB and IVH under Rule 9 (1) (a), or he may take Economics courses I, IIA, IIIA, IIIB and IVH under Rule 9 (1) (b) which requires the completion of a second sub-major in lieu of the completion of Economics IIB.

An honours student who under Rule 9 (2) takes two subjects, including economics, for special study, will take Economics I, Economics IIA, a Course III the choice of which may be influenced by the nature of the second subject of special study, and a specially devised Course IV embracing the two disciplines.

Every student taking an economics major must include Economics IIA because of the importance of international economics.

### 1609 Economics I

*Lectures* 84 hr

*Tutorials* 28 hr

#### SYLLABUS

1. Analysis of the pricing mechanism: the differing types of economy; demand, supply and markets; the basis of demand, consumption and marginal utility, the demand curve; concept of production; brief analysis of supply, combination of factors, variable returns to inputs, costs; demand, supply and price.

2. National product, national income and national expenditure; their meaning and significance; elementary social accounting.

3. Theory of income determination in closed and open systems.

4. Money and banking in the context of macroeconomics.

5. The Balance of Trade, significance for economic policy.

6. The aims of economic policy.

TEXTBOOKS

Government Printer, *National Income and Expenditure*, latest issue.

Ferguson, C. E., and Kreps, J. M., *Principles of Economics*, 2nd ed., Holt, Rinehart and Winston, 1965.

*The Reserve Bank of Australia*, 1975.

Harcourt, G. C., Karmel, P. H., and Wallace, R. H., *Economic Activity*, Cambridge, U.P., 1967.

Lipsey, R. G., *An Introduction to Positive Economics*, 2nd ed., Weidenfeld and Nicolson, 1966.

Rowan, D. C., *Output, Inflation and Growth*, Aust. ed., Macmillan, 1975.

Samuelson, P. A., Hancock, K., and Wallace, R., *Economics, Australian Edition*, 2nd ed., McGraw-Hill, 1975.

REFERENCE BOOKS

Stonier, A. W., and Hague, D. C., *A Textbook of Economic Theory*, 4th ed., Longmans, 1972.

Arndt, H. W., and Corden, W. M., *The Australian Economy: A Volume of Readings*, Cheshire, 1963.

Leftwich, R. H., *The Price System and Resource Allocation*, 4th ed., Holt, Rinehart and Winston, 1970.

Sirkin, G., *Introduction to Macroeconomic Theory*, 3rd ed., Irwin, 1970.

Harris, C. P., *The Economics of the Financial Sector*, Cheshire, 1972.

## 2610 Economics IIA

Lectures 84 hr

Tutorials 28 hr

SYLLABUS

1. An introduction to required mathematical techniques.

2. Microeconomic theory: Utility theory and the derivation of demand functions; production theory and the derivation of cost and supply functions; the model of the firm and industry in pure competition; departures from pure competition—monopoly, oligopoly and monopolistic competition; distribution theory; market performance and industrial structure with particular reference to the Australian economy; introduction to welfare economics.

3. International economics: the balance of payments, the principle of comparative advantage, principles of international trade policy, prices and the terms of trade, exchange rates, economic integration, international commercial co-operation, the balance of payments problem, foreign exchange dealings, international monetary and financial institutions, gold, reserve currencies, international liquidity reserves, international capital flows and the transfer problem.

TEXTBOOKS

Ferguson, C. E., *Microeconomic Theory*, Irwin, 1969.

Cole, C. L., *Microeconomics: a Contemporary Approach*, Harcourt Brace, Jovanovich, 1973.



## Department of Economics

Sherer, F. M., *Industrial Market Structure and Economic Performance*, Rand McNally, 1970.

Sodersten, B., *International Economics*, Macmillan, 1971.

Staley, C. E., *International Economics*, Prentice-Hall, 1970.

### REFERENCE BOOKS

Pickering, J. F., *Industrial Structure and Market Conduct*, Martin Robertson, 1974.

Baumol, W. J., *Economic Theory and Operations Analysis*, Prentice-Hall, 1972.

Laidler, D., *Introduction to Microeconomics*, Philip Allan, 1974.

Lancaster, K., *An Introduction to Modern Microeconomics*, Rand McNally, 1969.

Ryan, W. J. L., *Price Theory*, Macmillan, 1958.

Watson, D. S., *Price Theory and its Uses*, Houghton Mifflin, 1963.

Devine, P. J., Jones, R. M., Lee, N., and Tyson, W. J., *An Introduction to Industrial Economics*, Allen and Unwin, 1974.

Curwen, P. J., *The Theory of the Firm*, Macmillan, 1976.

Hawkins, C. J., *Theory of the Firm*, Macmillan, 1973.

Hirshleifer, J., *Price Theory and Applications*, Prentice-Hall, 1976.

Caves, R. E., and Jones, R. W., *World Trade and Payments*, Little Brown, 1973.

Kindleberger, C. P., *International Economics*, Irwin, 1973.

Stern, R. M., *The Balance of Payments*, Aldine, 1973.

Findlay, R., *Trade and Specialisation*, Penguin, 1970.

Robertson, D., *International Trade Policy*, Macmillan, 1972.

Scammell, W. M., *International Trade and Payments*, Macmillan, 1974.

Cooper, R. N., (ed.), *International Finance*, Penguin, 1969.

Hirsch, F., *Money International*, Penguin, 1969.

Cohen, B. J., *Balance of Payments*, Penguin, 1969.

Grubel, H. G., *The International Monetary System*, Penguin, 1969.

## 2610H Economics IIA (Honours)

Honours students will cover the same syllabus as that for Course 2610 Economics IIA, but will treat the work in greater depth and with more emphasis on mathematical techniques. Textbooks as for Course 2610 Economics IIA and additional references.

## 2611 Economics IIB

Lectures 84 hr

Tutorial 28 hr

(This course may not be offered in 1977.)

### SYLLABUS

1. Public finance: the role of the government in the economy; principles and types of government expenditure, possibilities of variation, the Defence vote, economic and welfare aspects of expenditure items; sources of revenue, theory

of taxation, taxation systems and proposals for reform; loan finance and debt management; federal, state and local government financial relations; fiscal policy in relation to stability, growth, resource allocation and income distribution.

2. Economics of war and defence: economic aspects of war and defence preparation in peacetime, the real burden, estimates of war potential, economic preparedness, defence management decision-making techniques, strategic aspects of foreign trade and investment; the wartime economy, priorities, mobilisation and transfer of manpower and resources, control mechanisms for production and allocation, wartime inflation and its containment, fiscal and balance of payments problems, foreign trade and economic warfare; reconversion to a peacetime economy.

#### TEXTBOOKS

Dixon, J. (ed.), *The Public Sector*, Pelican, 1972.

Eckstein, O., *Public Finance*, 3rd ed., Prentice-Hall, 1973.

Herber, B. P., *Modern Public Finance*, Irwin, 1971.

Houghton, R. W. (ed.), *Public Finance*, 2nd ed., Penguin, 1973.

Neville, J. W., *Fiscal Policy in Australia*, Cheshire, 1970.

Clark, J. J., *The New Economics of National Defense*, Random House, 1966.

### 2611H Economics IIB (Honours)

As for Course 2611 Economics IIB but with additional work.

### 3610 Economics IIIA

*Lectures* 84 hr

*Tutorials* 28 hr

#### SYLLABUS

1. Advanced Macroeconomics: Theories of aggregate consumption; investment theory; government expenditure and taxation; imports and exports; equilibrium in the real sector. The demand and supply of money; equilibrium in the monetary sector. Macroeconomic equilibrium. Further topics in monetary economics including the modern quantity theory of the demand for money and an empirical consideration of monetary multipliers; some consideration of the inside-outside money thesis.

2. Growth and Fluctuations: Theories of the cycle; methods of forecasting; stabilisation policies and their significance for economic growth; the postwar cycle in Australia.

3. Theories of Economic Development.

4. Economic aspects of the underdeveloped countries: income levels, agriculture, industry, population, unemployment, foreign trade, aid, domestic savings, planning, institutional obstructions, the role of the government.

#### TEXTBOOKS

Wykoff, F. C., *Macroeconomics. Theory, Evidence and Policy*, Prentice-Hall, 1976.

## *Department of Economics*

Mathews, R. C. O., *The Trade Cycle*, Cambridge U.P., 1969.

Myint, H., *The Economics of Developing Countries*, 4th ed., Hutchinson, 1973.

Cole, J., *The Poor of the Earth*, Macmillan, 1976.

Onyemelukwe, C. C., *Economic Underdevelopment*, Longman, 1974.

Spiegelglas, S. and Welsh, C. J., *Economic Development: Challenge and Promise*, Prentice-Hall, 1970.

### **3610H Economics IIIA (Honours)**

As for Course 3610 Economics IIIA but with additional tutorials and seminars in order to cover the work at greater depth.

### **3611 Economics IIIB**

*Lectures 84 hr*

*Tutorials 28 hr*

#### **SYLLABUS**

1. Comparative economic systems: the study of and types of economic systems, elements of Marxist economics; markets and economic planning and management; structural developments; prices; consumption and investment; incentives; domestic and foreign trade; economic growth; evaluation of capitalism and socialism.

2. East-West economic relations: historical background; policies, organisation and structure of trade; prices, exchange rates, tariffs, bilateralism, multilateralism and access to markets; commercial, financial and technological co-operation, trade disputes; Australia's interests; East-West economic relations in the world scene.

#### **TEXTBOOKS**

Elliot, J. E. and Campbell, R. W., *Comparative Economic Systems*, Prentice-Hall, 1973.

McMillan, C. H. (ed.), *Changing Perspectives in East-West Commerce*, Heath, 1974.

Nove, A. and Nuti, D. M. (eds.), *Socialist Economics: Selected Readings*, Penguin, 1972.

Wilczynski, J., *The Economics and Politics of East-West Trade: A Study of Trade between Centrally Planned Economies and Market Economies in a Changing World*, Macmillan, 1969.

Wilczynski, J., *The Economics of Socialism. Principles Governing the Operation of Centrally Planned Economies in the USSR and Eastern Europe under the New System*, 2nd ed., Allen and Unwin, 1972.

#### **REFERENCE BOOKS**

Adler-Karlsson, G., *Western Economic Warfare 1947-1969: A Case Study in Foreign Economic Policy*, Almqvist and Wicksell, 1968.

Bornstein, M. (ed.), *Comparative Economic Systems: Models and Cases*, 3rd ed., Irwin, 1974.

Brown, A. A. and Neuberger, E. (eds), *International Trade and Central Planning*, U. of California P., 1968.

Eckstein, A. (ed.), *Comparison of Economic Systems: Theoretical and Methodological Approaches*, U. of California P., 1971.

Halm, G. N., *Economic Systems: A comparative Analysis*, 3rd ed., Holt, Rinehart and Winston, 1968.

Heilbronner, R. L., *Between Capitalism and Socialism: Essays in Political Economics*, Vintage Books, 1970.

Kernig, C. D. (ed.), *Marxism, Communism and Western Society: A comparative Encyclopaedia* (in 8 vols), Herder and Herder, 1972.

Wasowski, S. (ed.), *East-West Trade and the Technology Gap: A Political and Economic Appraisal*, Praeger, 1969.

Wilczynski, J., *The Multinationals and East-West Relations*, Macmillan, 1976.

### 3611H Economics IIIB (Honours)

Lectures 95 hr

Tutorials 35 hr

Work for honours includes the contents of 3611 Economics IIIB studied to a greater depth, plus two selected topics (one from each of the two sections) for special study.

### 4601H Economics IV (Honours)

#### SYLLABUS

Determinants of the size and structure of the public sector, the nature of public goods and their effect on economic welfare. Nationalisation and socialisation. Pricing policies of public utilities. Application of cost-benefit analysis and other techniques to resource allocation, income redistribution and other objectives of public policy. Economic appraisal of transport, water resource, land use, recreation, urban and regional projects and of manpower, education and defence production programs. Environmental and natural disaster studies. The multinationally-owned public enterprise.

#### TEXTBOOKS

No textbooks are prescribed.

#### REFERENCE BOOKS

Herber, B. P., *Modern Public Finance. The Study of Public Sector Economics*, rev. ed., Irwin, 1971.

Friedman, W., *Public and Private Enterprise in Mixed Economies*, Columbia U.P., 1974.

Haveman, R. H., *The Economics of the Public Sector*, Wiley, 1970.

Dixon, J. (ed.), *The Public Sector*, Penguin, 1972.

Reed, P. W., *The Economics of Public Enterprise*, Butterworths, 1973.

Wagner, R., *The Public Economy*, Eurospan, 1973.

Gulyer, A. J., *The Economics of Social Policy*, Martin Robertson, 1973.

Millward, R., *Public Expenditure Economics*, McGraw-Hill, 1971.

Bohm, P., *Social Efficiency*, Macmillan, 1973.

Nove, A., *Efficiency Criteria for Nationalised Industries*, Allen and Unwin, 1973.

Layard, R. (ed.), *Cost-benefit Analysis*, Penguin, 1972.

Adler, H. A., *Economic Appraisal of Transport Projects*, Indiana U.P., 1971.

Thompson, J. M., *Modern Transport Economics*, Penguin Education, 1974.

Clark, J. J., *The New Economics of National Defense*, Random House, 1966.

Schreiber, A. F., Gatons, P. K., and Clemmer, R. B., *Economics of Urban Problems*, Houghton Mifflin, 1971.

Maass, A., Hufschmidt, M. M., Dorfman, R., Thomas, H. A., Marglin, S. A., and Fair, G. M., *Design of Water Resource Systems*, Macmillan, 1962.

Smith, B. L. R., *The New Political Economy: The Public Use of the Private Sector*, Macmillan, 1975.

Pryor, F. L., *Public Expenditures in Communist and Capitalist Nations*, Irwin, 1968.

## Department of Geography

### 1953 Geography I

*Lectures 56 hr*  
*Tutorials/ Practical 84 hr*

#### SYLLABUS

#### *Part I: Physical Geography*

An introduction to the various elements and processes of the natural environment.

- (i) Climatology
- (ii) Hydrology
- (iii) Geomorphology
- (iv) Biogeography

The practical work provides an introduction to cartography, morphometry and map interpretation.

#### *Part II: Human Geography*

This course represents an introduction to modern human geography and is concerned with spatial organisation and environmental interaction. The practical work provides an introduction to the use of statistics and computing in Geography.

#### PRESCRIBED TEXTS

Abler, R., Adams, J. S., and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

Chase, C. I., *Elementary Statistical Procedures*, McGraw-Hill, 1967.

Maddox, J., *The Doomsday Syndrome*, Macmillan, 1975.

Monkhouse, F. J., and Wilkinson, H. R., *Maps and Diagrams*, Methuen, 1967.

Muller, R. A., (ed), *Physical Geography Today*, CRM Books, 1974.

### 2953 Geography II

*Lectures 56 hr*  
*Tutorials/ Practical 84 hr*

#### SYLLABUS

The course will be made up of three elective term units, one unit to be taken each term. The units available are:

- 1. Geomorphology
- 2. Biogeography
- 5. Environment and Society
- 4. Transport Geography
- 5. Social Geography
- 6. New Guinea
- 7. Behavioural Geography

## Department of Geography

8. Anthropogeography
9. Photogrammetry and Remote Sensing
10. Urban Systems
11. Medical Geography
12. Climatology and Meteorology
13. Systems and Models
14. Coastal Studies
15. Geography of the Third World
16. Strategic Geography
17. The Geography of Information and Communication
18. Spatial Organisation and Location Analysis

### 1. *Geomorphology*

A study of fluvial and coastal Geomorphology with emphasis on Australian examples.

The practical work will provide an introduction to field and laboratory techniques in Geomorphology and students will be required to attend a field excursion.

#### PRESCRIBED TEXTS

Bird, E. C. F., *Costs*, A.N.U. Press, 1968.

King, C. A. M., *Techniques in Geomorphology*, Arnold, 1969.

Leopold Wolman and Miller, *Fluvial Processes in Geomorphology*, Freeman, 1968.

Morisawa, M., *Streams: their Dynamics and Morphology*, McGraw-Hill, 1968.

### 2. *Biogeography*

A consideration of the ecosystem with particular reference to ecosystems in Australia. A basic introduction to techniques of vegetation and soils mapping, analysis and classification.

#### PRESCRIBED TEXTS

Corbett, J. R., *The Living Soil*, Martindale, 1966.

Eyre, S. R., *Vegetation and Soils*, Arnold, 1968.

U.S.A. Department Agriculture, *Soil Survey Manual Handbook*, No. 18  
USDA.

### 3. *Environment and Society*

A consideration of man's impact on the environment with emphasis on the influence of urban areas.

#### PRESCRIBED TEXTS

Ehrlich, P. R., and Ehrlich, A. H., *Population, Resources, Environment*, Freeman, 1970.

Detwyler, T. R., *Man's Impact on Environment*, McGraw-Hill, 1971.

#### 4. *Transport Geography*

Concerns Geography of transport and communication and contains an introduction to network analysis and allied techniques.

**PRESCRIBED TEXT**

Abler, R., Adams, J. S., and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

#### 5. *Social Geography*

Concerned with human environmental interaction and the process approach to the analysis of human geographical phenomena. It contains an introduction to the theory of decision making.

**PRESCRIBED TEXT**

Abler, R., Adams, J. S., and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

#### 6. *New Guinea*

A study of the physical and human geography of New Guinea with emphasis on the problems of a developing society.

**PRESCRIBED TEXT**

Howlet, D. A., *A Geography of Papua and New Guinea*, Nelson, 1972.

#### 7. *Behavioural Geography*

Concerned with process approaches to human environmental behaviour, placing emphasis on environmental perception. It involves the systematic analysis of human behaviour patterns in diverse environmental contexts: e.g. urban, rural, political, military, recreational, etc.

**PRESCRIBED TEXT**

Abler, R., Adams, J. S., and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

#### 8. *Anthropogeography*

Concerned with the animal and other characteristics of the human race in their environmental context. Deals with such matters as territoriality, aggression, social cohesion, and interpersonal interaction, tribalism and group activity, organisation and invention.

**PRESCRIBED TEXTS**

Ardrey, R., *The Territorial Imperative*, Fontana, 1969.

Koestler, A., *The Ghost in the Machine*, Pan, 1970.

Sahlins, M. D., *Tribesmen*, Prentice-Hall, 1968.

#### 9. *Photogrammetry and Remote Sensing*

Deals with techniques of data collection and analysis through such media as air and satellite photography, and other modes of sensing such as radar, sonar etc.



**PRESCRIBED TEXTS**

Avery, T. E., *The Interpretation of Air Photographs*, 3rd ed., Burgess Pub. Co., 1968.

Barrett, E. C. and Costin, F. F., *Environmental Remote Sensing: Applications and Achievements*, Edward Arnold, 1973.

**10. Urban Systems**

Concerned with the study of settlement and behaviour in the urban mode of human organisation. Studies are couched in the methodological framework of systems theory and analysis.

**PRESCRIBED TEXT**

Berry, B. J. L. and Horton, F. E., *Geographical Perspectives on Urban Systems*, Prentice-Hall, 1970.

**11. Medical Geography**

Involves the study of the ecology and distribution patterns of disease, nutrition and health.

**PRESCRIBED TEXT**

McGlashen, N. D., *Medical Geography*, Methuen, 1972.

**12. Climatology and Meteorology**

Systematic studies of global weather and climate, including applied aspects. Involves consideration of data problems and techniques of analysis.

**PRESCRIBED TEXTS**

Barry, R. G., and Chorley, R. J. *Atmosphere, Weather and Climate*, 2nd ed., Methuen, 1971.

Hare, F. K., *The Restless Atmosphere*, Hutchinson, 1967.

**13. Systems and Models**

Essentially a course in modern geographical methodology. It aims to indicate the scope and versatility of modern geographical analytic techniques.

**PRESCRIBED TEXTS**

Abler, R., Adams, J. S., and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

Buckley, W. (ed.), *Modern Systems Research for the Behavioural Scientist*, Aldine, 1968.

Chorley, R. J. and Haggett, P. (eds.), *Models in Geography*, Methuen, 1967.

**14. Coastal Studies**

Concerned with the study of the interface between marine and terrestrial environments, from both a physical and a human standpoint.

**PRESCRIBED TEXTS**

Bird, E. C., *Coasts*, A.N.U. Press, 1968.

King, C. A. M., *Beaches and Coasts*, 2nd ed., Arnold.

Piries, R. G. *Oceanography: Contemporary Readings in Ocean Sciences*, O.U.P., 1973.

15. *Geography of the Third World*

General and specific studies of the geography of lands and cultures of the 'Third World', with specific reference to those which neighbour Australia and New Zealand.

PRESCRIBED TEXT

Cressey, G. B., *Asia's Lands and Peoples*, McGraw-Hill, 1963.

16. *Strategic Geography*

Concerned with the macro-analysis of global interactions of ideological, political, economic and military power, within and between human communities.

PRESCRIBED TEXTS

Kasperson, R. E., and Minghi, J. V. (eds), *The Structure of Political Geography*, U. of London P., 1970.

Peltier, L. C., and Percy, G. E., *Military Geography*, Van Nostrand, 1966.

Prescott, J. R. V., *The Geography of Frontiers and Boundaries*, Hutchinson, 1967.

17. *The Geography of Information and Communication*

Concerns the study of the nature and ecology of information, and its communication through various media.

PRESCRIBED TEXTS

Abler, R., Adams, J. S. and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

Scientific American, *Communication*, Freeman, 1973.

Smith, A. G., *Communication and Culture*, Holt, Rinehart and Winston, 1966.

18. *Spatial Organisation and Location Analysis*

Deals with geographical phenomena in terms of patterns and processes involved in the organisation of space, having some particular concern with theories of geographical location.

PRESCRIBED TEXTS

Abler, R., Adams, J. S. and Gould, P., *Spatial Organisation*, Prentice-Hall, 1971.

Haggett, P. *Location Analysis in Human Geography*, Edward Arnold, 1965.

**2963 Geography II (Honours)**

As for 2963 Geography II plus a series of seminars which include additional and advanced work.

### **3953A Geography IIIA**

Lectures 56 hr  
Tutorials/Practical 84 hr

#### **SYLLABUS**

The course will be made up of two elective term units and the course Terrain Evaluation and Community Development. The elective units will be chosen from those not taken in Geography II. The units offered are those offered in Geography II.

#### ***Terrain Evaluation and Community Development***

A consideration of terrain evaluation and the Geographic approach to regional assessment. The bulk of the course consists of student research in the assessment of a particular area combining field, mapping and quantitative techniques. The culmination of the course will be the presentation of a combined report.

#### **PRESCRIBED TEXTS**

Avery, T. E. *Interpretation of Aerial Photographs*, Burgess, 1970.  
Durrenberger, R. W., *Geographical Research and Writing*, Cornwell,  
Stewart, G. A., *Land Evaluation*, Macmillan, 1968.

### **3953B Geography IIIB**

Comprising any three subjects not previously selected from the list of Geography options.

### **3963 Geography III (Honours)**

As for 3953A Geography IIIA and 3953B Geography IIIB plus a series of seminars which include additional and advanced work.

### **4953 Geography IV (Honours)**

Candidates are required to:

- (a) prepare a thesis of not more than 10,000 words,
- (b) attend work-in-progress seminars conducted jointly with postgraduate students in related fields,
- (c) attend seminars in geographical research methodology,
- (d) attend seminars related to specific fields of thesis research.

### **1901A Geography A**

A course of 42 lectures/tutorials/practical work for Engineering students, including:

- (a) An introduction to ecology, with special emphasis placed on Biogeography and the influence of man and his works on environment, including the urban environment.
- (b) An examination of the methods of terrain evaluation, with particular reference to the Land Systems approach and the PUCE (Province Unit

Component Evaluation) method. Attention is also given to other models which are superseding land systems analysis, and to an introduction to autocorrelative and autoregressive methods of cartographic representation of climatological, biological and geomorphic data.

- (c) Study of the role of photogrammetry as a basic method of remote sensing for terrain evaluation; extending to satellite meteorology and more advanced methods of remote sensing such as infra-red photography.

**PRESCRIBED TEXTS**

Chorley, R. J., and Haggett, P. (eds.), *Physical and Information Models in Geography*, Methuen University Paperbacks, London, 1969.

Haggett, P., *Geography: A Modern Synthesis*, Harper and Rowe, N.Y., 1972.

**1901B Geography B**

A course of 42 lectures/tutorials/practical work for Engineering students, including:

- (a) An examination of human ecology in primitive and developed societies. Special consideration is given to modes of adaptation to and control over environment and to the side effects of such environmental behaviours.
- (b) Study of the diffusion of peoples, ideas, technological innovations and cultures over the face of the earth.
- (c) Population theory and dynamics, with special consideration of population trends in developed and underdeveloped societies during the 19th and 20th centuries.

**PRESCRIBED TEXT**

Haggett, P., *Geography: A Modern Synthesis*, Harper and Rowe, N.Y., 1972.

# Department of Government

## 1001 Government I

*Lectures and Tutorials* 100 hr

### SYLLABUS

1. An introduction to the principles and concepts of Democracy.
2. Democratic government in Australia.

### TEXTBOOKS

- Cohen, Carl (ed.), *Communism, Fascism, and Democracy*, 2nd ed., Random House, 1971.
- Macpherson, C. B., *The Real World of Democracy*, Clarendon, 1966.
- Punnett, R. M., *British Government and Politics*, 2nd ed., Heinemann, 1971.
- Mayer, H., and Nelson, H. (eds.), *Australian Politics: A Third Reader*, Cheshire, 1973.
- Crisp, L. F., *Australian National Government*, 3rd ed., Longmans, 1973.
- Sawer, G., *Australian Government Today*, 11th ed., M.U.P., 1973.
- Emy, H. V., *The Politics of Australian Democracy*, Macmillan, 1974.
- Finer, S. E., *Comparative Government*, Penguin, 1974.

## 2001 Government II

*Lectures and Tutorials* 100 hr

### SYLLABUS

*Part I: Theories of revolution.*

*Part II: A study of the political system of the U.S.A.*

*Part III: A comparative study of communist politics.*

### TEXTBOOKS FOR PART I

- Rousseau, J. J., *The Social Contract*, translated G. D. Cole, E. P. Dutton, New York, 1913.
- Beloff, Max (ed.), *The Federalist*, Blackwell, Oxford, 1948.
- Marx, K., and Engels, F. *Selected Works*, Lawrence and Wishart London, 1950.
- Kaplan, L. (ed.), *Revolutions: A Comparative Study*, Vintage Books, New York, 1973.

### TEXTBOOKS FOR PART II

- Cummings, M. C., and Wise, D., *Democracy under Pressure*, 2nd ed., Harcourt Brace Jovanovick, 1974.
- Riker, W. H., *Democracy in the United States*, 2nd ed., Collier, 1965.
- Rossiter, C., *Parties and Politics in America*, Cornell, 1966.
- White, T. H., *The Making of the President*, 1964, Cape, 1965.
- Warren, S. (ed.), *The American President*, Prentice-Hall, 1967.
- de Grazia, A., *Congress: The First Branch of Government*, Anchor, 1967.

TEXTBOOKS FOR PART III

Marx, K., and Engels, F., *The Communist Manifesto*, ed. A. J. P. Taylor, Penguin Books, England, 1967.

Dallin, A. and Larson, T. B., *Soviet Politics since Krushchev*, Spectrum, 1968.

Hinton, H. C., *An Introduction to Chinese Politics*, Wren, 1973.

Tucker, R. C. (ed.), *The Marx-Engels Reader*, Norton, 1972.

Tucker, R. C. (ed.), *The Lenin Anthology*, Norton, 1975.

Cohen, L. J. and Shapiro, J. P. (eds.), *Communist Systems in Comparative Perspective*, Anchor, 1974.

Churchward, L. G., *Contemporary Soviet Government*, 2nd ed., Routledge and Kegan Paul, 1975.

**2031 Government II (Honours)** 50 hr

A course of lectures/tutorials supplementing and extending Part I of the Government II pass course.

**3021 Government III (A, B and C)** *Lectures and Tutorials* 112 hr

Three courses are available in Government III, each consisting of two of the following half-year units:

1. The International System
2. Strategic Studies
3. The Politics of the Middle East
4. International Relations of Asia and the Middle East

Government IIIA consists of units 1 and 2; Government IIIB consists of units 3 and 4; Government IIIC consists of units 1 and 4. Students taking one course in Government III may choose any of these three courses. Students taking two courses in Government III may take IIIA and IIIB.

**1. The International System**

- (a) Theories of international relations.
- (b) The emergence and development of the international system up to 1945, including a study of sovereignty, the nature and functions of warfare, nationalism, ideology, diplomacy, international law, the balance of power and collective security.
- (c) The nature of contemporary international relations, including an analysis of the formation and goals of foreign policy, power and national interest, community and alliance, civil war and intervention, limited war, nuclear strategy, arms control and disarmament, international organisation.

RECOMMENDED TEXTS

Forsyth, M. G., Keens-Soper, H. M. A., and Savigear, P. (eds.). *The Theory of International Relations*, Allen and Unwin, London, 1970.

Waltz, K. N., *Man, the State, and War*, Columbia U.P., New York, 1959.

- Carr, E. H., *The Twenty Years' Crisis*, Macmillan, London, 1961.  
Machiavelli, N., *The Prince*, Modern Library, New York, 1950.  
Morgenthau, H. J. *Politics Among Nations*, Knopf, New York, 1968.  
Purnell, R., *The Society of States*, Weidenfeld and Nicolson, London, 1973.  
Wolfers, A. *Discord and Collaboration*, Johns Hopkins, Baltimore, 1962.  
Quester, G. H. (ed.), *Power, Action, and Interaction*, Little Brown, Boston, 1971.  
Bull, H., *The Control of the Arms Race*, Weidenfeld and Nicolson, London, 1961.

## *2. Strategic Studies*

Strategic doctrines and military policies since 1945 with special reference to the United States, the Soviet Union and Western Europe. Concepts of deterrence, limited war, strategic balance and arms control. The impact of nuclear weapons and the nature of contemporary strategy.

### RECOMMENDED TEXTS

- Blackett, P. M. S., *Military and Political Consequences of Atomic Energy*, Turnstile Press, London, 1948.  
Brodie, B. (ed.), *The Absolute Weapon*, Harcourt Brace, New York, 1946.  
Brodie, B., *Strategy in the Missile Age*, Princeton U.P., 1959.  
Bull, H., *The Control of the Arms Race*, Weidenfeld and Nicolson, London, 1961.  
Halperin, M. H., *Limited War in the Nuclear Age*, Wiley, New York, 1963.  
Halperin, M. H., *Contemporary Military Strategy*, Faber, London, 1966.  
Huntington, S. P., *The Common Defense*, Columbia U.P., New York, 1961.  
Kahn, H., *On Thermonuclear War*, Princeton U.P., 1960.  
Kaufmann, W. W., *The McNamara Strategy*, Harper & Row, New York, 1964.  
Schelling, T. C., *Arms & Influence*, Yale U.P., 1966.

## *3. The Politics of the Middle East*

A comparative study of the political systems of the contemporary Middle East.

### RECOMMENDED TEXTS

- Abboushi, W. F., *Political Systems of the Middle East in the Twentieth Century*, Dodd, Mead and Co., New York, 1971.  
al-Marayati, A. A. (et al.), *The Middle East: Its Governments and Politics*, Duxbury, New York, 1972.  
Mansfield, P., *The Ottoman Empire & its Successors*, Macmillan, London, 1973.  
Peretz, D., *The Middle East Today*, Holt, Rinehart and Winston, New York, 1971.

## *4. International Relations of Asia and the Middle East*

A study of international relations in Asia and the Middle East with special reference to the roles of the USA, USSR, China and Japan.

RECOMMENDED TEXTS

Barnds, W. J., *India, Pakistan and the Great Powers*, Praeger, New York, 1972.

Greene, F., *U.S. Policy and the Security of Asia*, McGraw-Hill, New York, 1968.

Hinton, H., *Communist China in World Politics*, Macmillan, New York, 1966.

Huck, A., *The Security of China: Chinese Approaches to Problems of War and Strategy*, Chatto and Windus, London, 1970.

Jukes, G., *The Soviet Union in Asia*, Angus and Robertson, Sydney, 1973.

LaFeber, W., *America, Russia and the Cold War, 1945-1971*, 2nd ed., New York, 1972.

Olson, L., *Japan in Post War Asia*, Pall Mall, London, 1970.

Osgood, R. et al., *Japan and the United States in Asia*, Johns Hopkins, Baltimore, 1968.

Watt, A., *The Evolution of Australian Foreign Policy, 1938-1965*, Cambridge U.P., 1968.

### 3031 Government IIIA (Honours)

The course will consist of units 1 and 2 listed under 3021 Government III (The International System and Strategic Studies) and a series of seminars on a related topic.

The seminars will be held throughout the year on Legal and Moral Problems of International Violence. Students will be required to submit a major essay and sit for an examination in this subject.

#### *Legal and Moral Problems of International Violence*

56 hr

An examination of the relationship of politics, morality and law; the just war and aggression; war and the state in Hegel and Clausewitz; rules of warfare and war crimes; legal and moral dilemmas of nuclear weapons; private international violence; conscription and conscientious objection.

RECOMMENDED TEXTS

Cohen, M., et al. (eds.), *War and Moral Responsibility*, Princeton U. P., 1974.

Falk, R. A. (ed.), *The Vietnam War and International Law* (3 vols.), Princeton U. P., 1968-72.

Osgood, R. E., and Tucker, R. W., *Force Order, and Justice*, Johns Hopkins, Baltimore, 1967.

Stone, J., *Aggression and World Order*, California U. P., Berkeley, 1958.

Taylor, T., *Nuremberg and Vietnam*, Bantam Books, New York, 1971.

Bailey, S. D., *Prohibitions and Restraints in War*, Oxford U. P., London, 1972.

Butterfield, H., and Wight, M. (eds.), *Diplomatic Investigations*, Allen and Unwin, London, 1966.

Miner, R. H., *Victors' Justice*, Princeton U. P., 1971.



Mayer, P. (ed.), *The Pacifist Conscience*, Hart-Davis, London, 1966.  
Clausewitz, C. von, *On War*, Routledge and Kegan Paul, London, 1968.  
Hegel, G. W. F., *Philosophy of Right*, Oxford U. P., London, 1942.

### **3032 Government IIIB (Honours)**

The course will consist of units 3 and 4 listed under 3021 Government III (The Politics of the Middle East and International Relations of Asia and the Middle East) and a series of seminars on a related topic.

The seminars will be held throughout the year on Political Thought in the Middle East. Students will be required to submit a major essay and sit for an examination in this subject.

#### *Political Thought in the Middle East*

56 hr

The development of political thought in the Middle East from the 7th century A.D. to the present.

#### RECOMMENDED TEXTS

Karpat, K. H. (ed.), *Political and Social Thought in the Contemporary East*, Pall Mall, London, 1968.

Haim, S. G. (ed.), *Arab Nationalism: An Anthology*, U. of California P., Berkeley, 1964.

Hourani, A., *Arabic Thought in the Liberal Age, 1798–1939*, Oxford U.P., London, 1962.

Kerr, M. H., *The Arab Cold War 1958–1967: A Study of Ideology in Politics*, Oxford U.P., London, 1967.

### **4032 Government IV (Honours)**

The course consists of lectures and seminars throughout the year on the following subjects:

1. Political Theory.

2. Strategic Studies.

In addition students will be required to prepare a minor thesis.

## Departments of Government and History

### 4031 Combined Honours in Government and History

Students enrolled for combined honours in Government and History will, in respect of their work in the Department of Government, take the following two units, each of 14 weeks' duration:

#### 1. *Theories of Authority and Rulership*

Plato, *The Republic*, Clarendon Press, Oxford, 1944.

Aristotle, *Ethics*, Penguin Books, London, 1953.

Aristotle, *The Politics*, Penguin Books, London, 1962.

Machiavelli, N., *The Prince and the Discourses*, Random House, New York, 1950.

Mosca, G., *The Ruling Class*, McGraw-Hill, New York, 1939.

Pareto, V., *The Mind and Society*, Cape, London, 1935.

Weber, M., *Economy and Society*, Bedminster Press, New York, 1968.

Eisenstadt, S. N. (ed.), *Max Weber on Charisma and Institution Building*, U. of Chicago P., 1968.

Friedrich, C. J., *Man and his Government*, McGraw-Hill, New York, 1967.

#### 2. *Strategic Studies*

The nature and limits of strategic theory. The evolution of strategic doctrine and military policy since 1945 with special reference to the United States, and the Soviet Union and Western Europe. Ideas of deterrence, strategic stability and limited war. Problems of disarmament and arms control. The relationship between technology, strategic doctrine and military policy. Strategic problems of alliances with special reference to NATO and the German question.

Aron, R., *The Great Debate*, Doubleday, New York, 1965.

Blackett, P. M. S., *Military and Political Consequences of Atomic Energy*, Turnstile Press, London, 1948.

Brodie, B., *Strategy in the Missile Age*, Princeton U.P., 1960.

Bull, H., *The Control of the Arms Race*, Weidenfeld and Nicholson, London, 1961.

Enthoven, A. C. and Smith, K. W., *How Much is Enough?* Harper and Row, New York, 1971.

Halperin, M. H., *Limited War in the Nuclear Age*, Wiley, New York, 1963.

Halperin, M. H., *Contemporary Military Strategy*, Faber, London, 1966.

Kahn, H., *On Thermonuclear War*, Princeton U.P., 1960.

Kissinger, H., *Nuclear Weapons and Foreign Policy*, Harper and Row, New York, 1957.

Osgood, R. E., *NATO: The Entangling Alliance*, Chicago U.P., 1962.

Windsor, P., *Germany and the Management of Detente*, Chatto and Windus, London, 1971.

## *Departments of Government and History*

In respect of their work in the Department of History, students will take the following unit:

### *Origins of the First World War*

A detailed study of the foreign policy and diplomacy of the Great Powers 1902–1914; the role of Admiralties and General Staffs and their naval and military plans; the impact of the internal problems of the Great Powers on their foreign policy; historiographical controversies with particular reference to the Fischer thesis.

#### RECOMMENDED TEXTS

Albertini, L., *The Origins of the War of 1914*, 3 vols, O.U.P., London, 1965.

Berghahn, V. R., *Germany and the Approach of War in 1914*, Macmillan, London, 1973.

Geiss, I., *July 1914*, Batsford, London, 1967.

Koch, H. W. (ed.), *The Origins of the First World War*, Macmillan, London, 1972.

Turner, L. C. F., *Origins of the First World War*, Arnold, London, 1972.

## Department of History

### 1405 History I

*Lectures* 56 hr

*Tutorials* 28 hr

The course comprises a study of European and American history during the period 1748–1877.

#### *Introduction*

A brief examination of general trends since the Renaissance and Reformation.

#### *Part I—1748–1787*

The 18th-century monarchies with particular reference to France; the *Philosophes* and the intellectual revolution in Europe; the significance of the Seven Years War; the American Revolution and its impact on Europe; the origins of the Industrial Revolution and the French Revolution.

#### *Part II—1787–1815*

The fall of the French Monarchy and the establishment of the French Republic; the French Revolutionary Wars and the rise of Napoleon; the significance of the Consulate and the impact of the Napoleonic conquests on Europe; the principles of Napoleonic warfare and the generalship of Napoleon and Wellington; Federation and the rise of political parties in the United States.

#### *Part III—1815–1849*

Political and social trends in Britain and France 1815–48; Liberalism and Socialism; the growth of the United States and the long-term causes of the American Civil War; the revolutions of 1848.

#### *Part IV—1850–1877*

The coming of the American Civil War; the strategy of the war and Reconstruction; the character of the French Second Empire; Bismarck and the rise of Prussia; Moltke and the Prussian General Staff; the origins and significance of the Franco-Prussian War.

#### RECOMMENDED TEXTS

Anderson, M. S., *Europe in the Eighteenth Century*, Longmans, London, 1963.

Blum, J. M., *et al.*, *The National Experience: A History of the United States*, Harcourt, New York, 1973.

Dalton, B. J., *Origins of the American Civil War*, Cheshire, Melbourne, 1967.

Ropp, T., *War in the Modern World*, Duke U.P., Durham, N.C., 1966.

Rudé G., *Revolutionary Europe 1783–1815*, Collins, London, 1967.

## *Department of History*

Stearns, P. N., *The European Experience since 1815*, Harcourt, New York, 1972.

Tierney, B., *et al.*, *Great Issues in Western Civilization*, Vol. II, Random House, New York, 1967.

Turner, L. C. F., *The American Civil War and Reconstruction, 1861-1877*, Cheshire, Melbourne, 1971.

Turner, L. C. F., *Napoleon and Europe*, Cheshire, Melbourne, 1973.

## **2407 History IIA**

*Lectures 56 hr*

*Tutorials 28 hr*

The course comprises a study of European and American history during the period 1871-1962, with some consideration of major problems of Asian and African history during the period.

### *Part I—1871-1902*

Political and social trends in Britain, France and Germany; social and economic changes in Russia and the United States; the modernisation of Japan; the growth of diplomatic and military rivalries between the European powers; the impact of Europe on Asia and Africa.

### *Part II—1902-1919*

The Russo-Japanese War; the causes of the Russian revolutions of 1905 and 1917; the origins of the war of 1914; the strategy and politics of the First World War; the collapse of the German and Austrian empires; the Paris peace settlement; the Russian Civil War; the Chinese Revolution and the impact of the First World War on Asia.

### *Part III—1920-1939*

Problems of postwar Europe and the USA; the Great Depression; the Stalin régime; the Chinese Civil War and the development of Sino-Japanese conflict; the rise of Fascism and Nazism; the Spanish Civil War; Hitler's policies and the outbreak of the Second World War.

### *Part IV—1939-1950*

The technique of the Blitzkrieg and Hitler's conquests 1939-41; the German invasion of Russia; the strategy of the Pacific War 1942-45; the collapse of the Nazi Empire; the beginnings of the Cold War; the Communist conquest of China.

### *Part V—1950-1962*

The Cold War and containment—Korea, Indo-China and Vietnam; the emerging nations of Asia and Africa; nuclear weapons and the balance of power; the régime of Mao Tse-tung; the Cuban crisis 1962.

RECOMMENDED TEXTS

Gilbert, F., *The End of the European Era, 1890 to the Present*, Norton, New York, 1970.

Current, R. N. and others, *American History: A Survey*, Alfred A. Knopf, New York, 1965.

Gathorne-Hardy, G. M., *Short History of International Affairs, 1920-1939*, rev. ed., Oxford U.P., London, 1964.

Michael, F. H., and Taylor, G. E., *The Far East in the Modern World*, rev. ed., Methuen, London, 1964.

O'Neill, R. J., *General Giap—Politician and Strategist*, Cassell Melbourne, 1969.

Pinson, K. S., *Modern Germany*, Macmillan, New York, 1967.

Ropp, T., *War in the Modern World*, Duke U.P., Durham, N.C., 1966.

Tierney, B., et al., *Great Issues in Western Civilization*, Vol. II, Random House, New York, 1967.

Turner, L. C. F., *The First World War*, Cheshire, Melbourne, 1967.

Turner, L. C. F., *The Coming of the First World War*, Cheshire, Melbourne, 1968.

Turner, L. C. F., *Origins of the First World War*, Arnold, London, 1970.

Young Hum Kim, *Twenty Years of Crisis: The Cold War Era*, Prentice-Hall, Englewood N.J., 1968.

**2408 History IIA (Honours)**

*Seminars 56 hr*

A series of additional special seminars for honours students running currently with the pass course, where the emphasis will be on problems of historiography. Students must submit a major essay and sit for an additional examination.

*Alternative I: The Origins of the First World War (Will not be offered in 1977.)*

A detailed study of the foreign policy and diplomacy of the Great Powers 1902-14; the role of Admiralties and General Staffs and their naval and military plans; the impact of the internal problems of the Great Powers on their foreign policy; historiographical controversies with particular reference to the Fischer thesis.

RECOMMENDED TEXTS

Albertini, L., *The Origins of the War of 1914*, 3 vols, O.U.P., London, 1965.

Berghahn, V. R., *Germany and the Approach of War in 1914*, Macmillan, London, 1973.

Geiss, I., *July 1914*, Batsford, London, 1967.

Koch, H. W. (ed.), *The Origins of the First World War*, Macmillan, London, 1972.

Turner, L. C. F., *Origins of the First World War*, Arnold, London, 1972.

*Alternative II: The Foreign Policy of the United States 1898-1950*

The evolution of American Imperialism; the United States and the two World Wars; American relations with Latin America and Eastern Asia; the

United States and the Origins of the Cold War.

Braeman, J., *et al.*, (ed.), *Twentieth Century American Foreign Policy*, Ohio State U. P., Columbus, 1971.

Miller, R. H. (ed.), *American Imperialism in 1898: The Quest for National Fulfillment*, John Wiley, New York, 1970.

Callcott, W. H., *The Western Hemisphere: Its Influence on United States Policies to the End of World War II*, University of Texas Press, Austin, 1968.

Varg, P. A., *The Making of Myth: The United States and China, 1897-1912*, Michigan State U.P., East Lansing, 1968.

Smith, D. M., *The Great Departure: The United States and World War I, 1914-1920*, John Wiley, New York, 1965.

Wiltze, J. E., *From Isolation to War, 1931-1941*, Routledge, Kegan Paul, London, 1969.

Gaddis, J. L., *The United States and the Origins of the Cold War, 1941-1947*, Columbia U.P., New York, 1972.

## **2409 History IIB**

*Lectures* 56 hr

*Tutorials* 28 hr

The course comprises a study of Australian History 1788-1972 and is divided into two sections of equal weight.

### **Part I—Australia 1788-1900**

Aspects of the political, social and economic history of Australia, 1788-1900; the British colonial background and the choice of Botany Bay; the convict system and the emergence of a free society; the search for a staple; exploration and the expansion of settlement; the problem of political authority; the land question; Church and State; the anti-transportation movement; Black and White Australian relations; the impact of the gold discoveries; the growth of primary and secondary industry; faction politics and the rise of the Labor Party; defence and imperial relations; the federation movement.

### **Part II—Australia 1901-1972**

Political and social trends in Australia 1901-72 and Australia's foreign relations during the period.

Major strategic developments in 20th century warfare; Australian participation in 20th century wars.

#### **RECOMMENDED TEXTS**

### **Part I**

Abbott, G. J., and Nairn, N. B. (eds), *Economic Growth of Australia, 1788-1821*, Melbourne U.P., 1969.

Blainey, G., *The Tyranny of Distance*, Sun Books, Melbourne, 1966.

Clark, C. M. H. (ed.), *Select Documents in Australian History*, 2 vols, Angus and Robertson, Sydney, 1950 and 1955.

Clark, M., *A Short History of Australia*, Heinemann, London, 1964.

Crowley, F. K. (ed.), *A New History of Australia*, Heinemann, Melbourne, 1974.

Inglis, K. S., *The Australian Colonists: An Exploration of Social History, 1788-1870*, Melbourne U.P., 1974.

Molony, J. N., *An Architect of Freedom: John Hubert Plunkett in New South Wales, 1832-1869*, A.N.U. Press, Canberra, 1963.

Nairn, B., *Civilising Capitalism; the Labor Movement in New South Wales, 1870-1900*, A.N.U. Press, Canberra, 1973.

Serle, G., *The Golden Age: a History of the Colony of Victoria, 1851-1861*, Melbourne U.P., 1963.

## Part II

Alexander, F., *Australia since Federation*, Nelson, Melbourne, 1967.

Bean, C. E. W., *Anzac to Amiens*, Australian War Memorial, Canberra, 1961.

Esthus, R. A., *From Enmity to Alliance*, Melbourne U.P., 1965.

Hasluck, P. M. C., *The Government and the People, 1939-1941*, Australian War Memorial, Canberra, 1967, reprint.

Long, G., *The Six Years War*, Australian War Memorial, Canberra, 1973.

Louis, L., and Turner, I., *The Depression of the 1930s*, Cassell, Melbourne, 1968.

Turner, L. C. F., *Australia since the Camera, Vol. III. The Great War 1914-1918*, Cheshire, Melbourne, 1972.

Watt, A., *The Evolution of Australian Foreign Policy, 1938-1965*, Cambridge U.P., 1967.

## 3408 History IIIA

Lectures 56 hr  
Tutorials 28 hr

The course is divided into two sections of equal weight.

### Part I—The Impact of the West on Asia 1850-1905

Particular attention will be paid to the expansion of European Imperialism in the littoral states of the Indian Ocean.

### Part II—India, China and South-East Asia 1905-65.

A study of Asian nationalist movements in the area after 1905; the breakdown of Western colonial rule and the problems of the new Asian states, with emphasis on revolts and counter-insurgency after 1945. The course will concentrate on:

- the Indian and Indonesian nationalist struggles;
- revolutionary movements in China 1911-49;
- the Huk movement in the Philippines;
- the Malayan 'Emergency';
- the Viet Minh and Viet Cong.



## Department of History

### RECOMMENDED TEXTS

#### Part I

Bingham, W., Conroy, H., and Ikle, F. W., *A History of Asia, Vol. II, Old Empires, Western Penetration, and the Rise of New Nations since 1600*, Allyn and Bacon, Boston, 1965.

Edwardes, M., *The West in Asia 1850-1914*, Batsford, London, 1967.

Fieldhouse, D. K., *Economics and Empire 1830-1914*, Cornell U.P., Ithaca, N.Y., 1973.

Hall, D. G. E., *A History of South-East Asia*, 3rd ed., Macmillan, London and New York, 1968.

Panikkar, K. M., *Asia and Western Dominance: A Survey of the Vasco Da Gama Epoch of Asian History 1498-1945*, Allen and Unwin, London, 1953.

Peffer, N., *The Far East: A Modern History*, U. of Michigan P., Ann Arbor, 1968.

Toussaint, A., *History of the Indian Ocean*, trans. by J. Guicharnaud, Routledge, London, 1966.

Vinacke, H. M., *A History of the Far East in Modern Times*, Allen and Unwin, London, 1960.

#### Part II

Fitzgerald, C. P., *The Birth of Communist China*, Penguin, London, 1964.

Michael, F. H. and Taylor, G. E., *The Far East in the Modern World*, rev. ed., Methuen, London, 1964.

O'Malley, L. S. S. (ed.), *Modern India and the West*, O.U.P., London, 1968.

O'Neill, R. J., *Indo-China Tragedy 1945-1954*, Cheshire, Melbourne, 1968.

O'Neill, R. J., *General Giap—Politician and Strategist*, Cassell, Melbourne, 1969.

Pomeroy, W. J. (ed.), *Guerilla Warfare and Marxism*, International, New York, 1968.

Schurmann, F., and Schell, O. (eds.), *China Readings 2, Republican China*, Penguin, London, 1968.

Schurmann, F., and Schell, O. (eds.), *China Readings 3, Communist China*, Penguin, London, 1968.

### 3409 History IIIA (Honours)

Seminars 56 hr

A series of additional special seminars for honours students running concurrently with the pass course. Students must submit a major essay and sit for an additional examination.

The rise and eclipse of Japanese Military Power, 1873-1945.

A study of the development of the Japanese armed forces and their role in peace and war from the introduction of conscription to the end of the Pacific War.

The problems to be examined include:

- the relationship of the forces to Japanese society; dominance of the officer corps by Satsuma and Choshu; early penetration of politics by the military;
- the struggle for Korea; the war with China and its effects on the Japanese forces;
- the Russo-Japanese war; policy and strategy hand in hand; the Japanese performance on land; sea power in action—Togo and Tsushima; the war as a precursor of 1914-18;
- the failure of parliamentary government and the militarisation of Japan between the world wars; the Army and Manchuria; the invasion of China;
- the Japanese forces and their readiness for war with a major power; doctrine and command; the strategy of December 1941; the Pacific War.

#### RECOMMENDED TEXTS

Borton, H., *Japan's Modern Century*, 2nd ed., Ronald Press, New York, 1970.

Okamoto Shumpei, *The Japanese Oligarchy and the Russo-Japanese War*, Columbia U.P., New York, 1970.

Walder, D. *The Short Victorious War*, Hutchinson, London, 1973.

Storry, R., *The Double Patriots* (reprint), Greenwood Press, Westport, Conn., 1973.

Crowley, J. B., *Japan's Quest for Autonomy: National Security and Foreign Policy, 1930-38*, Princeton U.P., New Jersey, 1966.

Boyle, J. H., *China and Japan at War, 1937-1945*, Stanford U.P., Stanford, 1972.

Maruyama Masao, *Thought and Behaviour in Modern Japanese Politics*, Oxford U.P., London, 1966.

Collier, B., *The War in the Far East, 1941-1945*, William Morrow, New York, 1969.

### 3410 History IIIB

Lectures 56 hr

Seminars 28 hr

A course to be taken by honours students in their third year. The syllabus and recommended texts for this course are exactly the same as those for History IIB.

### 3412 History IIIB (Honours)

Seminars 56 hr

A series of additional special seminars for honours students running concurrently with History IIIB. Students must submit a major essay and sit for an additional examination.

*From Imperial Appendage to American Satellite?: Australia 1900-72*

A study of Australian-British-American relations from Federation to the Whitlam government. Particular attention will be paid to the theory and practice of Imperial defence between the wars and to the infusion of American interests into the Australian culture after the war.

RECOMMENDED TEXTS

Esthus, R. A. *From Enmity to Alliance: United States-Australian Relations 1931-41*, Melbourne U.P., Melbourne, 1965.

Hasluck, P., *The Government and the People, 1939-41*, Australian War Memorial, Canberra, 1967.

McCarthy, J. M. *Australia and Imperial Defence, 1918-1939*, Queensland U.P., St Lucia, 1975.

Reese, T. R., *Australia, New Zealand and the United States: A Survey of International Relations 1941-68*, Oxford U.P., London, 1969.

Watt, A., *The Evolution of Australian Foreign Policy 1939-65*, Cambridge U.P., Cambridge, 1968.

**4405 History IV**

*Part I*—A course in Historiography and the Philosophy of History

A study of the methods and achievements of great historians from the 18th to the 20th century, and of theories of History during the period. Some attention will be paid to Australian historians.

*Part II*—A Special Subject

To be offered in 1977. *Origins of the First World War*, Particular attention will be paid to Historiography and clashes of opinion between rival historical schools.

*Part III*—A minor thesis of approximately 10,000 words.

**1413 History C**

*Lectures and Tutorials* 84 hr

A history course designed for students studying for a science or engineering degree.

The course comprises a study of politics and war in the 19th and 20th centuries.

*Part I* (To be offered to engineering students in 1977.)

A broad survey of:

The characteristics of 19th-century Liberalism, Nationalism and Socialism; the impact of the First World War and Russian Revolution; the character of Fascist and Nazi régime; the origins and significance of the Second World War; the Cold War and the rise of the Neutralist bloc; problems of emergent Afro-Asian powers; Australia's relations with Asia 1945-60.

**Part II** (To be offered to science students in 1977.)

A broad study of military theory and strategy in the 19th and 20th centuries.

Attention will be paid to:

- (a) Napoleonic strategy; the American Civil War; Moltke and the rise of the Prussian General Staff.
- (b) Military theories of the 20th century; the strategy of the First and Second World Wars; revolutionary warfare in Asia.
- (c) Study in depth of a campaign, i.e. the Western Desert, June-November 1942.

RECOMMENDED TEXTS

**Part I**

Benns, F. L., *Europe since 1914 in its World Setting*, 8th ed., Appleton-Century-Crofts, New York, 1954.

Brecher, M., *The New States of Asia*, O.U.P., London, 1963.

Gelber, H. G. *The Coming of the Second World War*, Cheshire, Melbourne, 1967.

Hudson, G. F., *The Hard and Bitter Peace: World Politics since 1945*, Pall Mall, London, 1966.

Michael, F. H. and Taylor, G. E., *The Far East in the Modern World*, rev. ed., Methuen, London, 1964.

Thomson, D., *Europe since Napoleon*, Longmans, London, 1966.

Turner, L. C. F., *The Coming of the First World War*, Cheshire, Melbourne, 1968.

**Part II**

Earle, E. M. (ed.), *Makers of Modern Strategy*, Princeton U.P., Princeton, 1966.

Falls, C., *A Hundred Years of War*, Duckworth, London, 1961.

Hall, D. G. E., *A History of South-East Asia*, 3rd ed., Macmillan.

Howard, M. (ed.), *The Theory and Practice of War*, Cassell, London, 1965.

Ropp, T., *War in the Modern World*, Duke U.P., Durham, N.C., 1966.

Turner, L. C. F., *The First World War*, Cheshire, Melbourne, 1970.

Turner, L. C. F., *The American Civil War and Reconstruction, 1861-1877*, Cheshire, Melbourne, 1971.

Turner, L. C. F., *Napoleon and Europe*, Cheshire, Melbourne, 1973.

Vinacke, H. M., *A History of the Far East in Modern Times*, Allen and Unwin, 1960.

**4413 History IIC**

Lectures 28 hr

Tutorials 14 hr

A history half-unit to be studied by honours students in science in their fourth year. It comprises a study of World History 1919-62.

*Part I—1919-1939*

The Paris peace settlement; the impact of the First World War on Asia; problems of postwar Europe and the U.S.A.; the Great Depression; the Stalin régime; the Chinese Civil War and the development of Sino-Japanese conflict; the rise of Fascism and Nazism; the Spanish Civil War; Hitler's policies and the outbreak of the Second World War.

*Part II—1939-1950*

The technique of the Blitzkrieg and Hitler's conquests 1939-41; the German invasion of Russia; the strategy of the Pacific War 1942-45; the collapse of the Nazi Empire; the beginnings of the Cold War; the Communist conquest of China.

*Part III—1950-1962*

The Cold War and containment—Korea, Indo-China and Vietnam; the emerging nations of Asia and Africa; nuclear weapons and the balance of power; the régime of Mao Tse-tung; the Cuban crisis 1962.

RECOMMENDED TEXTS

Gilbert, F., *The End of the European Era, 1890 to the Present*, Norton, New York, 1970.

Current, R. N. and others, *American History: A Survey*, Alfred A. Knopf, New York, 1965.

Gathorne-Hardy, G. M., *A Short History of International Affairs, 1920-1939*, rev. ed., Oxford U.P., London, 1964.

Michael, F. H. and Taylor, G. E., *The Far East in the Modern World*, rev. ed., Methuen, London, 1964.

O'Neill, R. J., *General Giap—Politician and Strategist*, Cassell, Melbourne, 1969.

Pinson, K. S., *Modern Germany*, Macmillan, New York, 1967.

Ropp, T., *War in the Modern World*, Duke U.P., Durham, N. C., 1966.

Tierney, B. and others, *Great Issues in Western Civilization*, Vol. II, Random House, New York, 1967.

Young Hum Kim, *Twenty Years of Crisis: The Cold War Era*, Prentice-Hall, Englewood N. J., 1968.

## Department of Language and Literature

### 1507 English I

A course of 84 lectures, with tutorials, principally on Modern Literature (poetry since Yeats, drama since Ibsen, and fiction since Conrad), and on the history and use of the English language.

#### TEXTS

- (i) Mack, M., Dean, L., and Frost, W. (eds), *Modern Poetry*  
Macbeth, G. (ed.), *Poetry 1900 to 1965*  
Hardy, *Selected Poems*
- (ii) Ibsen, *The Wild Duck*  
Shaw, *Man and Superman*  
O'Casey, *Juno and the Paycock*  
Ionesco, *The Chairs*  
Brecht, *Mother Courage*  
Eliot, *The Cocktail Party*  
Pinter, *The Caretaker*  
O'Neill, *The Emperor Jones; Long Day's Journey into Night*  
Williams, *A Streetcar Named Desire*  
Miller, *Death of a Salesman*
- (iii) Emily Bronte, *Wuthering Heights*  
Conrad, *Heart of Darkness*  
Joyce, *Portrait of the Artist as a Young Man*  
Nadine Gordimer, *A Guest of Honour*  
Fitzgerald, *The Great Gatsby*  
Faulkner, *Go Down Moses*  
Malamud, *The Assistant*  
Ellison, *Invisible Man*
- (iv) Barber, C., *The Story of Language*, Pan.  
Brooks, C. and Warren, R. P., *The Fundamentals of Good Writing*, Dobson.

#### REFERENCE BOOKS

- Allen, W., *Tradition and Dream*, Penguin.
- Cunliffe, M., *The Literature of the United States*, Penguin.
- Ford, B. (ed.), *The Modern Age*, Penguin.

### 2507 English II

A course of 84 lectures, with tutorials, on Romantic and Realist Literature: (i) English and American poetry (ii) English fiction (iii) American fiction, principally of the 19th century.

TEXTS

- (i) Blake, *Selected Poems* (ed. Bateson)  
Wordsworth (ed. Butt)  
Coleridge (ed. Colmer)  
Keats (ed. Sharrock)  
Tennyson (ed. Millgate)  
Browning (ed. Allott)  
Arnold (ed. Watt)  
Hopkins (ed. Storey)  
Matthiessen, F. O. (ed.), *Oxford Book of American Verse*
- (ii) Scott, *The Heart of Midlothian*  
Jane Austen, *Northanger Abbey; Emma*  
Dickens, *Bleak House*  
George Eliot, *Middlemarch*  
James, *The American; The Europeans; The Portrait of a Lady*  
Conrad, *Nostromo*  
Hardy, *Far from the Madding Crowd; Tess of the d'Urbervilles*
- (iii) Cooper, *The Deerslayer*  
Hawthorne, *The Scarlet Letter; The Celestial Railroad and other Stories*  
Melville, *Moby Dick; Billy Budd and other Tales*  
Twain, *Huckleberry Finn; The Mysterious Stranger and other Stories*

REFERENCE BOOKS

- Allen, W., *The English Novel*, Penguin.
- Cunliffe, M., *The Literature of the United States*, Penguin.
- Ford, B. (ed.), *Blake to Byron*, Penguin.
- Ford, B. (ed.), *Dickens to Hardy*, Penguin.

### 3507 English III

A course of 84 lectures, with tutorials, on Renaissance, Baroque and Neo-Classical Literature.

TEXTS

- Shakespeare, *Coriolanus, Romeo and Juliet, The Taming of the Shrew, Othello, Much Ado about Nothing*
- Webster, *The Duchess of Malfi*
- Tourneur, *The Revenger's Tragedy*
- Jonson, *Volpone*
- Ingram, W. G., and Redpath, T. (eds), *Shakespeare's Sonnets*
- Clements, A. L. (ed.), *John Donne's Poetry*
- Kenner, H. (ed.), *Seventeenth Century Poetry*
- Bush, D. (ed.), *Milton: Poetical Works*
- Frost, W. (ed.), *Selected Works of John Dryden*
- Grant, D. (ed.), *Pope: Selected Poems*
- Cruttwell, P. (ed.), *Samuel Johnson: Selected Writings*

Wimsatt, W. K. (ed.), *Dr Johnson on Shakespeare*  
Johnson, *The Lives of the Poets*

REFERENCE BOOKS

Ford, B. (ed.), *Donne to Marvell*, Penguin  
Ford, B. (ed.), *Dryden to Johnson*, Penguin

**1521 English A**

A course of 28 lectures and 14 tutorials on modern literature (including war literature) and on the types of prose discourse.

TEXTS

Brooks, C. and Warren, R. P., *The Fundamentals of Good Writing*, Dobson.  
Waugh, *Sword of Honour*  
Storey, *This Sporting Life*  
Sillitoe, *Saturday Night and Sunday Morning*  
Fitzgerald, *The Great Gatsby*  
Malamud, *The Assistant*  
Owen, *Poems*  
Graves, *Goodbye to All That*  
Hillary, *The Last Enemy*  
Laird, J. T. (ed.), *Other Banners*  
Gardner (ed.), *The Terrible Rain*

**2521 English B**

A course of 28 lectures and 14 tutorials on modern Australian poetry and drama and Australian convict fiction.

TEXTS

Heseltine (ed.), *The Penguin Book of Australian Verse*  
*Three Australian Plays*, Penguin  
*Four Australian Plays*, Penguin  
Lawler, *The Summer of the Seventeenth Doll*  
Williamson, *Don's Party*  
Warung, *Tales of the Convict System* (ed. Andrews)  
Keneally, *Bring Larks and Heroes*  
Clarke, *For the Term of his Natural Life*

**1508 Australian Literature**

(In 1977, this course is offered as a single English course only, and may not be used to form part of a major or sub-major in English.)

A course of 84 lectures, with tutorials, on Australian literature in the 19th and 20th centuries. Lectures will pay special attention to, but will not be confined to, Kendall, Brennan, Judith Wright, McAuley, Hope, Lawler, Seymour, Williamson, Clarke, Furphy, Boyd, Herbert, White, Lawson and Moorhouse.



## Department of Mathematics

The Mathematics Department provides courses which contribute towards the structure of all three first degrees offered by the Faculty. Students may undertake major studies in mathematics or computer science, or may study them in order to service the requirements of major studies in other disciplines. As with all other departments in the Faculty, the primary task of the Mathematics Department is to provide courses for students majoring within the department. Students may take mathematics or computer science as a major study for either the BA(Mil) or BSc(Mil) degree. In addition, the department provides courses for each of the four years of the BE degree.

Undergraduates for BA(Mil) may take any number of subjects offered by the department up to a maximum of six, which can enter the degree course as single subjects, sub-majors, major or double-major as defined in the rules for the award of the BA(Mil) degree. Undergraduates for BSc(Mil) may choose a variety of mathematics courses ranging from the minimum requirement to a full concentration in mathematics or computer science (equivalent to the double major for BA(Mil)) as defined in the rules for the award of the BSc(Mil) degree. Further, students who demonstrate the necessary competence may qualify for admission to the degree of either BA or BSc with Honours.

The four areas of study available in the department are as follows. Areas (a) and (b) come under the general heading of mathematics; and (c) and (d) under the heading computer science.

### (a) *Pure Mathematics*

The pure mathematician is concerned with the study of mathematics for its own sake, the development of new techniques and theories and the endeavour to explore and understand better the relationships between the various parts of the subject. This course provides an introduction to the broad areas of analysis and algebra, together with a study of mathematical logic leading to a discussion of the foundations of mathematics.

### (b) *Applied Mathematics*

Applied Mathematics consists of the application of mathematical methods to problems arising in other fields. In this course the emphasis is on applications to physics and especially to fluid dynamics. The course provides an introduction to mathematical techniques of value to applied mathematicians and shows how these are used in the study of fluid dynamics and exterior ballistics.

### (c) *Statistics and Operations Research*

Statistics and Operations Research are branches of mathematics that have been extensively developed because of the relevance of their techniques to applications in research and management. The aim of the course is twofold, firstly to develop the theoretical foundations of probability and statistics and linear

programming, and secondly to investigate some of the applications to experimental and economic statistics and operations research.

**(d) Computer Science**

Computer Science concerns itself with the analysis of techniques and algorithms for the automation of numerical computation and information manipulation processes, and the study of automata for their implementation. The course is intimately bound up with the electronic digital computer, its design, operational characteristics and control, as well as its application to the problems of modern technology.

**Outline of Subjects and Units**

The department provides two first year mathematics subjects for study in any degree course. Both subjects will normally be taken by undergraduates for BSc(Mil) and BE and either or both may be taken by undergraduates for BA(Mil). Subjects in the second and later years are constructed from units which are combined in various ways to form subjects. This provides for flexibility to meet the varying needs of students, and also the requirements for service courses for all the degrees. These units are arranged in four strands corresponding to the four areas of study available in the department. In addition, special units are available for students proceeding with honours courses.

**First Year**

The two first year subjects are:

1131 Mathematics IA

1132 Mathematics IB

**Second and Third Years**

The second and third year subjects listed in the table below are constructed from units which are set out in the schedules, A2, B2, C2 and D2 referred to as level 2 schedules, and A3, B3, C3 and D3 referred to as level 3 schedules.

<i>Subject number</i>	<i>Subject name</i>	<i>Number of units</i>	<i>Available in degree course*</i>
2130	Mathematics II	4 mathematics	S
2131	Mathematics IIA	2 mathematics	A, E, S
2132	Mathematics IIB	2	A
2180	Computer Science II	4 computer science	S
2181	Computer Science IIA	2 computer science	E, S
2183	Computer Science IIC	1 computer science	E
2185	Statistics IIC	1 computer science	E
3120	Mathematics III	6 mathematics	S
3121	Mathematics IIIA	2 mathematics	S
3122	Mathematics IIIB	1 mathematics	E, S
3131	Mathematics IIIA	3	A
3132	Mathematics IIIB	3	A
3180	Computer Science III	6 computer science	S
3181	Computer Science IIIA	2 computer science	S
3182	Computer Science IIIB	1 computer science	S

\* A—Arts, E—Engineering, S—Science

## *Department of Mathematics*

### *Strand A—Pure Mathematics*

#### *Schedule A2*

Algebra II  
Analysis II  
Calculus II

#### *Schedule A3*

Linear Algebra III  
Analysis III  
Complex Variable III  
Logic III

### *Strand B—Applied Mathematics*

#### *Schedule B2*

Differential Equations II  
  
Dynamics and Hydrodynamics II

#### *Schedule B3*

Ordinary Differential Equations III  
Partial Differential Equations III  
Exterior Ballistics III  
Fluid Dynamics III

### *Strand C—Statistics and Operations Research*

#### *Schedule C2*

Operations Research II  
  
Probability and Statistics II

#### *Schedule C3*

Linear Programming III  
Operations Research III  
Experimental Statistics III  
Mathematical Statistics III

### *Strand D—Computer Science*

#### *Schedule D2*

Digital Systems II  
Numerical Analysis II  
Programming II

#### *Schedule D3*

Digital Systems III  
Numerical Analysis III  
Information Structures III  
Systems Programming III

### *Honours Units*

One or more honours units may be offered within each strand.

## **Prerequisites**

The relationship between units is established by prescribing prerequisites for advanced units rather than assigning units to years. The choice of units for all subjects requires the approval of the Head of the Mathematics Department and will be determined primarily by the interests of the student, but also by the availability of units.

### *Unit*

#### *Schedule A2*

Algebra II  
Analysis II  
Calculus II

### *Prerequisites*

Mathematics IB  
Mathematics IA  
Mathematics IA

#### *Schedule A3*

Linear Algebra III  
  
Analysis III

Calculus II,  
Algebra II\*  
Analysis II

<i>Unit</i>	<i>Prerequisites</i>
Complex Variable III	Calculus II
Logic III	none
<i>Schedule B2</i>	
Differential Equations II	Mathematics IA
Dynamics and Hydrodynamics II	Mathematics IA, Calculus II*
<i>Schedule B3</i>	
Ordinary Differential Equations III	Calculus II, Differential Equations II
Partial Differential Equations III	Calculus II, Differential Equations II
Exterior Ballistics III	Calculus II, Differential Equations II, Dynamics and Hydrodynamics II*
Fluid Dynamics III	Calculus II, Differential Equations II, Dynamics and Hydrodynamics II*
<i>Schedule C2</i>	
Operations Research II	Mathematics IB
Probability and Statistics II	none
<i>Schedule C3</i>	
Linear Programming III	Operations Research II Numerical Analysis II* or Algebra II*
Operations Research III	Mathematics IB
Experimental Statistics III	Probability and Statistics II, Numerical Analysis*
Mathematical Statistics III	Mathematics IA Probability and Statistics II
<i>Schedule D2</i>	
Digital Systems II	Mathematics IB, Physics I
Numerical Analysis II	Mathematics IB, Mathematics IA*
Programming II	Mathematics IB
<i>Schedule D3</i>	
Digital Systems III	Digital Systems II
Information Structures III	Programming II
Numerical Analysis III	Numerical Analysis II
Systems Programming III	Programming II

\* may be taken concurrently.

## **For the Degree of BA with Honours**

A student intending to proceed to an honours degree will select specific units which are required for a major study in one or two of the strands available in the Department.

The choice of units in the second and third year will be subject to the approval of the Head of the Mathematics Department and will be made in such a way as to ensure that the student is properly prepared for the fourth year if he is admitted to it.

### **Second Year**

There are two second year honours subjects:

- 2135 *Mathematics IIA (Honours)* consists of two units, together with additional honours work as specified by the Head of the Mathematics Department.
- 2136 *Mathematics IIB (Honours)* consists of two units, together with additional honours work as specified by the Head of the Mathematics Department.

### **Third Year**

There are two third year honours subjects:

- 3138 *Mathematics IIIA (Honours)* consists of three units, of which one is an honours unit and two are level 3 units chosen from the strand in which the student intends to concentrate his honours work.
- 3139 *Mathematics IIIB (Honours)* consists of three units chosen so as to complement the subject 3138 *Mathematics IIIA (Honours)*. One honours unit shall be included, and at most one level 2 unit.

### **Fourth Year**

A student enrolled in the degree of *BA with Honours in the Faculty of Military Studies*, on his admission to the honours course in fourth year, will take the subject:

- 4131 *Mathematics IV (Honours)* consisting of specialised study in selected topics, together with an approved project in the strand in which the student is concentrating his honours work.

## **For the Degree of BSc with Honours**

A student intending to proceed to an honours degree will select specific units which are required for a major study in one of the four strands available in the Department.

The choice of units in the second and third year will be subject to the approval of the Head of the Mathematics Department and will be made in such a way as to ensure that the student is properly prepared for the fourth year if he is admitted to it.

### Third Year

There are two third year honours subjects:

3128 *Mathematics III (Honours)* consists of six mathematics units of which two are honours units and four are level 3 units.

3188 *Computer Science III (Honours)* consists of six computer science units, of which two are honours units and four are level 3 units.

### Fourth Year

A BSc(Mil) student who is majoring in Mathematics and is seeking admission to the course for the degree of *BSc with Honours in the Faculty of Military Studies* in accordance with the rules of that degree will have consulted with the Head of the Mathematics Department not later than the end of his second year, and will have completed in the third year one of the prescribed programs of study given below:

Computer Science III  
(Honours)

Mathematics IIIA  
and History C Part II

or

Mathematics III  
(Honours)

Computer Science IIIA  
and History C Part II

On his admission to the honours course in fourth year the student will take one of the subjects:

4131 *Mathematics IV (Honours)*

4181 *Computer Science IV (Honours)* consisting of specialised study in selected topics, together with an approved project in the strand in which the student is concentrating his honours work.

### Prescriptions for Subjects and Units

#### 1131 Mathematics IA

A first course in mathematical techniques: vectors, differentiation, integration, differential equations.

Four periods per week throughout the year.

Vectors and elementary co-ordinate geometry; cartesian and plane polar co-ordinates, parametric equations, curve sketching. Scalar and vector products, triple products, applications to geometry.

Mathematical proof and notation. Order and inequalities. Introduction to number systems; mathematical induction.

Relations and functions. Limits and continuity; an informal introduction.

Differentiation. Properties of functions; Rolle's theorem and mean value theorems, slope and concavity of graphs. Stationary points and points of inflexion, local and absolute extrema, applications to curve sketching and problems.

Integration; the definite integral as a sum, properties of integrals, anti-derivatives, fundamental theorem of calculus.

Elementary functions; circular functions and inverses, logarithm and exponential functions, hyperbolic functions and inverses.

Integration techniques. Improper integrals. Applications of integrals; areas, centres of mass, moments of inertia.

Elementary differential equations and applications.

TEXTS

Hille, E., and Salas, S., *First Year Calculus*, Blaisdell, 1968.

Spiegel, M. R., *Theory and Problems of Vector Analysis*, Schaum, 1959.

REFERENCE

Brand, Louis, *Differential and Difference Equations*, Wiley, 1966.

## 1132 Mathematics IB

A course of essential topics in finite mathematics, including linear algebra, elementary series, probability and logic. The emphasis is placed on algorithms for problem solution and computer programming is introduced in the context of the mathematical topics.

Four periods per week throughout the year: Three lectures and one tutorial per week for the first semester; followed by two lectures and two practice class/tutorials per week for the second semester.

Introduction to statistics; presentation of data, mean and variance, calculation methods, calculators.

Digital computing; algorithms, flow charts, basic numerical and computer concepts, accuracy, precision and significance. Programming; FORTRAN language, problem analysis for computer solution, development and debugging techniques.

Series; convergence, looping algorithms, power series, evaluation of elementary functions, Taylor's series, iteration. Elementary logic; set notation, Venn diagrams, logical operations, truth table analysis. Complex numbers, Z-plane, de Moivre's theorem.

Program organisation; subprograms, scope of variables, segmentation, modularity. Structures; storage allocation, mapping functions, record I/O handling, subscript algebra, textual data.

Linear algebra; equation systems, determinants, Cramer's rule, nested looping, computer solution methods. Matrix algebra; notation, matrix types, algorithms for matrix operations, matrix inversion.

Application techniques; sorting, searching, solution of transcendental equations, integration, Monte Carlo methods, program efficiency.

Elementary linear programming, simple game matrix. Boolean algebra; de Morgan's theorems, circuit simplifications, arithmetic by logical operation.

TEXTS

Cohn, P. M., *Linear Equations*, Dover, 1958.

Forsythe, A. I., Keenan, T. A., Organick, E. I., and Stenberg, W., *Computer Science—A Primer*, Wiley, 1969.

Forsythe, A. I., Keenan, T. A., Organick, E. I., and Stenberg, W., *Computer Science—Fortran Language Programming*, Wiley, 1970.

Lederman, W., *Complex Numbers*, Dover, 1962.

Green, J. A., *Sequences and Series*, Routledge and Kegan Paul, 1958.

REFERENCES

Dorn, W. S., and Greenberg, H. J., *Mathematics and Computing*, Wiley, 1967.

Hohn, F. E., *Introduction to Linear Algebra*, Macmillan, 1972.

Rueff, M. and Jeger, M., *Sets and Boolean Algebra*, Allen and Unwin, 1970.

## Algebra II

A course in matrix algebra and group theory, and an introduction to other algebraic structures.

Two periods per week throughout the year.

Matrix methods, matrix algebra, linear transformations, determinants, inverse matrices, linear systems of equations, rank and linear dependence, special square matrices, eigenvalues, reduction to diagonal form.

Groups and other algebraic structures: sets, mappings, group axioms, special groups, subgroups, homomorphisms and isomorphisms, rings, fields.

TEXTS

Pipes, L. A., *Matrix Methods for Engineering*, Prentice-Hall, 1963.

Burton, D. M., *Abstract and Linear Algebra*, Addison-Wesley, 1972.

REFERENCES

Baumslag, B., and Chandler, B., *Group Theory*, Schaum, 1968.

Birkhoff, G., and MacLane, S., *A Survey of Modern Algebra*, Macmillan of New York, 1968.

## Analysis II

An introduction to real variable analysis.

Two periods per week throughout the year.

Algebraic and topological properties of the set of real numbers.

Functions, limits, continuity, uniform continuity, mean value theorems and applications.

Theory of Riemann integral.

Convergence of sequences, series, and integrals; uniform convergence.

Lebesgue integral.

TEXT

Taylor, A. E., *Advanced Calculus*, Ginn, 1955.

REFERENCES

Burrill, C. W., and Knudson, J. R., *Real Variables*, Holt, Rinehart and Winston, 1969.

Rudin, W., *Principles of Mathematical Analysis*, McGraw-Hill, 1964.



## Calculus II

A second course in mathematical techniques involving multivariable calculus and integration in the context of scalar and vector fields.

Two periods per week throughout the year.

Functions of several variables. Composite functions; chain rules. Mean value theorem, Taylor's expansion. Extreme values; Lagrange multipliers, method of least squares.

Scalar and vector fields; differential operators. Line integrals; scalar potential and conservative vector fields. Area and volume integrals; geometrical and physical applications.

Surface integrals; vector flux, divergence and curl, cartesian representation, operator  $\nabla$ . Integral theorems; Green's theorem for the plane, Gauss' divergence theorem, Stokes' theorem.

Series; convergence, power series, Elementary functions of a complex variable.

### TEXTS

Protter, M. H., and Morrey, C. B., *Modern Mathematical Analysis*, Addison-Wesley, 1964.

Spiegel, M. R., *Vector Analysis*, Schaum, 1959.

### REFERENCE

Kreyszig, E., *Advanced Engineering Mathematics*, Wiley, 1962.

## Differential Equations II

A course in the techniques for solving ordinary differential equations, Laplace transforms, and Fourier series.

Two periods per week throughout the year.

First order differential equations; separation of variables, exact type, homogeneous type, linear and Bernoulli types.

Higher order differential equations; linear operator methods, constant coefficients, Cauchy type, variation of parameters, reduction of order.

Laplace transform; application to ordinary differential equations.

Series solutions of ordinary differential equations.

Fourier series; boundary value problems, separation of variables in a partial differential equation.

### TEXT

Rainville, E. D., and Bedient, P. E., *Elementary Differential Equations*, Macmillan, 1969.

### REFERENCES

Kreyszig, E., *Advanced Engineering Mathematics*, Wiley, 1962.

## Dynamics and Hydrodynamics II

An introduction to the dynamics of a system of particles (classical dynamics) and the dynamics of a continuum (hydrodynamics).

Two periods per week throughout the year.

Particle dynamics; linear momentum principle, energy principle, projectiles.

Systems of particles; angular momentum principle, plane motion of a rigid body.

Classical hydrodynamics; one-dimensional channel flow, two-dimensional irrotational flow, applications to ground-water theory and water waves.

### TEXTS

Bullen, K. E., *An Introduction to the Theory of Mechanics*, Science, 1949.

Rutherford, D. E., *Classical Mechanics*, Oliver and Boyd, 1951.

Sabersky, R. H., and Acosta, A. J., *Fluid Flow: A First Course in Fluid Mechanics*, Macmillan, 1964.

### REFERENCES

Synge, J. L., and Griffith, B. A., *Principles of Mechanics*, McGraw-Hill, 1949.

Verruijt, A., *Theory of Groundwater Flow*, Macmillan, 1970.

## Operations Research II

A course in the methods of optimisation with emphasis on applications.

Two periods per week throughout the year.

Introduction; Operations Research concepts.

Linear Programming; algebraic and geometric solutions, simplex tableau, duality, sensitivity analysis.

Allocation; transportation and assignment models.

Optimisation; problem formulation, searching algorithms.

Dynamic Programming; applications to networks, single and multistage decision problems.

Games Theory; graphical and algebraic solutions, bidding models.

### REFERENCES

Hillier, F. S., and Lieberman, G. J., *Introduction to Operations Research*, Holden-Day, 1967.

Thierauf, R. S., and Grosse, R. A., *Decision Making through Operations Research*, Wiley, 1970.

Frazer, J. R., *Applied Linear Programming*, Prentice-Hall, 1968.

Converse, A. O., *Optimisation*, Holt, Rinehart and Winston, 1970.

## Probability and Statistics II

A generalised introduction to familiarise students with concepts which occur in experimental research material.

Two periods per week throughout the year.

Probability; combinatorials, conditional, independence, Bayes' rule.

Random variables; discrete, continuous, expectations, estimators, moments, grouped data.

Density functions; uniform, binomial, multinomial, hyper-geometric, Poisson, negative binomial, normal, gamma, beta.

Sampling theory;  $\chi^2$  distribution, ' $t$ ' distribution, large samples, small samples,  $F$  distribution.

Estimation theory; maximum likelihood estimators, means, difference between means, proportions, variance, ratio of two variances.

Hypothesis testing; quality control, goodness of fit, independence.

Correlation and regression; single linear, multiple linear.

Analysis of variance; one way, two way.

TEXT

Walpole, R. E., *Introduction to Statistics*, Macmillan, 1968.

REFERENCES

Freund, J., *Statistics—A First Course*, Prentice-Hall, 1970.

Wonnacott, T., and Wonnacott, R., *Introductory Statistics*, Wiley, 1969.

## **Numerical Analysis II**

A course in numerical analysis and computational methods with emphasis on error analysis and algorithms for digital computer solution.

Two periods per week throughout the year.

Number systems; positional notation, base conversion.

Error propagation and noise in computation; round-off error, truncation, estimating errors in machine computation, statistical approaches.

Matrices and simultaneous linear equations; inversion of matrices, eigenvalue problem, determinants. Numerical solution of simultaneous linear equations, relaxation and iterative techniques.

Calculus of finite differences; polynomial approximations. Interpolation of arbitrarily spaced data; Lagrange formulation, barycentric form.

Numerical quadrature, integration, and solution of differential equations; computer methods, stability. Runge-Kutta and predictor-corrector methods, two-dimensional partial differential equations, relaxation methods.

TEXT

Southworth, R. W., and Deleeuw, S. L., *Digital Computation and Numerical Methods*, McGraw-Hill, 1965.

#### REFERENCES

- Ames, W. F., *Numerical Methods for Partial Differential Equations*, Thomas Nelson and Sons, 1969.
- Ayres, Frank R., *Theory and Problems of Matrices*, Schaum, 1962.
- Booth, A. D., *Numerical Methods*, 3rd ed., Butterworths, 1966.
- Hamming, R. W., *Numerical Methods for Scientists and Engineers*, McGraw-Hill, 1962.
- National Physics Laboratory (Teddington, G.Br.), *Modern Computing Methods*, H.M. Stationery Office, 1961.
- Scheid, Francis, *Theory and Problems of Numerical Analysis*, McGraw-Hill, 1968.

### Programming II

A first course in programming at machine language level, together with a course in general computer applications.

Two periods per week throughout the year.

Machine organisation; storage hierarchy, stored program concepts, machine instructions, addressing schemes. Assembly programming; mnemonic notation, pseudo-operations, indexing.

Programming techniques; storage allocation, symbol manipulation, packing, floating point operations. Subprograms; scope of symbols, argument transfer, compiler-generated linkages, modular structures, linking and loading. Input-output; buffering, interrupt processing, introduction to multiprogramming.

Information processing; file structures, sequential and random access methods, file maintenance, sort-merge techniques, system design.

#### TEXTS

- Honeywell, CCD., *DDP 516 Programmers Reference Manual*, 1970.
- McCracken, D., Weiss, H., and Lee, T. H., *Programming Business Computers*, Wiley, 1966.
- Sherman, P. M., *Programming and Coding Digital Computers*, Wiley, 1966.

#### REFERENCES

- Evans, G., Wallace, J., and Sutherland, F., *Simulation using Digital Computers*, Prentice-Hall, 1968.
- Knuth, D., *The Art of Computer Programming*, Addison-Wesley, 1969.

### Digital Systems II

An introduction to the basic concepts in the design of digital systems and the organisation of digital computers.

*This course is presented in conjunction with the Department of Electrical Engineering.*

Two periods per week throughout the year.

## Department of Mathematics

Boolean algebra; methods for the logical synthesis of switching networks, both combinational and sequential.

Utilisation of electronic devices as bivalued elements in digital systems.

Introduction to computer organisation.

### TEXTS

Edwards, F. H., *The Principles of Switching Circuits*, M.I.T. Press, 1973.

Digital Equipment Corporation, *Introduction to Programming*, 1972.

Digital Equipment Corporation, *Programming Languages*, 1972.

Hollingsworth, D., *Mini-Computers: A review of Current Technology, Systems and Applications*, Rand Report R-1279, July 1973.

## Linear Algebra III

A course in the theory of vector spaces, the use of matrix operators on finite dimensional spaces, and a brief introduction to Hilbert spaces.

Two periods per week throughout the year.

Vector spaces; linear dependence, basis and dimension, real and complex spaces, Euclidean spaces, orthogonality, linear transformations.

Matrix operators; determinants, rank and equivalence, linear systems of equations, change of basis, orthogonal, and unitary matrices, congruence, symmetric and hermitian matrices.

Algebraic forms; bilinear forms, quadratic forms, hermitian forms, applications.

Characteristic polynomial; eigenvalues, similarity, diagonalisation. Matrix polynomials; Cayley-Hamilton theorem.

Hilbert spaces; euclidean spaces  $E_n$  and  $E_\infty$ , complete spaces, function spaces, integral operators, Hilbert spaces, orthonormal sequences, basis for an infinite dimensional space.

### TEXTS

Lipschutz, Seymour, *Theory and Problems of Linear Algebra*, Schaum Outline, McGraw-Hill, 1968.

Halmos, P. R., *Finite Dimensional Vector Spaces*, Van Nostrand, 1958.

## Analysis III

A course in real and abstract analysis.

Two periods per week throughout the year.

General topology; topological spaces.

Topological linear spaces; metric spaces, normed linear spaces.

Daniell integral, Lebesgue integral.

### TEXTS

Arnold, B. H., *Intuitive Concepts in Elementary Topology*, Prentice-Hall, 1962.

Maddox, I. J., *Elements of Functional Analysis*, Cambridge U.P., 1970.

Fullerton, G. H., *Mathematical Analysis*, Oliver and Boyd, 1970.

REFERENCE

Haaser, N. B., and Sullivan J. A., *Real Analysis*, Van Nostrand, 1971.

### Complex Variable III

A course in the theory of functions, of a complex variable and some of its more immediate applications.

Two periods per week throughout the year.

Functions; limits, continuity, differentiation, Cauchy-Riemann equations, analytic functions, conjugate harmonic functions, the elementary functions.

Integrals; curves in the complex plane, complex integrals, Cauchy's integral theorem, indefinite integrals, Cauchy integral formula, theorems on integrals.

Series, convergent sequences and series, convergence tests, uniform convergence, power series, Taylor series, Laurent series.

Residues and poles; isolated singularities and residues, the residue theorem, residues at a pole, isolated singularities at infinity, evaluation of real definite integrals by contour integration.

Conformal mapping; the elementary functions as mappings, conformal mappings, inverse functions, special mapping, the Schwarz-Christoffel mapping, applications.

TEXT

Churchill, R. V., *Complex Variables and Applications*, McGraw-Hill, 1960.

REFERENCE

Spiegel, M. R., *Theory and Problems of Complex Variables*, McGraw-Hill, 1964.

### Logic III

A first course in mathematical logic which develops both the heuristic approach with the emphasis on the use of logic, and the formal approach emphasising the deductive structure.

Two periods per week throughout the year.

Propositional truth-function logic; the propositional connectives, material implication, negation, equivalence, disjunction and conjunction. Truth tables, tautologies, self-contradictory and contingent propositions. Perfectly disjunctive and conjunctive normal forms. The use of truth-functional logic in the testing of arguments for validity or invalidity. The use of *reductio ad absurdum* and related methods.

First order predicate logic; the quantifiers. Free and bound variables. A Gentzen-like approach to the testing of arguments for validity or invalidity. Universal instantiation, universal generalisation, existential generalisation and existential instantiation.

A propositional calculus; object language and metalanguage. Primitive symbols and well-formed formulae. Axioms. Rules of inference. Consistency and completeness of this calculus.

A first order predicate calculus; primitive symbols and well-formed formulae. Axioms. Rules of inference. Consistency and completeness of this calculus.

TEXTS

Copi, I. M., *Symbolic Logic*, 4th ed. Macmillan, 1973.

Tarski, A., *Introduction to Logic*, Oxford, 1964.

Hughes, G. E., and Londey, D. G., *The Elements of Formal Logic*, Methuen, 1965.

REFERENCES

Goodstein, R. L., *Development of Mathematical Logic*, Logos, 1971.

Mendelson, E., *An Introduction to Logic*, Van Nostrand, 1964.

Robbin, J. W., *Mathematical Logic—A First Course*, Benjamin, 1968.

Rosser, J. B., *Logic for Mathematicians*, McGraw-Hill, 1953.

Schoenfield, J. R., *Mathematical Logic*, Addison-Wesley, 1967.

### Ordinary Differential Equations III

An introduction to the theory of ordinary differential equations.

Two periods per week throughout the year.

First order differential equations and systems; plane autonomous systems, phase plane analysis, stability.

Linear equations; general theory, homogeneous equations, independent solutions, non-homogeneous equations, the adjoint equation.

Special ordinary differential equations of second order, and properties of their solutions.

Boundary value problems; Sturm-Liouville theory, Green's functions.

TEXT

Ross, S. L., *Differential Equations*, Blaisdell, 1972.

REFERENCE

Birkhoff, G., and Rota, G. C., *Ordinary Differential Equations*, Blaisdell, 1962.

### Partial Differential Equations III

A course on the solution of partial differential equations and associated boundary value problems by separation of variables and by integral transforms.

Two periods per week throughout the year.

Derivation in particular physical contexts of second order linear partial differential equations of importance in physics and engineering; classification and general properties.

Special functions arising in the separation of variables technique.

Solution of boundary value problems by separation of variables.

Fourier series; finite Fourier transforms.

Integral transforms and inversion formulae; general discussion of transforms and properties, with the main emphasis on Laplace and Fourier transforms.

Solution of boundary value problems by integral transforms.

#### TEXTS

Calus, I. M., and Fairley, J. A., *Fourier Series and Partial Differential Equations*, Wiley, 1971.

Churchill, R. V., *Operational Mathematics*, McGraw-Hill, 1958.

Miller, Kenneth, S., *Partial Differential Equations in Engineering Problems*, Prentice-Hall, 1959.

Tranter, C. J., *Integral transforms in Mathematical Physics*, Methuen, 1956.

#### REFERENCES

Sokolnikoff, I. S., and Redheffer, R. M., *Mathematics of Physics and Modern Engineering*, McGraw-Hill, 1966.

Irving, J., and Mullineaux, N., *Mathematics in Physics and Engineering*, Academic Press, 1959.

Sneddon, I. N., *Special Functions of Mathematical Physics and Chemistry*, Oliver and Boyd, 1956.

Sneddon, I. N., *Fourier Transforms*, McGraw-Hill, 1951.

### Exterior Ballistics III

A course on theoretical and numerical methods used in Exterior Ballistics.

Two periods per week throughout the year.

Power law air resistance, aerodynamic drag, methods of measuring aerodynamic coefficients.

Normal equations of a trajectory and their numerical solution, standard meteorological functions.

Differential corrections; gravitational variations, rotating frames, Coriolis force, Euler force, centrifugal force, meteorological variations.

Approximate methods; Siacci, Euler.

Ballistic and firing tables, field gunnery.

Bombing and firing from aircraft.

Rockets.

History of ballistics.

#### TEXT

Moulton, F. R., *Methods in Exterior Ballistics*, Dover, 1962.



REFERENCES

McShane, E. J., Kelley, J. L., and Reno, F. V., *Exterior Ballistics*, Denver U.P., 1953.

Hayes, T. J., *Elements of Ordnance*, Wiley, 1938.

### Fluid Dynamics III

A course on the dynamics of incompressible, inviscid fluids with an introduction to the dynamics of viscous fluids.

Two periods per week throughout the year.

Equations of motion for inviscid, incompressible fluids. One-variable flow problems, e.g. spherically symmetric problems. Two-dimensional flow, circle theorems, use of conformal transformations Joukowski aerofoils. Axially symmetric flow.

Equations of motion for viscous incompressible fluids. Exact solutions of the equations. Slow viscous flow. Introduction to boundary layer theory.

TEXTS

Allen Jr., Theodore, and Ditsworth, Richard L., *Fluid Mechanics*, McGraw-Hill, 1972.

Sabersky, R. H. and Acosta, A. J., *Fluid Flow: A First Course in Fluid Mechanics*, Macmillan 1964.

REFERENCES

Batchelor, G. K., *An Introduction to Fluid Dynamics*, Cambridge U.P., 1967.

Wilson, D. H., *Hydrodynamics*, Arnold, 1959.

### Linear Programming III

A detailed study of the theory of linear programming and the simplex tableau, with applications to specific fields of Operations Research.

Two periods per week throughout the year.

Simplex Tableau; mathematical derivation.

Duality; derivation, validity, interpretation.

Sensitivity; ranging, availability charts.

Applications; games theory, allocation.

REFERENCES

Smyth, W. R., and Johnson, L. A., *Introduction to Linear Programming with Applications*, Prentice-Hall, 1966.

Flagle, C. D., Huggins, W. H., and Roy, R. H., *Operations Research and Systems Engineering*, Hopkins, 1964.

Hadley, G., *Linear Programming*, Addison-Wesley, 1964.

### Operations Research III

The methodology of stochastic models and other topics of application to research and management.

Two periods per week throughout the year.

Queueing Theory; arrival and service distributions, queue discipline, single and multiple servers.

Markov Chains; persistent and transient states, closed sets, recurrent relations. Applications to models.

Network Analysis; generalisation of transportation model, scheduling, CPM, PERT, application to models.

Simulation; flow diagrams, random number generators, stochastic variable generators. Discrete, continuous and queueing models, inventory models.

Inventory Theory; deterministic and probabilistic models, price breaks, restrictions.

Replacement; discounting costs, anticipation of failure, reliability, group inspection problems.

#### REFERENCES

Hillier, F. S., and Lieberman, G. J., *Introduction to Operations Research*, Holden-Day, 1967.

Thierauf, R. S. and Grosse, R. A., *Decision Making through Operations Research*, Wiley, 1970.

Mitchell, G. H., *Operational Research, Techniques and Examples*, English University, 1972.

Houlden, B. T., *Some Techniques of Operational Research*, English University, 1962.

Naylor, T. H., Balintfy, J. L., Burdich, D. S. and Chu, K., *Computer Simulation Techniques*, Wiley, 1966.

Wiest, J. D., and Levey, F. K., *A Management Guide to PERT/CPM*, Prentice-Hall, 1969.

### Experimental Statistics III

An introduction to statistical models having applicational usages in all fields of experimental sciences and management.

Two periods per week throughout the year.

Regression Analysis; linear models, matrix approach, non-linear models.

Analysis of variance; single factors, factorial models, nested models, replication.

Sampling; general, stratified, cluster.

#### REFERENCES

Kemphorne, O., *The Design and Analysis of Experiments*, Wiley, 1966.

Finney, D. J., *An Introduction to the Theory of Experimental Design*, University of Chicago, 1960.

Kish, L., *Survey Sampling*, Wiley, 1965.

Cochran, W. G., *Sampling Techniques*, Wiley, 1963.

Cochran, W. G., and Cox, G. M., *Experimental Design*, Wiley, 1962.

### Mathematical Statistics III

An advanced treatment of Probability and Statistics from a mathematical viewpoint.

Two periods per week throughout the year.

Probability; random variables, combinatorials, conditional independence. Generating functions; characteristic functions. Applications; sums and products.

Limit laws. Estimation, hypothesis testing, sufficient statistics, dichotomous populations. Nonparametric statistics.

#### REFERENCES

Blum, J. R., and Rosenblatt, J. I., *Probability and Statistics*, Saunders, 1972.

Mood, A. M. and Graybill, F. A., *Introduction to the Theory of Statistics*, McGraw-Hill, 1963.

Dwass, M., *Probability and Statistics*, Benjamin, 1970.

### Numerical Analysis III

A second course in numerical analysis with emphasis on non-polynomial approximations.

Two periods per week throughout the year.

Linear approximations; orthogonal polynomials; Fourier series, expansions of discrete and continuous functions, Fast Fourier Transform. Sampling theory; band limited functions, smoothing functions. Curve fitting using  $L_1$ ,  $L_2$  and  $L_\infty$  norms.

Non-linear approximations; spline functions.

Pseudo-random number generation; congruential methods, Tausworthe generators.

#### TEXTS

Knuth, D., *The Art of Computer Programming*, Addison-Wesley, 1969.

Hamming, R. W., *Numerical Methods for Scientists and Engineers*, McGraw-Hill, 1962.

#### REFERENCE

Handscorn, D. C. (ed.), *Methods of Numerical Approximation*, Pergamon, 1965.

### Information Structures III

A course in the structuring of data elements and algorithms for the processing of data structures.

Two periods per week throughout the year.

Information structures, stacks, queues and dequeues, linked lists, trees, arrays and orthogonal lists, binary tree representation, multi-linked structures, dynamic storage allocation, organisation of files.

Symbiotics; interactive graphics, computer-aided design, computer-aided instruction.

TEXTS

Knuth, D., *The Art of Computer Programming*, Addison-Wesley, 1969.

REFERENCES

Berztiss, A. T., *Data Structures, Theory and Practice*, Academic Press, 1971.

Hellerman, H., *Digital Computer System Principles*, McGraw-Hill, 1967.

Newman, W. M., and Sproull, R. F., *Principles of Interactive Computer Graphics*, McGraw-Hill, Sydney, 1973.

### Digital Systems III

A course in the hardware elements of computer systems, their architecture and reliability.

*This Course is presented in conjunction with the Department of Electrical Engineering.*

Two periods per week throughout the year.

Implementation of computer logic; transistor switching circuits, digital integrated circuits, computer organisation, memories.

Hardware elements and algorithms; logic design, state machines, gating and transfer functions, registers, algorithms for arithmetic operations, speed-up techniques.

Control functions; clock cycle and timing sequences, instruction repertoires, decoding and sequencing, interrupts, input-output control.

Input-output facilities; device characteristics, interfaces, storage hierarchy, buffers, data channels, multiplexors.

Advanced addressing principles; memory paging, segmentation, and protection techniques.

Microprogramming.

Multiprocessors, high-speed and pipeline systems.

Computer systems reliability; error detection and correction, hardware diagnostic and monitoring features, environment control.

TEXTS

Clare, C. R., *Designing Logical Systems using State Machines*, McGraw-Hill, 1975.

Bell, C. G., and Newell, A., *Computer Structure: Readings and Examples*, McGraw-Hill, 1971.

Iliffe, J. K., *Basic Machine Principles*, 2nd ed., MacDonald, 1972.

Beizer, B., *The Architecture and Engineering of Digital Computer Complexes*, 2 vols., Plenum Press, 1971.

### Systems Programming III

A course in system programming concepts and techniques including work on programming languages and operating systems.

Two periods per week throughout the year.

System programming; multi-precision arithmetic algorithms, macro-assembly, compiling techniques, recursion and re-entrance.

Programming Languages; Iverson notation, interpretive languages, interactive software, preprocessors, simulators.

Operating and supervisory systems; batch control, real-time concepts, multiprogramming memory management, virtual memory, relocation, modularity, dynamic structures, protection, scheduling algorithms.

Data base management; communications systems, implementation aspects, multiprocessing.

TEXT

Knuth, D., *The Art of Computer Programming*, Addison-Wesley, 1969.

REFERENCES

Hassitt, A., *Computer Programming and Computer Systems*, Academic Press, 1967.

Hellerman, H., *Digital Computer System Principles*, McGraw-Hill, 1967.

Wegner, P., *Programming Languages, Information, Structures and Machine Organization*, McGraw-Hill, 1967.

Martin, J., *Programming Real-Time Computer Systems*, Prentice-Hall, 1966.

Bates, F., and Douglas, Mary L., *Programming Language One*, Prentice-Hall, 1967.

Sharpe, W. F., *Basic*, Free Press, 1967.

Davis, G., *Computer Data Processing*, McGraw-Hill, 1970.

## Department of Chemistry

### 1303 Chemistry

Lectures 30 hr  
Laboratory 30 hr

#### LECTURE COURSE

#### (a) *Atomic and Molecular Structure*

Sub-atomic particles; electron arrangements in atoms; periodic classification; ionic and covalent structures; hydrogen bonds; van der Waals forces; crystal structures of metals and simple salts; relationships between physical properties and structure.

#### (b) *Thermochemistry and Kinetics*

Heat of reaction; activation energy; rates of reaction; bond energies and heats of formation; the combustion of hydrocarbons.

#### (c) *Macromolecules*

Basic organic chemistry and silicate chemistry; structures and properties of organic polymers, natural silicates and silicones.

#### (d) *Electrochemistry*

Voltaic cells; electrode potentials; redox reactions.

#### LABORATORY COURSE

Exercises designed to supplement the lecture course and introduce instrumental methods of analysis.

#### RECOMMENDED TEXTS

Sisler, H. H., VanderWerf, C. A. and Davidson, A. W. *College Chemistry*, Macmillan, 1967.

Depuy, C. H. and Rinehart, K. L. *Introduction to Organic Chemistry*, Wiley, 1967.

### 1306 Chemistry I

Lectures 78 hr  
Tutorials 26 hr  
Laboratory 78 hr

#### LECTURE COURSE

#### (a) *Gases, Liquids and Solids*

Kinetic-molecular theory; intermolecular forces; liquid structures; solutions and solubility; phase equilibria; critical phenomena; crystal types; crystal lattices; lattice energies.

#### (b) *Thermodynamics*

The concepts of energy, entropy, enthalpy, free energy, chemical potential, equilibrium and equilibrium constant.

#### (c) *Equilibria in Gases and in Aqueous Solutions*

Gas phase problems; stability constants; acid-base equilibria; solubility equilibria; redox equilibria.

(d) *Atomic and Molecular Structure*

Quantum theory; atomic orbitals; electron arrangements in elements; ionisation energies; bonding; molecular geometry; molecular orbital theory; polarisation; bonding in metals.

(e) *Systematic and Descriptive Chemistry*

The Periodic classification; periodic properties; electronegativity; oxidation numbers; acidic and basic character of oxides and hydroxides; the solubility of salts; the chemistry of selected Groups and Periods; organic nomenclature and a survey of functional groups.

(f) *Rates and Mechanisms*

Rate constants; the notion of mechanism; activation energy; transition states; catalysis.

LABORATORY COURSE

Exercises introducing chemical techniques and supplementing the lecture course.

RECOMMENDED TEXTS

Porterfield, W. W., *Concepts of Chemistry*, Norton, 1972.

Dasent, W. E., *Inorganic Energetics*, Penguin, 1970.

Companion, A. L., *Chemical Bonding*, McGraw-Hill, 1964.

Sisler, H. H., VanderWerf, C. A., and Davidson, A. W., *College Chemistry*, Macmillan, 1967.

Aylward, G. H., and Findlay, T. J. V., *SI Data Book*, Wiley, 1971.

Banks, J. E., *Naming Organic Compounds*, Saunders, 1967.

**2310 Chemistry II**

*Lectures* 4 hrs per week

*Laboratory* 4 hrs per week

OUTLINE OF COURSE

Topics amounting to eight points will be selected by taking topics (a), (b), (c), (d), (e), and *either* topics (f) and (g) *or* topic (h). Topics (a)–(e) and (g) count as one point each, (f) as two points and (h) as three points.

(a) *Electrochemistry and Thermodynamics*

The concepts of chemical potential, fugacity, activity and their application to the reaction isotherm. The Nernst equation and its application to simple cells with liquid junctions. The definition of activity coefficients of electrolytes and their determination in cells without liquid junctions. The determination of the thermodynamic quantities,  $\Delta G$ ,  $\Delta H$ ,  $\Delta S$ , and  $E^\circ$  and the application of cell thermodynamics to the determination of ionisation constants. The NBS scale of pH.

(b) *Spectroscopic Methods of Analysis*

Principles, applications and instrumentation of absorption, fluorescence, atomic absorption, emission, X-ray and reflectance spectroscopy for quantitative analysis. Precision and accuracy of spectroscopic methods. Laboratory techniques.

(c) *Introduction to Molecular Spectroscopy*

Brief survey of experimental techniques. Theory and application of rotational spectra, vibration-rotation spectra and electronic spectra. Bond-dissociation energies.

(d) *Inorganic Chemistry and Bonding A*

Chemical bonding, structure and stereochemistry in selected compounds of main group elements of Groups II-VI.

(e) *Inorganic Chemistry and Bonding B*

Molecular symmetry elements and their relationship to symmetry operations and point groups; molecular point group character tables; chemical applications of symmetry.

(f) *Organic Chemistry A*

Bonding and reactivity in organic compounds. Reactions classified by mechanism. Stereochemistry. Application of these basic concepts to: hydrocarbons, alcohols, phenols, carbonyl compounds, sugars, carboxylic acids and derivatives, ethers, epoxides, aromatic compounds, nitrogen-containing compounds. An introduction to infra-red and ultra-violet spectroscopy.

(g) *Organic Chemistry B*

Further consideration of stereochemistry and reaction mechanisms. Application of basic concepts to some other functional groups: alkyl halides, dienes, aryl halides, carbonyl compounds (carbanion chemistry),  $\alpha$ ,  $\beta$ -unsaturated carbonyl compounds, diazonium salts.

(h) *Organic Chemistry L*

A basic course in mechanistic organic chemistry for chemistry majors, developing the relationship between structure, bonding and reactivity as a way of understanding the properties and reactions of complex molecules.

Topics: types of organic molecules, conjugated bonds, resonance and aromaticity, stereochemistry, classification of organic reactions, reaction energetics, nucleophilic addition to carbonyl compounds, elimination reactions, electrophilic addition to  $\pi$  systems, molecular rearrangements, oxidation and reduction, radical reactions; an introduction to infra-red and ultra-violet spectroscopy and the chemistry of polymers.

RECOMMENDED TEXTS

*Topic (a)*

Denaro, A. R., *Elementary Electrochemistry*, Butterworths, 1967.

*Topic (b)*

Skoog, D. A. and West, D. M., *Principles of Instrumental Analysis*, Holt, Rinehart and Winston, 1971.

*Topic (c)*

Dunford, H. B., *Elements of Diatomic Molecular Spectra*, Addison-Wesley, 1968.



## Department of Chemistry

### Topic (d)

Cotton, F. A. and Wilkinson, G., *Advanced Inorganic Chemistry*, 3rd ed., Interscience, 1972.

Cartmell, E., and Fowles, G.W.A., *Valency and Molecular Structure*, 3rd ed., Butterworths, 1966.

### Topic (e)

Hollas, J. M. *Symmetry in Molecules*, Chapman and Hall, 1972.

### Topics (f), (g) and (h)

Conrow, K., and McDonald, R. N., *Deductive Organic Chemistry*, Addison-Wesley, 1966.

Morrison, R. T., and Boyd, R. N., *Organic Chemistry*, 3rd ed., Allyn and Bacon, 1973.

Sykes, P., *A Guidebook to Mechanism in Organic Chemistry*, 3rd ed., Longmans, 1970.

Hendrickson, J. B., Cram, D. J., and Hammond, G. S., *Organic Chemistry*, 3rd ed., McGraw-Hill, 1970.

Natta, G., and Farina, M., *An Introduction to Stereochemistry*, Longmans, 1972.

## 2311 Chemistry IIA

Topics amounting to four points will be selected from the list appearing under 2310 Chemistry II. Topic (f) is compulsory. A student's selection will be subject to the approval of the Head of the Department.

## 3310 Chemistry III

*Lectures* 5 hours per week  
*Laboratory* 12 hours per week

### OUTLINE OF COURSE

Topics amounting to twelve points will be selected. Topics (a), (b), (c) and (d), each with a value of one point, must be selected. The remaining eight points will be obtained by a selection from topics (e) to (t), each topic having a value of two points.

The following constraints apply. Students should comply with all pre-requisites and corequisites. Only eight of the optional two-point topics will be available each year. These optional topics will be presented in four pairs. One topic from each pair is to be selected. A student's selection will be subject to the approval of the Head of the Department.

### (a) *Analytical and Preparative Inorganic Chemistry*

Prerequisite: Inorganic Chemistry and Bonding A.

Corequisite: Electroanalytical Chemistry.

A variety of laboratory assignments will be completed which involve synthetic chemistry, analytical chemistry and the use of modern physico-chemical methods and instrumentation to confirm electronic structure and stereochemistry. Assignments requiring use of the chemical literature will be completed.

(b) *Instrumental Analysis of Organic Compounds*

Prerequisites: Spectroscopic Methods of Analysis.  
Organic Chemistry A.

The application of nuclear magnetic resonance, infra-red, ultra-violet and mass spectrometry to the determination of structures of organic compounds. Combined gas chromatography-mass spectrometry and computer techniques.

(c) *Electroanalytical Chemistry*

Prerequisite: Electrochemistry and Thermodynamics.  
Corequisite: Analytical and Preparative Inorganic Chemistry.

The accurate measurement of p-H; pH-titrations. The electrolytic conduction of electrolytes, ionic conduction at zero concentration, conductimetric titrations. Voltammetric methods and their use in the analysis of trace amounts of some important electroactive species.

(d) *Inorganic Chemistry*

Prerequisites: Inorganic Chemistry and Bonding A.  
Inorganic Chemistry and Bonding B.  
Corequisite: Analytical and Preparative Inorganic Chemistry.

Chemical bonds involving d-orbitals. A study of transition metal complexes including nomenclature, isomerism, preparative methods, stability, theory of bonding, stereochemistry, electronic spectra and magnetism. Typical complex chemistry of the first transition series metals.

(e) *Molecular Spectroscopy*

Prerequisite: Introduction to Molecular Spectroscopy.

Multielectron atomic orbital theory; vector coupling. Molecular orbitals; united-atom correlation diagrams. Molecular models; rigid rotor, symmetric top. Hund's rules. Symmetry and selection rules. Nuclear spin effects and level populations. Introduction to molecular group theory.

(f) *Chemical Physics*

One or more topics from the list below will be given in any year. These topics will be designed to demonstrate the use of mathematical and theoretical techniques in describing physical phenomena in chemical systems.

The topics are: regular solution theory; reaction rates; molecular group theory; advanced thermodynamics; critical phenomena and phase theory; liquid crystals.

(g) *Statistical Thermodynamics*

Prerequisite: Electrochemistry and Thermodynamics or equivalent.

Introduction to distributions and calculation of thermodynamic properties. Translational partition function. Internal partition function. Heat capacities. Entropy and third law of thermodynamics. Equilibrium constants. Computation of thermodynamic functions from spectroscopic data.

**(h) *Applied Physical Chemistry***

Prerequisites: Electrochemistry and Thermodynamics.  
Organic Chemistry A.

Two topics to be selected from the following:

**(i) The Nature of Surfaces and Adsorption**

The liquid-liquid interface, surface free energy, the Gibbs equation. Ionic colloids and colloidal behaviour. The gas-solid interface, isotherms, heterogeneous catalysis.

**(ii) The Physical Chemistry of some Important Industrial and Biological Processes.**

A revision of basic thermodynamic relationships. Case studies of some industrial processes including kinetic considerations. Free energy considerations in biological processes, the citric acid cycle.

**(iii) The Physical Chemistry of Flames and Explosions**

Basic definitions and the physico-chemical properties of explosives. A study of effects associated with flames. The burning of propellants and explosives, reactions in solids, the hydrodynamic theory of detonation.

**(i) *Applied Electrochemistry***

Prerequisite: Electrochemistry and Thermodynamics.  
Corequisite: Electroanalytical Chemistry.

Electrodeposition reactions and their industrial applications. Corrosion theory, types of corrosion cells, factors involved in corrosion, passivity. The corrosion of iron and steel under various conditions. The corrosion of selected non-ferrous metals. Electrochemical energy conversion, the thermodynamic and kinetic factors to be considered in the construction of fuel cells and storage batteries.

**(j) *Advanced Inorganic Chemistry***

Prerequisites: Inorganic Chemistry and Bonding A.  
Inorganic Chemistry and Bonding B.  
Corequisite: Inorganic Chemistry.

Advanced chemistry of selected main group elements involving study of synthesis, bonding and stereochemistry in selected compounds or classes. The chemistry of organometallic compounds including carbonyl, nitrosyl and  $\pi$ -complex systems. The application of spectroscopic methods and magnetochemistry to problems in inorganic chemistry.

**(k) *Applied Inorganic Chemistry***

Prerequisite: Inorganic Chemistry and Bonding A.

The chemistry of the lanthanide elements (briefly), and of the actinides, in particular thorium, uranium and plutonium. Applications in nuclear

technology, Lattice defects and non-stoichiometry. Applications of non-stoichiometric systems. Radiochemistry and radiochemical techniques. Chemical effects of ionising radiation. Applications of isotopes in chemistry, engineering, medicine and agriculture.

(1) *Organic Chemistry*

Prerequisites: Organic Chemistry A and Organic Chemistry B,  
or Organic Chemistry L.

Pericyclic reactions, photochemistry, design of organic syntheses, five-membered and six-membered heterocycles, structure and biosynthesis of some natural products.

(m) *Applied Organic Chemistry*

Prerequisite: Organic Chemistry A.

Petroleum, petroleum refining, lubricating oils, greases. Production of primary petrochemicals. Syntheses based on primary petrochemicals. The organic chemical industry, international and Australian. Explosives, physico-chemical aspects, manufacture and formulation. Dyes and dyeing.

(n) *Organic Macromolecules*

Prerequisite: Organic Chemistry A.

Course limit: Six students.

Thermodynamics of polymer solutions: Flory-Huggins theory; colligative properties. Methods of M.W. determination: end-group analysis; colligative properties analysis; solution viscosity; ultracentrifugation; light scattering. Preparation and kinetics of polymerisation: condensation, free radical, anionic and cationic and co-ordination polymerisations. Commercial polymers: structure-property relations; uses; methods of determination.

(o) *Chemistry of Industrial Materials and Processes*

Water, large scale purification processes. Metals, crystalline structure and imperfections, phase equilibria. Ceramics, including silicate minerals, glasses and cements. EITHER ultra-purification processes and some new materials OR organic polymers, terminology, structure-property relations, uses. (The alternative, organic polymers etc., will not be available to students taking the two-point topic, Organic Macromolecules.)

(p) *Environmental Chemistry*

Prerequisite: Organic Chemistry A.

The chemical effects of energy production, chemical industry, agriculture and urban living on the environment. Analysis and monitoring of pollutants.

(q) *Biological Chemistry*

Prerequisite: Organic Chemistry A.

Structure of different types of protein. Enzymes, mechanism of action, inhibition, respiratory enzymes. Chemotherapy, selective toxicity, some mechanisms of drug action and drug resistance. Chemical and biological warfare agents, source, nature, mode of action, detection, decontamination.

EITHER, chemistry of heredity, function of nucleic acid in heredity and enzyme synthesis, replication of DNA, heredity defects, radiation damage; OR metals in biological processes, a study of the biochemistry of metals.

(r) *Photographic Chemistry*

Prerequisites: Organic Chemistry A.

Electrochemistry and Thermodynamics.

Photochemistry of silver halide crystals. Chemistry and kinetics of development. Superadditivity. Secondary chemical processes. Spectral and supersensitisation by organic dyes. Non-silver halide photosensitive systems.

(s) *Chemical Equilibria in Aqueous Systems*

Prerequisite: Electrochemistry and Thermodynamics.

The ionisation of polyfunctional acids and bases, the theory of buffer action. Dissolved CO<sub>2</sub> in aqueous systems, the precipitation and dissolution of naturally occurring oxides, hydroxides and carbonates. Metal ions and ligands, metal ion buffers, organic complexes in natural waters. The regulation of the chemical composition of natural waters.

(t) *Selected Special Topics*

Lectures based on the specialist interests of staff may be presented in a given year. It may be appropriate to combine such lectures with parts of certain other Third Year topics.

Examples of lectures based on staff interests are:

Organic geochemistry

Thermodynamics of irreversible processes

Chemistry of nuclear technology

Chemistry of food

Linear free energy relationships

RECOMMENDED TEXTS

*Topics (a), (b) and (c)*

Skoog, D. A., and West, D. M., *Principles of Instrumental Analysis*, Holt, Rinehart and Winston, 1971.

*Topic (b)*

Kemp, W., *Organic Spectroscopy*, Macmillan, 1975.

Silverstein, R. M., and Bassler, G. C., *Spectrometric Identification of Organic Compounds*, Wiley, 1967.

*Topic (c)*

Denaro, A. R., *Elementary Electrochemistry*, Butterworths, 1967.

*Topic (d)*

Cotton, F. A., and Wilkinson, G., *Advanced Inorganic Chemistry*, 3rd ed., Interscience, 1972.

Kettle, S. F. A., *Coordination Compounds*, Nelson, 1969.

*Topic (e)*

Dunford, H. B., *Elements of Diatomic Molecular Spectra*, Addison-Wesley, 1968.

*Topic (g)*

McClelland, B. J., *Statistical Thermodynamics*, Chapman and Hall, 1973.

*Topic (l)*

Hendrickson, J. B., Cram, D. J., and Hammond, G. S., *Organic Chemistry*, 3rd ed., McGraw-Hill, 1970.

*Topic (m)*

Wiseman, P., *An Introduction to Industrial Organic Chemistry*, Applied Science Publishers Ltd, 1972.

*Topic (n)*

Margerison, D., and East, G. C., *Introduction to Polymer Chemistry*, Pergamon, 1967.

Billmeyer, F. W., *Textbook of Polymer Science*, 2nd ed., Wiley-Interscience, 1971.

*Topic (r)*

Kowaliski, P., *Applied Photographic Theory*, Wiley, 1972.

*Topic (s)*

Stumm, W., and Morgan, J. J., *Aquatic Chemistry*, Wiley, 1970.

### 3311 Chemistry IIIA

Topics amounting to four points will be selected from the lists appearing under 3310 Chemistry III and 2310 Chemistry II but may not include more than two points from the latter.

Topics chosen from 3310 Chemistry III are subject to the constraints given under 3310 Chemistry III. The following topics may be preferable because the laboratory component is reduced: Topics (e), (f), (g), (k), (m), (o), (q) and (s). Any of the remaining topics in 3310 Chemistry III and 2310 Chemistry II may be chosen, subject to the student being able to complete the laboratory component within the framework of the current Science time-table. In some special situations, a student choosing a lecture course with a laboratory component which conflicts with other commitments may, with the approval of the Head of

the Department, be allowed to complete a special project in lieu of the prescribed laboratory component.

Students who choose topics from 2310 Chemistry II will be examined at a higher level than students enrolled in 2310 Chemistry II. A particular topic will not be open to students who have completed the corresponding topic under 2310 or 2311.

A student's selection will be subject to the approval of the Head of the Department.

### **3312 Chemistry IIIB**

Topics amounting to two points will be selected from the lists appearing under 3310 Chemistry III and 2310 Chemistry II. The same suggestions, conditions and constraints given under 3311 Chemistry IIIA apply.

### **4301 Chemistry IV**

The course will consist of study in a specialised field of chemistry and will comprise such lectures, seminars, examinations, research projects, reports, as prescribed by the Head of the Department of Chemistry.

## Department of Physics

### 1203 Physics I

*Lectures* 84 hr

*Practical* 84 hr

*Tutorials* 28 hr

#### *General Physics and Mechanics*

Physical quantities, units, standards and measurements; dimensions and dimensional analysis; co-ordinate systems. Newton's laws of motion, kinematics and dynamics. Momentum, energy, work and power. Rotational dynamics, moment of inertia, angular momentum. Newton's law of gravitation, Kepler's laws. Simple harmonic motion and resonance.

#### *Electricity and Magnetism*

Coulomb's law, calculations of electric fields and potentials, Gauss' law, multipoles, conductors and electric currents. Ohm's law and origins of electrical resistance, electrical measurements, Kirchhoff's rules and circuit analysis. Capacitance. Magnetic induction, motion of charges in electromagnetic fields. Biot-Savart and Ampere's laws. D.C. instruments. Electromagnetic induction, Faraday's law, inductance. Analysis of RL, RC and RLC circuits.

#### *Properties of Matter and Heat*

Temperature, thermometry, heat capacity. First law of thermo-dynamics. Heat transfer processes. Kinetic theory of gases. States of matter, phase changes and latent heat. Solids, expansion, conduction and elastic moduli. Liquids, surface tension, hydrostatics, hydrodynamics, Bernoulli's theorem.

#### *Wave Motion and Optics*

Classification of waves, superposition, Doppler effect, resonance, Huygen's principle, electromagnetic waves, polarisation, reflection, refraction and diffraction. Resolving powers of instruments.

#### *Atomic and Nuclear Physics*

Particles and waves, the uncertainty principle, introduction to wave mechanics. The Rutherford nucleus and scattering. The Bohr atom. Optical and X-ray spectra. Nucleons, stable nuclei, radioactivity, fission and fusion.

#### RECOMMENDED TEXTS

Weidner and Sells, *Elementary Modern Physics*, 2nd ed., Allyn and Bacon, 1968.

Weidner and Sells, *Elementary Classical Physics*, vols I and II, Allyn and Bacon, 1965.

Williams, Brownstein and Gray, *Physics—Students Study Guide with Programmed Problems*, Parts I vols. II, Wiley, 1970.



## Department of Physics

### REFERENCE BOOKS

Alonso and Finn, *Fundamental University Physics*, Addison-Wesley, 1967.

Bueche, *Introduction to Physics for Scientists and Engineers*, McGraw-Hill, 1969.

Ford, *Classical and Modern Physics*, vol. 1 and vol. 2, Xerox, 1972.

Halliday and Resnick, *Physics for Students of Science and Engineering*, Wiley, 1967.

## 1273 Physics I

Lectures 84 hr

Practical 63 hr

Tutorials 28 hr

### SYLLABUS

The course is the same as 1203 Physics I with a reduction in laboratory work related to electrical experiments.

## Physics II

### OUTLINE OF TOPICS

The point value of each topic is as indicated.

#### (a) *Electronics and Circuit Theory* (1½ points)

Linear electric circuits, transient and steady state responses. Thevenin's theorem, superposition, resonance. Semiconductors, the pn junction, junction transistors and applications.

#### (b) *Thermodynamics and Statistical Mechanics* (1 point)

Thermodynamic variables, state of a system, equilibrium and reversibility. Laws of thermodynamics. Kelvin temperature scale. Entropy. Thermodynamic functions and Maxwell's relationships. Application of thermodynamics to different systems. Adiabatic demagnetisation. Statistical Mechanics: introduction, Maxwell-Boltzmann statistics, Fermi-Dirac and Bose-Einstein statistics, applications.

#### (c) *Atomic and Nuclear Physics* (1 point)

Quanta of radiation, photoelectric effect, Compton effect. Origin of spectra, quantum states, hydrogen atom. Excitation and absorption. X-ray spectra. Wave mechanics: de Broglie's postulate, Davisson and Germer experiment, Schrodinger's equation, solution of Schrodinger's equation, uncertainty principle. Nuclear structure, stable nuclei, radioactivity. Detectors. Nuclear reactions. Energy.

#### (d) *Relativity* (½ point)

Galilean relativity. Michelson-Morley experiment. Einstein's postulates. Lorentz transformations. Simultaneity. Length contraction, time dilation. Relativistic mass, relativistic mechanics, mass-energy equivalence.

(e) *Solid State Physics A* (1 point)

Lattice dynamics, homogeneous medium, monatomic and diatomic arrays, infra-red absorption; lattice energy of ionic solids. Thermal properties of solids, specific heat, Einstein, Debye models. Crystal physics, structure, Miller indices, reciprocal lattice. Laue, Bragg diffraction equation. Structure factors.

(f) *Solid State Physics B* ( $\frac{1}{2}$  point)

Structure determination: production and absorption of X-rays, mono- and poly-crystalline diffraction methods; electron microscopy and diffraction, elementary electron optics, specimen preparation, interpretation of single crystal diffraction patterns.

(g) *Magnetic Materials* ( $\frac{1}{2}$  point)

Diamagnetism, Paramagnetism, Ferromagnetism. Hysteresis and the magnetisation curve. Ferromagnetic domains and domain walls.

(h) *Electricity and Magnetism A* (2 points)

Electrostatic field, flux, and potential; Gauss' law and divergence, circulation and curl. Material media: conductors, capacitance, dielectrics, boundaries. Methods of solution: uniqueness, images, use of Laplace's equation. Dipoles and multipole expansion. Electric currents: continuity, boundaries, complete circuits and e.m.f.s. Magnetic force between currents, magnetic induction, flux and divergence, Ampere's law and curl. Scalar and vector potentials. Ampere's law modified. Induced e.m.f. Maxwell's equations. Electro-magnetic plane waves in unbounded media. Energy density and energy flow.

(i) *Electricity and Magnetism T* (1 point)

Electrostatic field, flux and potential; Gauss' law and divergence, circulation and curl. Material media: conductors, capacitance, dielectrics, boundaries. Electric currents and current density, complete circuits and e.m.f.s. Magnetic forces between currents, magnetic induction, flux and continuity of lines of flux. Ampere's law. Ampere's law modified. Induced e.m.f. Maxwell's equations. Electromagnetic plane waves in free space.

RECOMMENDED TEXTS

Brophy, *Basic Electronics for Scientists*, 2nd ed., McGraw-Hill, 1972.

Cusack, *The Electrical and Magnetic Properties of Solids*, Longmans, 1963.

Dekker, *Solid State Physics*, Macmillan, 1958.

Halliday, *Introductory Nuclear Physics*, 2nd ed., Wiley, 1955.

Morse, *Thermal Physics*, Benjamin, 1964.

Resnick, *Introduction to Special Relativity*, Wiley, 1968.

Scott, *The Physics of Electricity and Magnetism*, Wiley, 1966.

Semat and Albright, *Introduction to Atomic and Nuclear Physics*, 5th ed., Chapman and Hall, 1973.

REFERENCE BOOKS

Bleaney and Bleaney, *Electricity and Magnetism*, 2nd ed., Oxford U.P., 1965.

Constant, *Theoretical Physics*, Addison-Wesley, 1958.

Duffin, *Electricity and Magnetism*, McGraw-Hill, 1965.

Eisberg, *Fundamentals of Modern Physics*, Wiley, 1961.

Feynman, *Lectures on Physics*, vol. II, Addison-Wesley, 1964.

Kaplan, *Nuclear Physics*, Addison-Wesley, 1963.

Kittel, *Introduction to Solid State Physics*, 4th ed., Wiley, 1971.

Korneff, *Introduction to Electronics*, Academic Press, 1966.

Livesey, *Atomic and Nuclear Physics*, Blaisdell, 1966.

Malmstadt, Enke and Toren, *Electronics for Scientists*, Benjamin, 1963.

Schwarz, *Intermediate Electromagnetic Theory*, Wiley, 1964.

Sears, *Mechanics, Wave Motion and Heat*, Addison-Wesley, 1958.

Weidner and Sells, *Elementary Modern Physics*, 2nd ed., Allyn and Bacon 1968.

Zemansky, *Heat and Thermodynamics*, 5th ed., McGraw-Hill, 1968.

**2210 Physics II**

*Lectures* 4 hours per week

*Tutorials/ Practical* 4 hours per week

- (a) Electronics and circuit theory.
- (b) Thermodynamics and statistical mechanics.
- (c) Atomic and nuclear physics.
- (d) Relativity.
- (e) Solid State Physics A.
- (f) Solid State Physics B.
- (g) Magnetic Materials.
- (h) Electricity and Magnetism A.

**2211 Physics IIA**

*Lectures* 2 hours per week

*Tutorials/ Practical* 2 hours per week

- (a) Electronics and circuit theory.
- (b) Thermodynamics and statistical mechanics.

Plus a total of 1½ points from topics (c), (d), (e), (f), (g) and (i).

**2273 Physics II**

*Lectures* 98 hr

*Tutorials/ Practical* 112 hr

SYLLABUS

The course is the same as 2210 Physics II, with the omission of the material on circuit theory.

### **3203 Physics III**

*Lectures 5 hours per week  
Laboratory 12 hours per week*

#### **OUTLINE OF COURSE**

Topics amounting to twelve points will be selected from the following list. Topics (a), (b) and (c) are compulsory. Topic (a) counts for three points, topics (b) to (d) for two points each. Each of the remainder count for one point. A student's selection will be subject to the approval of the Head of the Department.

- (a) Electromagnetism and circuit theory (Prerequisite: Topic (h) of Physics II).
- (b) Quantum mechanics (Prerequisite: Topic (c) of Physics II).
- (c) Physics of the solid state (Prerequisite: Topics (e) and (f) of Physics II).
- (d) Astrophysics.
- (e) Statistical mechanics.
- (f) Electron emission and applications.
- (g) Electrical conduction in semi-conductors.
- (h) Linear active circuits and devices.
- (i) Digital circuits.
- (j) Magnetic materials.
- (k) Spectroscopy.
- (l) Nuclear physics (Prerequisite: Topic (c) of Physics II).
- (m) Particle physics (Prerequisite: Topic (c) of Physics II).
- (n) Plasma physics.
- (o) Ionospheric physics.
- (p) Low temperature physics.

### **3204 Physics IIIA**

Topics amounting to four points will be selected from the list appearing under Physics II and 3203 Physics III, but may not include more than one point from the former. A student's selection will be subject to the approval of the Head of the Department.

### **3205 Physics IIIB**

Topics amounting to two points will be selected from the list appearing under Physics II and 3203 Physics III but may not include more than one point from the former. A student's selection will be subject to the approval of the Head of the Department.

**1806 Science A**

Lectures 84 hr  
Demonstration/ Tutorials 56 hr

This subject is presented by the Departments of Chemistry and Physics.

**SYLLABUS**

- (a) A comparative study of the validity and usefulness today of theories developed by man prior to 1900, with particular reference to: the atomic theory and the structure of matter; Newtonian mechanics; electromagnetic radiation; the kinetic theory of matter. This study includes discussions of the scientific method, hypothesis and theory, and models.
- (b) An introduction to the theories of the 20th century, particularly: nuclear and particle physics; special relativity and relativistic mechanics; Planck's quantum concept, wave properties of material particles.
- (c) Basic vocabulary of chemistry: physical properties of substances; symbols, formulae and equations; molecular structure, Periodic Table. Chemical energy. Carbon compounds.
- (d) Chemical Industry: structure of chemical industry and its relation to society; fuels; products, including polymers, detergents and drugs; waste disposal.
- (e) Air and Water: properties of gases, liquids and solutions; composition of the atmosphere and hydrosphere; water purification and sewage treatment; biological and industrial pollution, measurement and control.
- (f) Agriculture and Food: agricultural chemicals, including fertilisers, insecticides and defoliants; the major components of food; nutrition; synthetic and emergency foods; toxic substances.
- (g) Military applications of science.

**RECOMMENDED TEXTS**

March, Robert H., *Physics for Poets*, McGraw-Hill, 1970.

Atkins, K. R., *Physics*, Wiley, 1965.

Giddings, J. C., *Chemistry, Man and Environmental Changes*, Canfield Press, 1973.

Giddings, J. C., and Monroe, M. B. (ed.), *Our Chemical Environment*, Canfield Press, 1972.

# Department of Civil Engineering

## 2725 Civil Engineering I

*Lectures* 66 hr  
*Tutorials* 40 hr  
*Practical* 10 hr  
*Fieldwork* 24 hr

### SYLLABUS

#### *Geotechnics*

Earth's crust, minerals, vulcanism, rocks, folding, faulting, sequence, mapping, Australian series, weathering. Soil sampling, classification, properties, compaction. Erosion; river, coastal and ocean processes. Subsoil and geophysical investigations. Engineering applications.

#### *Engineering Surveying*

Elementary theory of errors. Simple surveying instruments, chaining, chain surveying. Spirit levelling. Theodolites, theodolite traversing. Indirect methods of distance measurement. Tacheometry. Contour and detail surveys. Areas and volumes. Horizontal and vertical curves. Barometric heighting. Compass, compass traversing.

### TEXTBOOKS

Allan, A. D., Hollway, J. R., Maynes, J. H. B., *Practical Field Surveying and Field Computations*, Heinemann, 1968.

DSIR, *Soil Mechanics for Road Engineers*, HMSO, 1964.

Lambe, T. W., *Soil Testing for Engineers*, Wiley, 1969.

Robson, D. A., *The Science of Geology*, Blandford, 1968.

## 3733 Civil Engineering II

*Lectures* 170 hr  
*Tutorials/Practical* 138 hr  
*Design Office* 84 hr  
*Field Work* 50 hr

### SYLLABUS

#### *Soils Engineering*

Pressure, suction and movement of soil moisture; effective stress. Shear strength and testing of soils. Introduction to consolidation and settlement. Elastic theory of soil stress. Lateral earth pressure. Retaining walls. Stability of slopes. Bearing capacity theory. Foundation types, with emphasis on pile type and behaviour. Site investigation for foundations. Earth and rockfill dams: types, basis of selection. Selected computer applications in soil mechanics and foundation engineering.

#### *Civil Engineering Materials*

- (a) *Concrete*: Components, aggregate quality and selection, properties, mix design, handling, curing, placing, testing, light-weight aggregates,

air entrainment, durability, permeability, extensibility, shrinkage, cracking, field control and acceptance.

- (b) *Timber*: Properties and influence on design, factors affecting strength, the potential of timber, modern developments in the use of timber.
- (c) Properties and uses of structural steel, H.T. steel, special steels, structural aluminium, plastics. Brittle fracture and theories of failure.
- (d) Creep, dynamic loading and fatigue of various materials.

### *Hydraulics and Hydrology*

Channel flow, steady non-uniform flow, backwater curves, hydraulic jump, unsteady flow, flood routing. Flow measurement. Hydrologic cycle, water and energy balance, elements of meteorology, analysis of precipitation, infiltration, hydrograph analysis, flood estimation. Waves. Elements of coastal engineering.

### *Structures*

- (a) *Structural Analysis*: Influence lines. Moment area method. Stability, determinacy and analysis of trusses. Analysis of indeterminate structures. Energy methods for linearly elastic materials, virtual work, Castigliano's theorems, Maxwell's reciprocal theorem. Slope deflection method. Moment distribution. Introduction to force and displacement methods. Approximate methods, portal method, cantilever method, assumed shear distribution.
- (b) *Design*: Types of loads on structures, safety factors, codes of practice. Permissible stress design of steel, timber, reinforced concrete and prestressed concrete structures.
- (c) *Design Office*: A series of design projects related to the above topics.
- (d) *Laboratory*: Laboratory experiments related to the above topics.

### *Principles of Instrumentation*

Measuring systems and techniques, measurement of physical quantities, recording and transmission of data.

### *Surveying Project*

A complete surveying exercise starting with the establishment of horizontal and vertical control, continuing with the provision of detail information by tachemetry, and culminating in a detailed, contoured plan of a suitable area.

### TEXTBOOKS

Cement and Concrete Association of Australia, *Australian Reinforced Concrete Design Manual, Ultimate Strength, S.I. Units*, 1973.

Cement and Concrete Association of Australia, *Design, Control and Characteristics of Concrete*.

Darvall, P. Le P., and Brown, H. P., *Fundamentals of Reinforced Concrete Analysis and Design*, Macmillan, 1976.

Davis, H. E., Troxell, G. E., and Wiskocil, C. T., *Testing and Inspection of Engineering Materials*, 2nd ed., McGraw-Hill, 1955.

Gorenc, B. E., and Tinyou, R., *Steel Designer's Handbook, S.I.*, 2nd ed. (revised), U. of New South Wales P., 1973.

Lambe, T. W. and Whitman, B. V., *Soil Mechanics*, Wiley, 1972.

Linsley, R. K. and Franzini, J. B., *Water Resources Engineering*, McGraw-Hill, 1972.

Mills, A. P., Hayward, H. W., Rader, L. F., *Materials of Construction*, Wiley.

Pearson, Kloot and Boyd, *Timber Engineering Design Handbook*, 2nd ed., Jacaranda Press, 1962.

Rouse, H., *Engineering Hydraulics*, Wiley, 1961.

Smith, G. H., *Elements of Soil Mechanics for Civil and Mining Engineers*, 3rd ed. (metric), Crosley, Lockwood, Staples, 1973.

Taylor, W. H., *Concrete Technology and Practice*, 3rd ed., Angus and Robertson, 1969.

Terzaghi, K., and Peck, R. B., *Soil Mechanics in Engineering Practice*, 2nd ed., Wiley, 1969.

Timoshenko, S., *Strength of Materials*, Part II, 3rd ed., Van Nostrand, 1956.

Todd, J. D., *Structural Theory and Analysis*, Macmillan, 1974.

Webber, N. B., *Fluid Mechanics for Civil Engineers, S.I. Edition*, Chapman and Hall, 1971.

## 4725 Civil Engineering III

Lectures 152 hr  
Tutorials/ Practical 100 hr

### SYLLABUS

#### *Roads and Aerodromes*

Route analysis and road location in rural and urban environment including location of bridges. Road geometrics and design, its influence on behaviour of drivers. Landscape aspects of road design—examples of road design policies and their application. Design of roads, expressways, intersections and interchanges. Pavement requirements, thickness design, pavement materials, gravels, stabilisation, cement and bituminous concrete. Wearing courses. Use of computers in road design.

Application to aerodrome problems, characteristics of aeroplane loading on pavements. Hydrology of aerodrome and road drainage; culvert design. Drawing office design problems on roads and aerodromes.

#### *Engineering and Building Construction*

Construction plant and equipment—compressed air services, tunnelling and blasting; hoisting and conveying; earthmoving, pile driving, etc.; safety aspects.

Construction administration—planning and scheduling. Work study. Tenders and preparation of estimates, contracts and specifications.

Special problems in building construction.



## *Department of Civil Engineering*

### *Water and Public Health Engineering*

Soilwater and groundwater hydraulics and hydrology, yield and storage problems. Pipe networks, water hammer. Dimensional analysis, hydraulic model theory, scale effect. Hydraulic machinery, characteristic curves, cavitation.

Processes of decomposition and decay; chemical and biochemical measurement of degree of pollution; basic principles of the treatment of polluted waters. Water supply schemes; construction of sewers; pumping stations; sewage treatment and disposal; swimming pools; refuse disposal.

### *Structures*

Analysis of arches, rings, grids and plane cable structures. Introduction to the theory of elasticity. Limit analysis and limit design of steel structures. Experimental stress analysis. Energy methods for elastic materials. Introduction to finite element theory. Stability of bars in compression.

### *Seminar*

Each student will be required to lead a seminar on a topic related to civil engineering.

#### TEXTBOOKS

American Institute of Steel Construction, *Plastic Design in Steel*, AISC New York, 1969.

Antill, J. M., and Ryan, P. W. S., *Civil Engineering Construction*, 2nd ed., Angus and Robertson, 1965.

Antill, J. M., *Civil Engineering Management*, Angus and Robertson, 1970.

DSIR, *Soil Mechanics for Road Engineers*, HMSO, 1964.

Fair, G. M., Geyer, J. C., and Okun, D. A., *Elements of Water Supply and Wastewater Disposal*, 2nd ed., Wiley, 1971.

Ghali, A., and Neville, A. M., *Structural Analysis, A Unified Classical and Matrix Approach*, Intext Educational Publishers, 1972.

Imhoff, K., Muller, W. J., and Thistlethwayte, D. K. B., *Disposal of Sewage and other Water-borne Wastes*, 2nd ed., Butterworths, 1971.

Linsley, R. K., and Franzini, J. B., *Water Resources Engineering*, McGraw-Hill, 1972.

Webber, N. B., *Fluid Mechanics for Civil Engineers—S.I. Edition*, Chapman and Hall, 1971.

### **4703C Project and Thesis**

*Tutorials* 140 hr

The project will take the form of a minor piece of research or investigation, a major feasibility study or design, or a comprehensive literature review. Emphasis will be placed on application of earlier and current studies to a practical engineering problem. Where appropriate, the problem will be of a military planning nature, and may involve group effort in groundwork planning and field investigations.

**4707 Management Science**

*Lectures* 112 hr

*Tutorials* 28 hr

**SYLLABUS**

***Theory of Management***

The role of management in a technologically advanced society. Human behaviour in the work situation; communication; influence; decision making. Models of organisations from static structural notions to dynamic open systems. Engineering management, technical change and automation.

***Engineering Economics***

Basic concepts in management economics. Project evaluation techniques in private and public enterprise. Introduction to management accounting.

***Operations Research***

The computer science unit Operations Research II and the following topics of the computer science unit Operations Research III: Queueing Theory, Markov Chains and Network Analysis.

**TEXTBOOKS**

Antill, J. M., *Civil Engineering Management*, Angus and Robertson, 1970.

De Garmo, E. P., *Engineering Economy*, 5th ed., Macmillan, 1973.

Maynard, H. B., *Industrial Engineering Handbook*, 2nd ed., McGraw-Hill, 1963.

Ryan, P. W. S., *Engineering Administration*, 2nd ed., Angus and Robertson, 1969.

## Department of Electrical Engineering

Electrical Engineering is much the youngest of the three major, now traditional branches of engineering. It had its origin in the turning to practical use of the discoveries of Faraday, Ampere, Maxwell and a number of other eminent 19th century physicists. It has remained the most strongly science-oriented branch of engineering.

At first it had its major impact by providing the means for the generation, distribution and utilisation of electric power. However, while this remains an important sub-area of the whole subject, the last three decades particularly have seen a rapid and extensive diversification into the fields of computers and control and electronics and communications, and beyond them into such areas as biology and medicine. The methodology invented by electrical engineers to conceptualise their problems has been widely borrowed to become an important part of the philosophic underpinnings of other diverse fields which, on the surface at least, have seemingly little in common with electrical engineering.

It is now true to say that there are very few areas of civilised activity which have remained untouched by the ideas and products of modern electrical technology. The absorption of recent scientific development has been very rapid and has demanded a fully developed scientific outlook on the part of electrical engineers for a proper understanding of the problems involved. Many devices, scarcely more than laboratory prototypes a decade ago, are now in widespread use as fully engineered hardware.

The course in electrical engineering leading to the BE degree which is offered at the Royal Military College provides for study and, at the final year level, some degree of specialisation in each of the three major subdivisions of electrical engineering—power and energy conversion, electronics and communications, and computers and control. It is intended to be systems oriented and topics included are selected with the vocational nature of the College in mind but their development is not otherwise especially military oriented. The course is designed to provide a sound base in science and mathematics as well as a properly developed grasp of electrical engineering principles. The first year is common with the other branches of engineering and is devoted mainly to the development of the scientific and mathematical foundations. Students are encouraged to look outside their chosen specialisation by inclusion of a general studies requirement and the third year of the course includes a strong component in management science and operations research which is common with the other engineering streams.

A major course revision was undertaken during 1975. This has led to a regrouping of subject material, the introduction of new topics and a rearrangement of the courses. To facilitate the latter and to increase program flexibility the concept of 'sessional units' has been introduced. A sessional unit comprises

two contact hours per week for fourteen weeks, that is for half of the weeks programmed for academic work in a year. Thus a sessional unit consists of twenty-eight contact hours and will normally be confined to either the first or the second half of a year. The first half of a year is denoted 'session one' and the second half 'session two'. In some cases a unit may be presented during either session of a year, but in other cases one unit may be a prerequisite for another, so that the former unit would be presented in session one and the latter unit in session two. The new courses were presented for the first time in 1976.

## **Outline of Course and List of Sessional Units**

### **2746 Electrical Engineering I**

Students taking this subject will do all six sessional units listed below. To pass the course a pass in aggregate must be obtained.

<i>Unit No.</i>	<i>Unit Name</i>	<i>Session</i>
1	Electronic Devices . . . . .	1
2	Electrical Measurements . . . . .	1
3	Introductory Circuit Theory, Part 1 . . . . .	1
4	Introductory Circuit Theory, Part 2 . . . . .	2
5	Electronic Circuits . . . . .	2
6	Machines and Transformers . . . . .	2

### **3748 Electrical Engineering II**

Students taking this subject will do all twelve sessional units listed below. To pass the course a pass in aggregate must be obtained.

<i>Unit No.</i>	<i>Unit Name</i>	<i>Session</i>
1	Intermediate Circuit Theory . . . . .	1
2	Electrical Properties of Materials . . . . .	1
3	Introductory Digital Systems, Part 1 . . . . .	1
4	Introductory Digital Systems, Part 2 . . . . .	2
5	Classical Linear Systems . . . . .	2
6	Fundamentals of Analogue Computation . . . . .	2
7	Engineering Electromagnetics . . . . .	2
8	Electronic Device Theory . . . . .	2
9	Power and Machines . . . . .	Optional
10	Intermediate Electronic Circuits . . . . .	Optional
11	Signals and Information Theory . . . . .	Optional
12	Industrial Electronics . . . . .	Optional

### **4742 Electrical Engineering III**

Students taking this subject will normally select 16 sessional units from those listed below. As an alternative, courses to the equivalent of four sessional units may, with the approval of the appropriate Heads of Departments, be selected from offerings in other departments and the remainder to a total of 16 from the list below. To pass the course a pass in aggregate must be obtained.

Unit No.	Unit Name	Session*	Prereq. Unit
1	Masers and lasers	1	..
2	Statistical theory of communication	1	..
3	Opto-electronic devices	1	..
4	Feedback control theory	1	..
5	Advanced digital systems	1	..
6	Field theory of guided waves	1	..
7	Antennas and radiation	1	..
8	Advanced electronic materials	1	..
9	Optical communications	2	1, 2, 3
10	Principles of electronic surveillance	2	2
11	Space communications	2	2
12	Military electronics	2	2
13	Theory of optimal control	2	4
14	Computer control	2	4
15	Introduction to non-linear systems	2	4
16	Advanced computer architecture	2	5
17	Active microwave devices	2	6
18	Microwaves optics	2	7
19	Transistor and integrated circuit technology	Optional	..
20	Elements of radiowave propagation	Optional	..
21	Advanced circuit theory	Optional	..
22	Network synthesis	Optional	..
23	Advanced electrical machines	Optional	..
24	Power systems	Optional	..
25	General theory of electrical machines	Optional	..
26	Illumination engineering	Optional	..
27	Engineering magnetohydrodynamics	Optional	..
28	Electrical energy conversion	Optional	..
29	Power electronics	Optional	..
30	Fundamentals of simulation	Optional	..
31	State variable methods	Optional	..
32	Television systems	Optional	..
33	Principles of radar	Optional	..
34	Reliability analysis	Optional	..
35	Superconductivity	Optional	..
36	Communications electronics	Optional	..

\* A course listed as a first session course may be given in the second session if no student elects to take an option for which it is a prerequisite.

## 2746 Electrical Engineering I

*Electronic Devices*

*Lectures and Tutorials 16 hr*

*Laboratory 12 hr*

A first course in vacuum and solid state electronic devices.

Electron emission; electron ballistics; principles of operation of vacuum tubes and cathode-ray tubes.

Conduction in solids; semiconductors, electrons and holes, doping, energy bands. Physical principles of a p-n junction; characteristics of semiconductor diodes and transistors.

TEXTBOOK

Smith, R. J., *Electronics: Circuits and Devices*, Wiley, 1973.

*Electrical Measurements*

*Lectures and Tutorials* 19 hr  
*Laboratory* 9 hr

An introductory course in the theory and practice of electrical measurements. Measurement errors and their calculations. Electrical indicating instruments. Electronic instruments. Instrumentation transducers. Instrumentation systems.

TEXTBOOK

Smith, R. J., *Electronics: Circuits and Devices*, Wiley, 1973.

*Introductory Circuit Theory,*  
*Part 1*

*Lectures and Tutorials* 28 hr

A first course in circuit theory with emphasis on network topology. Network as a system; model concept; meanings of lumped, linear, passive, bilateral, time invariant. Network topology; graphs and trees; mappability; loop currents and tie sets; node pair voltages and cut sets; duality. Derivation of the equilibrium equations; Kirchhoff's laws; simplified procedures; sources. Solution of the equilibrium equations; Thevenin's and Norton's theorems; reciprocity, driving point and transfer impedances; network transformations; power relations.

TEXTBOOK

Guillemin, E. A., *Introductory Circuit Theory*, Wiley, 1953.

*Introductory Circuit Theory,*  
*Part 2*

*Lectures and Tutorials* 28 hr

A first course in circuit theory with time varying excitation. Resistance, capacitance and self inductance as circuit elements; equilibrium equations in integro-differential form; step, impulse and higher order singularity functions; classical solution of the equilibrium equations; impulse response and convolution; solution of equilibrium equations by integral transform methods; time harmonic, steady state, complex notation, phasors and impedance, RMS values, real and reactive power, resonance, mutual inductance, ideal transformer.

TEXTBOOKS

Guillemin, E. A., *Introductory Circuit Theory*, Wiley, 1953.

Close, C. M., *The Analysis of Linear Circuits*, Harcourt Brace and World Incorporated, 1966.

*Electronic Circuits*

*Lectures and Tutorials* 16 hr  
*Laboratory* 12 hr

An introduction to the theory and practice of simple electronic circuits.

Rectification, filtering and regulation. Introduction to audio frequency amplifiers, hybrid parameters, biasing, frequency response, negative feedback. Operational amplifiers.

TEXTBOOK

Smith, R. J., *Electronics: Circuits and Devices*, Wiley, 1973.

*Machines and Transformers*

*Lectures and Tutorials* 20 hr  
*Laboratory* 8hr

An introduction to DC and AC machines and related topics. Magnetic fields and circuits; electrical, mechanical and magnetic interaction; machines as energy conversion devices. DC machines; commutation; generators and motors; steady-state operation. Power systems; single and poly-phase alternating currents. Single-phase transformers; construction and steady-state operation. AC machines; rotating magnetic fields; types of generators and motors; elementary consideration of synchronous generators.

TEXTBOOK

Edwards, J. D., *Electrical Machines*, Intertext, 1973.

**3748 Electrical Engineering II**

*Intermediate Circuit Theory*

*Lectures and Tutorials* 28 hr

A further development of topics in circuit theory. Transient response of linear circuits. Branch parameter matrices; use of tie set and cut set matrices in establishing equilibrium equations on a loop or node basis. Energy functions. Image parameter filter theory; magnitude and frequency scaling. Distributed parameter theory of transmission lines; special cases of RF lines; Smith chart. Mechanical, other non-electrical circuits and mixed circuits.

TEXTBOOKS

Guillemin, E. A., *Introductory Circuit Theory*, Wiley, 1953.

Close, C. M., *The Analysis of Linear Circuits*, Harcourt Brace and World Inc., 1966.

Johnson, W. C., *Transmission Lines and Networks*, McGraw-Hill, 1950.

Chipman, C. A., *Theory and Problems of Transmission Lines*, Schaun, 1968.

Gardner, M. F., and Barnes, S. L., *Transients in Linear Systems*, Wiley, 1963.

*Electrical Properties of  
Materials*

*Lectures and Tutorials* 19 hr  
*Laboratory* 9 hr

Classification of solids. Bond types; the electron as a particle and as a wave; wave mechanics of electrons. Band theory of solids; density of states. Boltzmann and Fermi-Dirac distributions: Fermi level in solids; effective mass. Intrinsic and extrinsic semi-conductors. Hall effect. Introduction to lasers and superconductivity.

TEXTBOOK

To be advised.

*Introductory Digital Systems,  
Part 1*

*Lectures and Tutorials* 19 hr  
*Laboratory* 9 hr

The following topics of the Computer Science Unit Digital Systems II:

Introduction to the basic concepts in the design of digital systems with the emphasis on logical aspects: Boolean algebra; methods for the logical synthesis of switching networks, both combinational and sequential.

TEXTBOOK

Edwards, F. H., *The Principles of Switching Circuits*, M.I.T. Press, 1973.

*Introductory Digital Systems,  
Part 2*

*Lectures and Tutorials* 19 hr  
*Laboratory* 9 hr

The following topics of the Computer Science Unit Digital Systems II:

Utilisation of electronic devices as bivalued elements in digital systems. Introduction to computer organisation.

TEXTBOOKS

Digital Equipment Corporation, *Introduction to Programming*, 1972.

Digital Equipment Corporation, *Programming Languages*, 1972.

Hollingsworth, D., *Mini-computers: A Review of Current Technology, Systems and Applications*, Rand Report R-1279, July 1973.

*Classical Linear Systems*

*Lectures and Tutorials* 28 hr

A first course on system theory emphasising the viewpoints and techniques of the electrical engineer. Concept of a system. Open loop and closed loop systems; basic concepts of feedback. Time domain response of second order systems; proportional, derivative and integral control; over, under and critical damping; speed of response; root trajectories in the complex plane; frequency response. Transfer function analysis; derivation of typical transfer functions. Reduction of block diagrams. Nyquist diagrams and Bode plots. Routh and Nyquist criteria for stability. Signal flow graphs.

TEXTBOOK

Thaler, G. J., and Brown, R. G., *Analysis and Design of Feedback Control Systems*, McGraw-Hill, 1960.

*Fundamentals of Analogue  
Computation*

*Lectures and Tutorials* 16 hr  
*Laboratory* 12 hr

Analogue computer components and their organisation into a computer system. Programming, setting up and scaling of problems on an analogue computer.

TEXTBOOK

Blum, J. J., *Introduction to Analog Computation*, Harcourt, Brace and World, 1969.



REFERENCE BOOKS

Korn & Korn, *Electronic Analogue and Hybrid Computers*, McGraw-Hill, 1964.

Jackson, A. S., *Analog Computation*, McGraw-Hill, 1960.

*Engineering Electromagnetics*

*Lectures and Tutorials* 22 hr

*Laboratory* 6hr

A discussion of time varying electric and magnetic fields with some elementary applications. Induction; Maxwell-Faraday law, self and mutual inductance. Displacement current; Maxwell-Ampere law. Time harmonic Maxwell equations; potentials; Poynting vector. Dielectric hysteresis; boundary conditions. Relation between field and circuit theory. Plane waves in dielectric and conducting materials; phase and group velocity, refractive index, dielectric impedance. Skin effect, relaxation time, reflection at a plane boundary, standing waves. Field theory of TEM mode line, electromagnetic radiation.

TEXTBOOK

Kraus, J. D. and Carver, K. R., *Electromagnetics*, 2nd ed. McGraw-Hill, 1973.

*Electronic Device Theory*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Quantitative theory of p-n junction. Surfaces and metal semiconductor contacts. Principles of semiconductor devices, junction transistor, power transistor, thyristor, field effect transistor and various types of diodes.

TEXTBOOK

Millman, J. and Halkias, C. C., *Electronic Devices and Circuits*, McGraw-Hill, 1967.

*Power and Machines*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Basic machine windings. Further consideration of synchronous and asynchronous AC machines under steady-state conditions. Poly-phase transformers. Two-three phase transformation. Parallel operation of machines. Metadynes and other machines used in control systems. Introduction to transient operation of machines. Power system measurements and instrumentation.

TEXTBOOK

Hindmarsh, J., *Electrical Machines and their Applications*, Pergamon Press, 1970.

*Intermediate Electronic Circuits*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Small signal amplifiers, wide band, direct-coupled, tuned. Power amplifiers, classes A, B and C. Oscillators.

TEXTBOOK

Angelo, E. J., *Electronics; BJTs, FETs and Microcircuits*, McGraw-Hill, 1969.

**Signals and Information Theory**

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Characteristics of signals. Noise. Information content of signals. Modulation techniques. Demodulation.

TEXTBOOK

Brown, J., and Glazier, E. V. I., *Telecommunications*, Chapman and Hall, 1966.

**Industrial Electronics**

*Lectures and Tutorials* 20 hr

*Laboratory* 8 hr

Power diodes, transistors and controlled rectifiers: characteristics, ratings, cooling and protection. Rectifying circuits; regulated power supplies. Controlled rectifiers: firing circuits using discrete components, commutation in AC and DC circuits with resistive loads. Choppers and inverters. Transducers. Industrial and commercial systems for control of temperature, speed, liquid level or other parameters. No-break power supplies. Feedback. Harmonics: analysis, minimisation and passive filters.

TEXTBOOKS

Gutzwiller, F. W. (ed.), *SCR Manual*, 5th ed., General Electric, 1972.

Gregory, B. A., *An Introduction to Electrical Instrumentation*, Macmillan, 1973.

**4742 Electrical Engineering III**

**Masers and Lasers**

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Stimulated and spontaneous emissions, population inversion. Principles of operation and applications of cavity maser and travelling wave maser. Principles of operation and application of solid state, gas, semiconductor and liquid lasers.

TEXTBOOKS

Thorp, J. S., *Masers and Lasers*, Macmillan, 1967.

Smith, W. V., *Laser Applications*, Artech, 1970.

REFERENCE BOOKS

Siegman, A. E., *An Introduction to Lasers and Masers*, McGraw-Hill, 1971.

Siegman, A. E., *Microwave Solid-state Masers*, McGraw-Hill, 1964.

**Statistical Theory of  
Communication**

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Probabilistic formulation of the communications problem. Mathematical description of signals and noise. Interchange of bandwidth and signal to noise ratio. Introduction to channel capacity and communication over noisy channels.

## *Department of Electrical Engineering*

### TEXTBOOK

Taub, H. and Schilling, D. L., *Principles of Communication Systems*, McGraw-Hill, 1971

OR

Carlson, A. B., *Communications Systems*, 2nd ed., McGraw-Hill, 1975.

*Opto-electronic Devices*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

Photoconductive and photoelectric processes, electroluminescence. Visual display systems, image intensifiers, infra-red imaging devices, liquid crystal displays, solar cells.

### TEXTBOOK

Larach, S., *Photoelectronic Materials and Devices*, Van Nostrand, 1965.

### REFERENCE BOOK

Luxenberg, H. R., and Kuehn, R. L., *Display Systems Engineering*, McGraw-Hill, 1968.

*Feedback Control Theory*

*Lectures and Tutorials* 16 hr

*Laboratory* 12 hr

Introduction to the basic theoretical tools for the analysis and design of feedback control systems. Theory of dynamic systems, phase-space approach. Stability theory, Nyquist criterion.

### TEXTBOOK

Gupta, S., and Hasdorff, L., *Fundamentals of Automatic Control*, Wiley, 1970.

*Advanced Digital Systems*

*Lectures and Tutorials* 16 hr

*Laboratory* 12 hr

The following topics of the computer science unit Digital Systems III:

Implementation of computer logic. Hardware elements and algorithms. Control functions. Input-output facilities.

### TEXTBOOK

Clare, C. R., *Designing Logical Systems using State Machines*, McGraw-Hill, 1975.

*Field Theory of Guided Waves*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

A course on the theory of transmission lines, waveguides and associated devices. Microwave frequencies and uses. Review of Maxwell's equations, constitutive relations, boundary conditions, potential theory. Lorentz reciprocity theorem. Basic field theory of TEM lines, rectangular and circular waveguides. Circuit theory of wave guiding systems, wave normalisation, equivalent voltages and currents, impedance, wave matrices. Impedance transformation and matching. Theory of selected passive microwave devices. Microwave ferrites. Resonators. Periodic structures and filters.

TEXTBOOK

Collin, R. E., *Foundations for Microwave Engineering*, McGraw-Hill, 1966.

REFERENCE BOOKS

Soohoo, R. F., *Theory and Application of Ferrites*, Prentice-Hall, 1960.

Kerns, D. W., and Beatty, R. W., *Basic Theory of Waveguide Junctions and Introductory Microwave Network Analysis*, Pergamon Press, 1969.

Adam, S. F., *Microwave Theory and Applications: 21 Laboratory Experiments*, Prentice-Hall, 1969.

*Antennas and Radiation*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

Small antennas. Arrays. Wire antennas. Aperture antennas. Wide-band antennas. Receiving antennas. Antenna measurements.

TEXTBOOK

Weeks, W. L., *Antenna Engineering*, McGraw-Hill, 1968.

*Advanced Electronic Materials*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Principles and applications of dielectric, ferro-electric piezo-electric and thermoelectric effects in bulk and thin film materials. Electron transport phenomena in a magnetic field, Hall effect, magneto resistance, thermomagnetic effect.

TEXTBOOK

To be advised.

REFERENCE BOOKS

Chopra, K. L. *Thin Film Phenomena*, McGraw-Hill, 1969.

Beam, W. R., *Electronics of Solids*, McGraw-Hill, 1965.

*Optical Communications*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Light sources, methods of modulation, transmission and detection. Optical components. Fiber optics.

TEXTBOOK

Pratt, W. K., *Laser Communication Systems*, Wiley, 1969.

*Principles of Electronic Surveillance*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

Principles of acoustic, seismic, electromagnetic and other methods of surveillance. Integration of sensing devices into surveillance systems. Estimation of nature, size, direction and rate of movement of intruding force. Characteristic signature. System reliability, probability of false alarm. Physiological and other factors affecting system operator performance.

TEXTBOOK

To be advised.

## *Department of Electrical Engineering*

### *Space Communications*

*Lectures and Tutorials* 28 hr

A study of space communication systems, long distance transmission, wave propagation and system considerations.

TEXTBOOK

To be advised.

### *Military Electronics*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

Principles of electronic countermeasures and counter countermeasures. Jamming techniques, recovery of signals in a countermeasures environment. Adaptive systems. Application to radar and communications systems.

TEXTBOOK

To be advised.

### *Theory of Optimal Control*

*Lectures and Tutorials* 28 hr

The optimal control problem. The maximum principle of Pontryagin. Hamilton-Jacobi equation. Canonical equations. Minimum time, fuel and energy problems. Design of optimal and sub-optimal systems.

TEXTBOOK

Kirk, D. R., *Optimal Control Theory*, Prentice-Hall, 1971.

REFERENCE BOOK

Sage, A. F., *Optimum Systems Control*, Prentice-Hall, 1968.

### *Computer Control*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

The principles of plant modelling, parameter estimation and optimal control in the computer control of complex processes. The mathematical representation of physical processes. Analogue, digital and hybrid simulation of physical processes.

TEXTBOOK

Speedy, C. B., Brown, R. F., and Goodwin, G. C., *Control Theory*, Oliver and Boyd, 1970.

### *Introduction to Non-Linear Systems*

*Lectures and Tutorials* 28 hr

Study of non-linear systems and methods of analysis. Stability studies with Lyapunov functions and functional analysis. Applications from electric circuits and control systems.

TEXTBOOK

Kirk, D. R., *Optimal Control Theory*, Prentice-Hall, 1971.

*Advanced Computer Architecture*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

The following topics of the computer science unit Digital Systems III:

Advanced addressing principles, memory paging, segmentation and protection techniques. Microprogramming. Multiprocessors, high speed and pipeline systems. Computer system reliability.

TEXTBOOKS

Bell, C. G. and Newell, A., *Computer Structures: Readings and Examples*, McGraw-Hill, 1971.

Iliffe, J. K., *Basic Machine Principles*, MacDonald, 1969.

Beizer, B., *The Architecture and Engineering of Dital Computer Complexes*, 2 vols, Plenum Press, 1971.

*Active Microwave Devices*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

R W H mechanism, Gunn oscillator, microwave semiconductor devices. Microwave valves, travelling wave tube, klystron and magnetron.

TEXTBOOKS

Shurmer, H. V., *Microwave Semiconductor Devices*, Pitman, 1971.

Dix, C. H., and Aldous, W. H., *Microwave Valves*, Iliffe, 1966.

REFERENCE BOOK

Watson, H. A., *Microwave Semiconductor Devices and their Circuit Applications*, McGraw-Hill, 1969.

*Microwave Optics*

*Lectures and Tutorials* 22hr

*Laboratory* 6hr

Asymptotic methods. Asymptotic solution of Maxwell's equations. Geometrical optics. Geometrical theory of diffraction. Diffraction by an edge. Diffraction by a curved surface. Aperture radiation. Fields at axial caustics.

TEXTBOOK

No set text.

*Transistor and Integrated  
Circuit Technology*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

An introduction to planar technology of semiconductor devices and integrated circuit fabrication. Thin film microelectronics and thick film circuits.

TEXTBOOK

To be advised.

REFERENCE BOOK

Planer, G. V., and Phillips, L. S., *Thick Film Circuits*, Butterworths, 1972.

*Elements of Radiowave  
Propagation*

*Lectures and Tutorials 22 hr  
Laboratory 6 hr*

Ground wave propagation. Plane-earth reflection. Space wave and surface wave. Spherical earth propagation. Tropospheric wave. Ionospheric propagation. Reflection and refraction of waves by the ionosphere. Skywave transmission calculations. Effect on the earth's magnetic field. Wave propagation in the ionosphere.

TEXTBOOK

Jordan, C., and Balmain, G., *Electromagnetic Waves and Radiating Systems*, Prentice-Hall, 1968.

*Advanced Circuit Theory*

*Lectures and Tutorials 28 hr*

A course intended to more extensively develop material presented in earlier courses. Topics will be selected from: computer aided design; insertion loss design methods; active filter design; Fourier integral, convolution and their interrelation; Tellegen's theorem with application; tolerance theory in circuit design; treatment of non-linearities by small signal and piecewise continuous techniques; energy functions, equivalence of Kirchhoff and Lagrange equations, relation to impedance functions.

REFERENCE BOOKS

An appropriate selection from Callaghan, Donald A., *Computer Aided Network Design*, McGraw-Hill, 1972.

Penfield, P., Spence, R., and Duinker, S., *Tellegen's Theorem and Electrical Networks*, MIT Press, 1970.

Herrero, J. L. and Willoner, G., *Synthesis of Filters*, Prentice-Hall, 1966.

Others to be advised as required.

*Network Synthesis*

*Lectures and Tutorials 28 hr*

The synthesis problem, approximation and realisation. Properties of passive one ports; positive real functions. One port realisation techniques. Properties of two ports; impedance and admittance matrices. Transfer function realisation. RC ladder and terminated LC structures. Introduction to the approximation problem.

TEXTBOOK

Van Valkenburg, M. E., *Introduction to Modern Network Synthesis*, John Wiley and Sons, 1964

*Advanced Electrical Machines*

*Lectures and Tutorials 20 hr  
Laboratory 8 hr*

Introduction to generalised theory of electrical machines. Control of speed, frequency and voltage. Induction machines, synchronous machines, DC machines and transformers. AC commutator motors. Operation of machines under transient conditions. Protection. Faults. Locus diagrams. Limits of stability. Hunting.

TEXTBOOKS

Brosan, G. S., and Hayden, J. T., *Advanced Electrical Power and Machines*, Pitman, 1966.

Millermaster, R. A., *Harwood's Control of Electric Motors*, Wiley, 1970.

*Power Systems*

*Lectures and Tutorials* 22 hr

*Laboratory* 6 hr

The nature, extent and variety of power systems. Components of power systems and their characteristics. Generators, transmission lines, transformers and loads. Control of power systems. Frequency, voltage, power, VAR. Load flow analysis. Simple networks. Use of computers in large systems. Faults on systems. Symmetrical components. Balanced and unbalanced faults. Stability of power systems. Steady-state and transient stability. DC transmission.

TEXTBOOK

Stevenson, W. D., *Elements of Power System Analysis*, McGraw-Hill, 1962.

*General Theory of Electrical Machines*

*Lectures and Tutorials* 28 hr

Maxwell's equations and the Lorentz transformation. The idealised electrical machine. Two-axis theory. Kron's primitive machine. Voltage and torque equations. Equations of motion. General equations in matrix form. Linear transformations. Invariance of power. Formulation of generalised equations for transformers and rotating machines. Operation of machines under steady-state and transient conditions.

TEXTBOOK

Hancock, N. N., *Matrix Analysis of Electrical Machinery*, Pergamon Press, 1964.

*Illumination Engineering*

*Lectures and Tutorials* 20 hr

*Laboratory* 8 hr

The nature of light and the characteristics of the eye as related to lighting and seeing. Commercial methods for production of light including incandescence, luminescence, fluorescence and gaseous sources. Characteristics of light sources and associated circuitry. Illumination measurements. Prescribed standards of illumination. Psychological and other factors affecting design of lighting systems. Typical designs and calculations.

TEXTBOOK

Henderson, S. T., and Marsden, A. M., *Lamps and Lighting*, 2nd. ed., Arnold, 1972.

*Engineering Magneto-hydrodynamics*

*Lectures and Tutorials* 28 hr

The MHD approximation. Motion of charged particles. Statistical behaviour of plasmas. Conduction and diffusion. Electro-magnetic waves and radiation in



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plasmas. MHD equations. Alfven and shock waves. Channel flows. Boundary layers. MHD propulsion. MHD power generation.

### TEXTBOOK

Sutton, W., and Sherman, A., *Engineering Magnetohydrodynamics*, McGraw-Hill, 1965.

### *Electrical Energy Conversion*

*Lectures and Tutorials* 19 hr  
*Laboratory* 9 hr

Energy supplies, efficiency of conversion, entropy. Sources: nuclear, chemical, solar. Magnetohydrodynamic conversion. Electromechanical conversion. Fuel cells. Solar cells. Thermoelectric converters. Thermionic converters.

### TEXTBOOK

No set text.

### *Power Electronics*

*Lectures and Tutorials* 20 hr  
*Laboratory* 8 hr

Series and parallel connection of semiconductors used in power circuits. Further discussion of firing circuits for controlled rectifiers. Integrated-circuit devices. Effects of load power-factor. Control of frequency and voltage as applied to the control of electrical machines. Regulators, inverters, cyclo-converters. Closed loop systems. Thyristor assisted commutation. High-voltage DC power transmission. Magnetic amplifiers.

### TEXTBOOKS

Gutzwiller, F. W. (ed.), *SCR Manual*, 5th ed., General Electric, 1972.

Ramshaw, R. S. *Power Electronics*, Chapman and Hall, 1973.

### *Fundamentals of Simulation*

*Lectures and Tutorials* 16 hr  
*Laboratory* 12 hr

The basic methodology of simulation and its relationship to operations research. Analogue, digital and hybrid simulation. Design of simulation experiments. Solution and simulation of models to predict system response and behaviour.

### TEXTBOOKS

Tocher, K. D., *The Art of Simulation*, E.U.P., 1963.

Naylor, T. H., Balintfy, J. L., Burdick, D. S., and Chu, K., *Computer Simulation Techniques*, Wiley, 1966.

### *State Variable Methods*

*Lectures and Tutorials* 28 hr

Elements of linear transformation and matrix theory. State equations and vectors. Differential time-invariant and time-variable systems. Discrete systems. Observability and Lyapunov stability.

### TEXTBOOK

To be advised.

Television Systems

Lectures and Tutorials 19 hr

Laboratory 9 hr

Physiological aspects of television, television standards, colour systems with particular reference to the PAL system, transmitters and receivers. Facsimile.

TEXTBOOK

Reed, C. R. G., *Principles of Colour Television Systems*, Pitman, 1969.

REFERENCE BOOKS

Hutson, G. H., *Television Receiver Theory, Part 1*, Arnold, 1966.

Hutson, G. H., *Colour Television Theory*, McGraw-Hill, 1971.

Principles of Radar

Lectures and Tutorials 19 hr

Laboratory 9 hr

Antennas for radar. Target characteristics. C-W radar. Pulsed-Doppler radar. Types of radar. Reception and noise. Propagation. Radar system design. Radar testing.

TEXTBOOK

Wheeler, G. J., *Radar Fundamentals*, Prentice-Hall, 1967.

Reliability Analysis

Lectures and Tutorials 28 hr

Principles of reliability analysis. Review of basic mathematical and statistical tools. Catastrophic failures; exponential and Weibull distributions; component and system failure models. Marginal failures; tolerances and environmental drifts. Redundancy techniques. Repairable systems. Statistical design of tests; failure rates, reliability specifications.

TEXTBOOK

Beckman, P., *Probability in Communications Engineering*, Harcourt Brace and World, N.Y., 1967.

Superconductivity

Lectures and Tutorials 22 hr

Laboratory 6 hr

Theory of superconductivity, loss mechanisms, effect of a magnetic field, superconducting materials. Applications to electrical machines and electronic devices.

TEXTBOOK

To be advised.

REFERENCE BOOK

Williams, J. E. C., *Superconductivity and its Applications*, Pion, 1970.

Communications Electronics

Lectures and Tutorials 19 hr

Laboratory 9 hr

A selection from the following topics to accommodate the interests of the class: multistage amplifiers; noise in amplifiers; linear integrated circuits; amplifier compensation; active filters; large-signal tuned amplifiers; switching and pulse circuits; digital integrated circuits.

Alley C. L., and Atwood K. W., *Electronic Engineering*, 3rd ed., Wiley, N.Y., 1973.

### **3750 Electrical Technology**

*Circuit Theory and Machines*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Basic DC and AC circuit theory. Transformers and electrical machines with applications.

*Basic Electronics*

*Lectures and Tutorials* 19 hr

*Laboratory* 9 hr

Elementary electronic components, devices and circuits.

TEXTBOOKS (for both units)

Hughes, E., *Electrical Technology*, Longmans, 1969.

Durling, A. E., *An Introduction to Electrical Engineering*, Macmillan, 1969.

### **4703E Project, Thesis and Specialist Lectures**

140 hr

The project will take the form of a minor piece of research or investigation, a feasibility study or design, or a comprehensive literature review chosen from a list of topics selected or approved by the Head of Department. As far as possible these topics will be of a military nature. Group effort may be permitted in appropriate cases.

In each case a staff member will be nominated as a supervisor to provide guidance and general supervision during the preparation of the thesis. Evidence of sufficient progress may be required from time to time. The thesis, which will be of not less than 5000 words, will be presented in draft in the prescribed format not later than the last day of the teaching year. Arrangements will be made for theses of outstanding merit to be typed, bound and deposited in the departmental library.

During the year students taking this subject will be required to participate in a series of seminars. In the first half of the year these will take the form of a series of about twelve specialist lectures on selected topics which will be presented by invited lecturers who are well known in a particular field of study or who are practising engineers in some field of engineering. There will be no formal examination in this part of the subject but students will be assessed on the basis of their participation and on short written summary reports on the lectures.

# Department of Mechanical Engineering

## 1708 Engineering I

*Lectures* 66 hr  
*Drawing Office* 50 hr  
*Shop Work* 50 hr  
*Laboratory/Tutorials* 40 hr

### SYLLABUS

#### *Introduction to Technology*

The present day scope of engineering viewed against its historical background especially in Australia.

The production in Australia of iron, steel and the common non-ferrous metals. Definitions and measurements of properties of materials.

The principles of pattern-making, foundry work, metal machining, workshop measurement and gauging.

#### *Engineering Mechanics*

Statistics of particles and rigid bodies under two- and three-dimensional force systems. Applications to trusses, frames and machines. Dry friction, wrapping friction. Distributed forces: centre of gravity and centroid of geometric figures. Internal forces in structural members: shear and bending moment diagrams. Principle of virtual work, application to statics of machines. Moments of inertia and second moments of area.

Kinematics and kinetics of the plane motion of a particle and a rigid body. Equations of motion: work, energy, impulse, momentum.

#### *Drawing Office*

Drawing as a means of communicating information accurately; sketches from machine parts and models. An introduction to the design process, to case studies and to the principles of drawing office practice.

#### *Workshop Practice*

Instruction and practice in the use of hand and machine tools. The production of simple machine parts from drawings supplied.

#### TEXTBOOKS\*

Beer, F. P., and Johnson, E. R. J., *Mechanics for Engineers*, combined volume 2nd ed., McGraw-Hill, 1962.

Begeman, M. L., and Amstead, B. H., *Manufacturing Processes*, 5th ed., Wiley, 1963.

Mills, A. P., Hayward, H. W., and Rader, L. F., *Materials of Construction*, 6th ed., Wiley, 1955.

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\* Textbooks for all engineering subjects include appropriate codes of practice, design charts and tables, standards, and handbooks.

Hoelscher, R. P., Springer, C. H. and Dobrovoly, J. S., *Graphics for Engineers, Visualization, Communication and Design*, Wiley, 1968.

## **2718 Engineering II**

*Lectures 136 hr*  
*Laboratory/Tutorials 88hr*

### **SYLLABUS**

#### *Mechanics of Solids*

Analysis of forces in simple trusses, frames and machines. Shearing force and bending moment diagrams for straight beams. Cables, catenaries. Graphic statics.

Elastic stress and strain due to tension, compression, shear, and torsion; elastic constants.

Statically indeterminate problems; temperature stresses, lack of fit, biaxial stress; Mohr's circle, principal stresses, complementary stresses.

Statical determinacy and indeterminacy—internal and external.

Flexure and shear stress in beams. Torsion of solid and hollow circular shafts. Axially and eccentrically loaded 'short' and 'long' columns; Euler theory.

Deflection of statically determinate beams.

#### *Materials I*

Materials science. Structure of perfect and imperfect solids. Phase equilibria in one and multicomponent systems. Grain structure, effect of deformation, recrystallisation, hot and cold working. Non-equilibrium relationships in multiphase materials; applications to heat treatment. Behaviour of materials in service: deformation, fatigue, fracture, wear, thermal stress, creep, radiation damage. Effects of microstructure and macrostructure on properties. Materials in electric and magnetic fields. Introduction to ceramic phases and properties; refractories, cements, concretes. Organic phases; physical properties, applications, elastomers, insulators, adhesives. Structure of wood, seasoning and preservation of timber. Metal removal, surface finishing, joining.

#### *Fluid Mechanics*

Physical properties of fluids, fluid statics. Continuity, one-dimensional energy and momentum equations. Laminar and turbulent flow, Reynolds number, pipe flow. Introduction to hydraulic machines. Boundary layer theory. Lift and drag.

### **TEXTBOOKS**

Barrett, C. R., Nix, W. D., and Tetelman, A. S., *The Principles of Engineering Materials*, Prentice-Hall, 1973.

Begeman, M. L., and Amstead, B. H., *Manufacturing Processes*, 5th ed., Wiley, 1963.

Timoshenko, S., and Young, D. H., *Elements of Strength of Materials*, 4th ed., Van Nostrand, 1962.

Vennard, J. K., *Elementary Fluid Mechanics*, 4th ed., Wiley, 1968.

Hoelscher, R. P., Springer, C. H. and Dobrovolny, J. S., *Graphics for Engineers, Visualization, Communication and Design*, Wiley, 1968.

## **2768 Mechanical Engineering I**

Lectures 56 hr

Drawing Office/Laboratory 84 hr

### SYLLABUS

#### *Thermodynamics I*

Fundamental laws of thermodynamics.

Thermodynamic properties of fluids.

Reciprocating engines and compressors: cycle analysis, construction, performance.

#### *Design I*

The general principles of design. The influence of manufacturing processes on design. Thread forms and standards. Strength of bolts. Limits and fits. Stress concentrations. Sliding bearings, ball and roller bearings. Keys, couplings, clutches and brakes. Flat and vee belt drives. Wire ropes and conveying equipment. Thin cylinders. Tension, compression and torsion springs. Welded and bolted connections. Design of structural elements.

#### *Drawing Office Practice*

Design of simple elements for machines and structures.

### TEXTBOOKS

Mayhew, Y. R., and Rogers, G. F. C., *Thermodynamics and Transport Properties of Fluids, SI Units*, 2nd ed., Blackwell, 1972.

Rogers, G. F. C., and Mayhew, Y. R., *Engineering Thermodynamics, Work and Heat Transfer in SI Units*, 2nd ed., Longmans, 1967.

Spotts, M. F., *Design of Machine Elements*, 3rd ed., Prentice-Hall, 1961.

## **3761 Applied Thermodynamics**

Lectures 28hr

Tutorials/Practical 28hr

### SYLLABUS

Fundamental laws of thermodynamics. Thermal properties of gases and vapours. Air compressors. Reciprocating internal combustion engines. Other types of heat engines. Refrigeration. Air-conditioning of buildings.

### TEXTBOOKS

Rogers, G. F. C., and Mayhew, Y. R., *Engineering Thermodynamics, Work and Heat Transfer in SI Units*, 2nd ed. Longmans, 1967.

## **3774 Mechanical Engineering II**

*Lectures 273 hr*  
*Tutorials 97hr*  
*Laboratory 92 hr*

### **SYLLABUS**

#### ***Thermodynamics II***

Vapour power cycles. Gas power cycles. Heat pump and refrigeration cycles. Combustion processes. Properties of mixtures. Air conditioning.

#### ***Fluid Dynamics I***

Dimensional analysis. Similitude and modelling. Fields. Mass and momentum equations. Vorticity. Deformation, dilation. Existence conditions for stream and potential functions. One-dimensional gas dynamics.

#### ***Dynamics I***

Mechanisms. Instantaneous centres and vector velocity diagrams. Inertia torque. Balancing of rotating and reciprocating masses. Free and forced vibration of single degree of freedom, undamped and damped systems. Introduction to film and boundary lubrication.

#### ***Stress Analysis***

Equations of two-dimensional theory of elasticity. Experimental methods of stress and strain analysis.

#### ***Materials II***

Further study of materials science. Ferrous and non-ferrous materials. Ceramics. Plastics.

#### ***Control Theory I***

System components, transfer functions, open and closed loop systems, transients and frequency response. Second order system with modification of system parameters. Introduction to stability criterion.

#### ***Principles of Instrumentation***

Measuring systems and techniques, measurement of physical quantities, recording and transmission of data.

#### ***Design II***

Analysis and design of mechanical components. Design of rotating and reciprocating machinery. Gear design. Pressure vessels. Limits and fits. Geometric analysis.

### **TEXTBOOKS**

Clark, D. S., and Varney, W. R., *Physical Metallurgy for Engineers*, 2nd ed., Van Nostrand, 1969.

Cohen, H., Rogers, G. F. C., Saravanamuttoo, H. I. H., *Gas Turbine Theory SI Units*, 2nd ed., Longmans, 1972.

Dally, J. W., and Riley, W. F., *Experimental Stress Analysis*, McGraw-Hill, 1965.

Mayhew, Y. R., and Rogers, G. F. C., *Thermodynamics and Transport Properties of Fluids, SI Units*, 2nd ed., Blackwell, 1972.

Morrison, J. L. M., and Crossland, B., *An Introduction to the Mechanics of Machines in SI Units*, Longmans, 1970

Rogers, G. F. C., and Mayhew, Y. R., *Engineering Thermodynamics, Work and Heat Transfer in SI Units*, 2nd ed., Longmans, 1967.

Slaymaker, R. R., *Mechanical Design and Analysis*, Wiley, 1959.

Streeter, V. L., *Fluid Mechanics*, 4th ed., McGraw-Hill, 1966.

Timoshenko, S., and Goodier, J. N., *Theory of Elasticity*, 3rd ed., McGraw-Hill, 1969.

Webb, C. R., *Automatic Control, an Introduction*, McGraw-Hill, 1964.

### 4764 Mechanical Engineering III

Lectures 119 hr  
Laboratory/Tutorials 119 hr

#### SYLLABUS

Mechanical Engineering III will consist of Dynamics II, Thermodynamics III and Mechanics of Solids II, plus a selection of three topics from the elective list, as approved by the Head of the Department.

#### *Dynamics II*

Mechanical vibration: two, three and multi-degree of freedom systems; natural modes, forced vibrations. Whirling of shafts with many degrees of freedom.

#### TEXTBOOKS

Morrison, J. L. M., and Crossland, B., *An Introduction to the Mechanics of Machines in SI Units*, 2nd ed., Longmans, 1970.

#### *Thermodynamics III*

Conductive heat transfer under steady and unsteady conditions, convective and radiant heat transfer.

#### TEXTBOOKS

Mayhew, Y. R., and Rogers, G. F. C., *Thermodynamic and Transport Properties of Fluids*, 2nd ed., Blackwell, 1972.

Rogers, G. F. C., and Mayhew Y. R., *Engineering Thermodynamics, Work and Heat Transfer in SI Units*, 2nd ed., Longmans, 1967.

#### *Mechanics of Solids II*

Applied elasticity: plates, rotating discs, contact stresses.

Theory of plasticity. Slip line field theory, velocity fields, stress fields, upper and lower bounds.

#### TEXTBOOK

Ford, H., *Advanced Mechanics of Materials*, Longmans, 1969.



*Elective Topics*

*Mechanics of Solids III*

Elastic stability: buckling of thin rings, tubes, shells and plates, twist bend buckling.

Inelastic response: non-linear response of materials, analysis of structural elements, pressure vessels.

Applied plasticity: analysis of forming and machining processes.

TEXTBOOKS

Den Hartog, J. P., *Advanced Strength of Materials*, McGraw-Hill, 1952.

Johnson, W., and Mellor, P. B., *Engineering Plasticity*, Van Nostrand, 1973.

Wang, C. T., *Applied Elasticity*, McGraw-Hill, 1953.

*Fluid Dynamics II*

Cartesian tensors. Compressible flows. Navier-Stokes and energy equations. Turbulent motion, Reynolds stresses. Boundary layer theory. Forced convection in laminar and turbulent flows. Free convection. Diffusion. Mass transfer. Radial flow and axial flow turbomachinery. Design considerations. Cavitation. Matching of component characteristics.

TEXTBOOKS

Longwell, P. A., *Mechanics of Fluid Flow*, McGraw-Hill, 1966.

Shepherd, D. G., *Principles of Turbomachinery*, Macmillan, 1957.

Whitaker, S., *Introduction to Fluid Mechanics*, Prentice-Hall, 1968.

*Thermodynamics IV*

Selected topics in classical and statistical thermodynamics theory. Selected applications.

TEXTBOOKS

Cohen, H., Rogers, G. F. C., Saravanamuttoo, H. I. H., *Gas Turbine Theory SI Units*, 2nd ed., Longmans, 1972.

Van Wylen, G. J., and Sonntag, R. E., *Fundamentals of Statistical Thermodynamics*, Wiley, 1966.

Wood, B. D., *Applications of Thermodynamics*, Addison-Wesley, 1969.

*Control Theory II*

Response functions. The general criterion for stability. Routh's criterion. Electronic analogue computer and its use in system simulation. Nyquist criterion and Nyquist diagrams. Bode diagrams and frequency response analysis. Root locus methods. Types of controller action and their effects on system response. Optimum settings, ultimate period method and maximum gain method. Analysis of types of pneumatic controllers and other control system components. Application of automatic control of typical mechanical systems.

TEXTBOOKS

Thaler, C. J., and Brown, R. G., *Feedback Control System*, 2nd ed., McGraw-Hill, 1960.

Webb, C. R., *Automatic Control, an Introduction*, McGraw-Hill, 1964.

*Design III*

Interchangeable manufacture; standardisation; unit and selective assembly; preferred sizes. Presentation and interpretation of geometric tolerances; grouping analysis of non-linear loop equations, economic allocation of tolerances; application of probability theory to tolerance allocation. Gauge design—effect of gauge tolerances on interchangeability.

TEXTBOOKS

Gladman, C. A., *Manual for Geometric Analysis of Engineering Designs*, Aust. Trade Pub., 1966.

*Dynamics III*

Advanced kinematics, velocity and acceleration analysis of complex mechanisms. Inflection circle. Euler-Savary equations.

Dynamic motion analysis, energy distribution, rate of change of energy methods.

Disc cams, analysis, synthesis, follower offset, spring determination.

Advanced dynamics, velocities and accelerations in three-dimensional co-ordinate systems. Moving frames of reference. Lagrange's equations. Euler's equations of motion.

TEXTBOOKS

Green, W. G., *Theory of Machines*, 2nd ed., Blackie, 1964.

Hirschhorn, J., *Kinematics and Dynamics of Plane Mechanisms*, McGraw-Hill, 1962.

**4703M Project and Thesis**

*Tutorials* 140 hr

The project will take the form of a minor piece of research or investigation, a major feasibility study or design, or a comprehensive literature review. Emphasis will be placed on application of earlier and current studies to a practical engineering problem. Where appropriate, the problem will be of a military planning nature, and may involve group effort in groundwork planning and field investigations.

## Postgraduate Study

Opportunities exist in the Faculty for postgraduate study and research leading to the University's degrees of Master of Arts (through research), Master of Science, Master of Engineering and Doctor of Philosophy.

The conditions for the award of these degrees are specified in the current *Calendar* of the University of New South Wales. The conditions for the award of the degree of Master of Engineering Science in the Faculty of Military Studies, being peculiar to the Faculty, are specified below.

Inquiries should be directed in the first instance to the heads of the appropriate departments.

Postgraduate registration is not restricted to military students.

### **Conditions for the award of the degree of Master of Engineering Science in the Faculty of Military Studies**

1. The Degree of Master of Engineering Science in the Faculty of Military Studies may be awarded by the Council on the recommendation of the Professorial Board to a candidate who has satisfactorily completed a program of advanced study comprising formal course work including as prescribed the submission of a report on a project or design approved by the Higher Degree Committee of the Faculty of Military Studies hereinafter referred to as the Committee.

#### *2. Qualifications for Registration as a Candidate for the Degree:*

- (i) An applicant for registration for the degree shall be a graduate from an appropriate four-year full-time undergraduate course in this University or other approved university or tertiary institution at a level approved by the Committee.
- (ii) The Committee may consider applications from graduates of three-year full-time courses in this University or other approved university or tertiary institution who also submit evidence of attainment in appropriate postgraduate activities extending over a period of not less than one full-time year or its equivalent.
- (iii) In special circumstances an application may be accepted from a person who submits evidence of such academic and professional attainments as may be approved by the Committee.
- (iv) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

#### *3. Registration:*

- (i) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least

three (3) calendar months before commencement of the course. The Committee shall determine the date of registration. In special circumstances and on the recommendation of a Head of Department registration may be permitted up to one calendar month prior to commencement of the course.

- (ii) An applicant for registration shall indicate the proposed project or design area in order that responsibility for the supervision of the program may be determined.
- (iii) A candidate for the degree shall be required to undertake such course of formal study, pass such examinations and submit a report on a project or design as prescribed by the Committee. Except in exceptional circumstances a candidate shall be required to pass at the first attempt all examinations prescribed by the Committee.
- (iv) No candidate shall be considered for the award of the degree until the lapse of two sessions in the case of a full-time candidate or four sessions in the case of a part-time candidate from the date of registration. In exceptional circumstances the Committee may approve remission of up to two sessions for a part-time candidate.
- (v) The progress of a candidate shall be reviewed at least once annually by the Committee on the recommendation of the Head of Department in which the candidate is registered and as a result of such review the Committee may terminate candidature.

#### *4. Program of Advanced Study:*

The program of advanced study including the preparation of a report on a project or design to be completed by each candidate shall total at least 36 credits, the number of credits allocated for each subject being determined by the Committee on the recommendation of a Head of Department.

#### *5. Project or Design:*

- (i) Where specified, a report on a project or design approved by the Committee may be submitted at, or before, the completion of the formal section of the course, but unless exceptional circumstances prevail shall be submitted not later than one year after completion of such course.
- (ii) The format of the report shall accord with the instructions of the Department and shall comply with the requirements of the Committee for the submission of project reports.
- (iii) The report shall be examined by two examiners appointed by the Committee.
- (iv) After examining the report on the project or design an examiner may:
  - (a) advise that the report reaches a satisfactory standard; or
  - (b) recommend that the candidate be required to resubmit the report in revised form after further work; or
  - (c) advise that the report has not reached a satisfactory standard.
- (v) A candidate may be required to attend for an oral or written examination.

*6. Recommendation for Admission to Degree:*

The Committee, after considering the examiners' report, where appropriate, and the candidate's other work in the prescribed course of study, shall recommend to the Professorial Board whether or not the candidate be admitted to the degree.

*7. Fees*

An approved candidate shall pay such fees as may be determined from time to time by the Council.

*(Note: The MEngSc course prescription has been approved and it will be included in the next edition of this Handbook.)*

## Miscellaneous Information

### Academic Dress

Hoods for the Degrees awarded in the Faculty of Military Studies:

*Bachelor of Arts in Military Studies:* Hood of old gold silk edged to a depth of two inches with white fur and to a further depth of two inches with midnight blue silk. (BCC 90 Midnight Blue)

*Bachelor of Arts:* Hood of old gold silk edged with white fur.

*Bachelor of Science in Military Studies:* Hood of old gold silk edged to a depth of two inches with amber silk and to a further depth of two inches with midnight blue silk. (BCC 5 Maize, BCC 90 Midnight Blue)

*Bachelor of Science:* Hood of old gold silk edged with amber silk. (BCC 5 Maize)

*Bachelor of Engineering:* Hood of old gold silk edged with light maroon silk. (BCC 36 Light Maroon)

### Transitional Provisions

In anticipation of the arrangements necessary at the time that a new institution will replace the Royal Military College, the University has agreed that:

1. Every student who has enrolled in the Faculty of Military Studies before 1 January of the year in which the Royal Military College becomes a separate autonomous institution and who has completed at least half of the requirements for a degree by that date should be permitted to elect to take his degree from the University of New South Wales, provided that he completes all the requirements for the degree within two calendar years from the date.

2. A joint liaison committee composed of members of the University and members of the new institution should be established to consider special cases of students in the transition period.

If, in the event, a date other than 1 January is chosen for the establishment of the new institution, the spirit of the first provision would be preserved and the transition period defined so as to be nearer to two years than one. For the purpose of the first provision, a postgraduate student who submits his thesis by the terminal date would be deemed to have completed all the requirements for his degree.

### Prizes

The following major prizes are awarded annually:

**The Sword of Honour:** Awarded to the graduate showing exemplary conduct and performance of duty.

**The Queen's Medal:** Awarded to the graduate who has achieved the most distinguished performance in military and academic studies.

## *Miscellaneous Information*

**Blamey Scholarships:** Awarded to—

The winner of the Sword of Honour.

The top graduate in the Arts course.

The top graduate in the Applied Science course.

The top graduate in the Engineering courses.

**Peter Stuckey Mitchell Travelling Awards:** Awarded to the two graduates achieving the highest standards in leadership, military studies, academic studies, physical fitness and personal characteristics.

## Appendix

### Commandants of the Royal Military College

- Brigadier-General W. T. BRIDGES, CMG, 1911–14
- Major-General J. W. PARNELL, CMG, 1914–20
- Major-General J. G. LEGGE, CB, CMG, 1920–22
- Colonel Commandant F. B. HERITAGE, CBE, MVO, 1922–29
- Brigadier E. F. HARRISON, 1929–31
- Major-General J. H. BRUCHE, CB, CMG, 1931
- Brigadier F. B. HERITAGE, CBE, MVO, 1931–32
- Colonel J. D. LAVARACK, CMG, DSO, 1933–35
- Brigadier C. G. N. MILES, CMG, DSO, 1935–39
- Brigadier E. C. P. PLANT, DSO, OBE, 1939–40
- Brigadier E. F. HARRISON, 1940–42
- \*Brigadier B. COMBES, CBE, 1942–45
- Brigadier E. L. VOWLES, MC, 1945–48
- Major-General H. WELLS, CBE, DSO, 1949–51
- Major-General R. N. L. HOPKINS, CBE, 1951–54
- Major-General I. R. CAMPBELL, CBE, DSO, 1954–57
- Major-General J. G. N. WILTON, CBE, DSO, 1957–60
- Major-General R. W. KNIGHTS, CBE, 1960–62
- Major-General C. H. FINLAY, CB, CBE, 1962–68
- Major-General C. A. E. FRASER, CBE, 1968–70
- Major-General C. M. I. PEARSON, AC, DSO, OBE, MC, 1970–73
- Major-General R. A. HAY, CB, MBE, 1973–
- \*First graduate of RMC to be appointed.

### Professors of the Royal Military College, 1911–67

- R. J. A. BARNARD, *Mathematics*, 1911–22
- R. HOSKING, *Physics*, 1911–22
- V. J. MILES, *English*, 1911–18
- J. F. M. HAYDON, *Modern Languages*, 1912–31
- L. H. ALLEN, *English*, 1918–31
- A. D. GILCHRIST, *Mathematics*, 1923–38
- C. E. MacKENZIE, *Chemistry and Physics*, 1923–48
- L. N. MORRISON, *English*, 1931–40
- T. A. SUTHERLAND, OBE, *Mathematics*, 1938–60, *Director of Academic Studies*, 1961–66
- E. R. BRYAN, OBE, *English and Modern Languages*, 1940–67, *Acting Dean*, 1967
- D. E. SWAN, OBE, *Physics and Chemistry*, 1948–62, *Physics*, 1962–67
- H. S. HODGES, *Economics and History*, 1948–67
- A. H. CORBETT, *Engineering*, 1950–67
- A. McMULLEN, *Mathematics*, 1961–67
- B. DEMPSEY, *Chemistry*, 1962–67



**Deans of the Faculty of Military Studies**

Professor Sir Leslie MARTIN, CBE, FAA, FRS, 1967–70

Professor B. D. BEDDIE, 1971–72

Professor J. C. BURNS, 1973–

**Directors of Military Art of the Royal Military College**

Lieutenant-Colonel C. W. GWYNN, CMG, DSO, 1911–14

Lieutenant-Colonel A. H. BRIDGES, 1915

Lieutenant-Colonel E. F. HARRISON, 1915–17

Brigadier-General H. J. FOSTER (RL), 1917–18

Lieutenant-Colonel E. H. REYNOLDS, OBE, 1918–20

Lieutenant-Colonel J. D. LAVARACK, CMG, DSO, 1920–24

Lieutenant-Colonel C. G. N. MILES, CMG, DSO, 1924–25

Lieutenant-Colonel F. H. FAREBROTHER, 1925–27

Lieutenant-Colonel A. L. RANSOME, DSO, MC, 1927–28

Lieutenant-Colonel G. C. STUBBS, DSO, 1928–30

Lieutenant-Colonel D. H. PRATT, DSO, MC, 1930–33

Lieutenant-Colonel R. M. SCOBIE, MC, 1933–34

\*Lieutenant-Colonel H. C. H. ROBERTSON, DSO, 1934–39

Lieutenant-Colonel E. L. VOWLES, MC, 1939

Lieutenant-Colonel R. G. LEGGE, DSO, MC, 1939–40

Lieutenant-Colonel K. A. MacKENZIE, DSO, 1940

Lieutenant-Colonel L. RICHARDSON, 1940–42

Lieutenant-Colonel D. D. PITT, 1942–43

Lieutenant-Colonel R. R. MacNICOL, 1943–44

Lieutenant-Colonel J. C. W. O'CONNOR, 1944–45

Lieutenant-Colonel J. W. FLETCHER, 1945–49

Lieutenant-Colonel T. J. DALY, DSO, OBE, 1949–51

Lieutenant-Colonel S. J. BLEECHMORE, 1951–53

Colonel F. G. HASSETT, DSO, MVO, OBE, 1953–58

Colonel H. G. BATES, OBE, 1958–60

Colonel P. L. TANCRED, 1960–64

Colonel G. D. SOLOMON, OBE, 1964–65

Colonel J. W. NORRIE, 1965–68

Colonel M. T. TRIPP, OBE, 1968–70

Colonel J. M. MAXWELL, OBE, 1970–74

Colonel K. J. TAYLOR, 1974–76

Colonel A. CLUNIES-ROSS, MBE, 1976–

\*First graduate of RMC to be appointed.

# Information for Students

## Enrolment in the University

On their entry to the Royal Military College cadets must enrol formally as undergraduate students in the Faculty of Military Studies of the University of New South Wales. Acceptance as a member of the University implies an undertaking on the part of each student to observe the regulations, by-laws and other requirements of the University in accordance with the declaration he signs at the time of enrolment. Such regulations etc. are published in the current *Calendar* of the University of New South Wales.

First year students are required to attend an enrolment session before the academic year begins, at a place and time to be advised. Before his enrolment can be completed, each new first year student must produce his Higher School Certificate (or equivalent) for sighting by the Registrar of the College.

Before entering the second and later years students will be required to complete and return re-enrolment forms to the Registrar of the College on a specified date.

## Change of Course

New first year students will have entered the College on the understanding that they would take up the places allotted to them in particular courses of study. In exceptional circumstances a student may be permitted to enrol in a different course, provided there is a vacancy and provided he is appropriately qualified.

It may be possible for a student to transfer from one course to another at the end of his first year provided that he is appropriately qualified. A student permitted to transfer will either re-enrol as a first year student in the new course or enrol as a second year student but with a restricted choice of program. For a student in good standing, transfer to the second year of the applied science course from the engineering course may be arranged subject to the concurrence of the heads of all the science departments; transfer to the second year of the electrical engineering course from the applied science course may be arranged subject to the concurrence of the Head of the Department of Electrical Engineering.

A student seeking to change his course should consult the Student Counsellor in the first instance. Changes of course are not permitted after 31 March.

## Change of Program

Once his enrolment has been completed, a student wishing to change the subjects in his program must apply to the Registrar of the College before 31 March. Changes (other than withdrawals from subjects) are not permitted after that date.

## **Withdrawal**

A student wishing to discontinue part or all of the program for which he has enrolled must apply to the Registrar of the College. Approval for withdrawal from subjects is not given automatically. It is emphasised that:

1. if any student other than a first year student withdraws from a subject after the first day of second term; or
2. if a first year student withdraws from a subject after 1 August; or
3. if a student does not sit for the examinations in a subject in which he has enrolled,

he will be regarded as having failed to satisfy the examiners in the subject, unless he has been given written approval by the University to withdraw without penalty. Without such approval late withdrawal could result in infringement of the University's re-enrolment rules.

A student's program of study must be compatible with the published timetable of classes. The onus is on the student to inform the Registrar of the College if there is any incompatibility.

## **Attendance at Classes**

Students are expected to be regular and punctual in attendance at all classes in the courses and subjects in which they are enrolled.

A student who has attended less than 80 per cent of the possible classes in a subject in which he has enrolled may be refused permission to sit for the examination in that subject.

In certain circumstances, a student who is repeating a subject may be exempted from attending some of the classes in that subject.

If a student, through illness or other reason, is prevented from attending classes or otherwise meeting the requirements of his course, the onus is upon him to notify the appropriate Heads of Departments. He should apply to be excused by the Registrar for non-attendance at classes for a period of not more than one month or, on the recommendation of the Dean, for a longer period.

## **Examinations**

The annual examinations in the Faculty of Military Studies are held in October-November. Examinations may also be conducted by departments at other times during the academic year.

A provisional timetable for the annual examinations is published early in the third term. Each student is advised to study the provisional timetable, and he must notify the Registrar of the College if any two of his examinations clash. The final timetable will be published three weeks before the examination period begins. Misreading of the timetable is not an acceptable excuse for failure to attend an examination.

In the assessment of a student's progress, consideration is given to work in laboratory and class exercises and to any term or other tests given during the year, as well as to his performance in written examinations.

## Electronic Calculators

The University has agreed that, subject to authorisation by Faculty, battery-operated electronic calculators may be used in examinations. Where appropriate such calculators may also be prescribed for subjects.

## Examination Results

The annual examination results are published by the Registrar of the College at the beginning of December, and are posted on notice boards in the College. Results are not available to students before the day of publication.

Each student's results for the year in all his subjects are published. Passes in subjects are graded as *High Distinction*, *Distinction*, *Credit* or *Pass*, which indicate relative merit. When a student's mark in a subject is slightly below the required standard but his overall performance warrants a concession he may be granted either a *Pass Conceded* or a *Terminating Pass* in the subject. A terminating pass will not permit him to progress further in the subject or to enrol in another subject for which a pass in the first is a prerequisite.

## Deferred Examinations

Deferred examinations are not granted to students in the Faculty of Military Studies. However, a Head of Department may make special arrangements to examine a student who, through illness or other exceptional circumstances, either has been prevented from taking the annual examinations or has been placed at serious disadvantage in preparing for or undertaking them. Special arrangements when made must be completed by the end of the College year.

## Restrictions upon Re-enrolling

The University's rules governing re-enrolment require a student with a record of failure to show cause why he should be permitted to re-enrol.

- (a) A student must 'show cause' before being allowed to repeat a subject in which he has failed more than once. If such subject is prescribed as part of his course, he must 'show cause' before being allowed to continue the course.
- (b) A student who is enrolled as a first year student in the Faculty of Military Studies and who fails in more than half the number of subjects in his program for the year must 'show cause' before being allowed to re-enrol.
- (c) Without 'showing cause', a student will not be allowed to continue his course unless he has completed all the subjects of the first year of his course by the end of his second year of attendance. This provision requires a student in the BA(Mil) course to complete four subjects by the end of his second year of attendance.
- (d) A student in the Faculty of Military Studies may be allowed a maximum period of five years in which to complete the academic and the

military requirements of his course, except that a BE candidate who entered his course in 1975 or subsequent years shall be required to complete all the requirements for that degree in not more than six years.

After the results of the annual examinations have been published, any student who is required to 'show cause' before being allowed to re-enrol in a subject or course will be notified in writing by the Registrar of the College, and will be invited to apply to the University by a certain date for permission to re-enrol.

The University will advise each student of the result of his application. Should his initial application to re-enrol not be granted, a student may appeal to an Appeal Committee constituted by the Council of the University.

### **Student Records**

The academic records of students in the Faculty of Military Studies are maintained by the Registrar of the College. A student may obtain a transcript of his examination results on application.

### **Advice**

Students needing advice on any matter are invited to contact the Student Counsellor, in Room 106 Anzac Block. Tel. 304.

### **The Bridges Memorial Library**

The Bridges Memorial Library is open during the following hours in term times:

Monday to Friday 8.00 am to 5.20 pm

Monday to Thursday 7.00 pm to 10.00 pm

Sunday 2.00 pm to 5.00 pm and 7.00 pm to 10.00 pm.

During the vacation period the hours of opening are 8.00 am to 5.20 pm

Monday to Friday.

