

FACULTY OF APPLIED SCIENCE

1967 HANDBOOK



THE UNIVERSITY OF NEW SOUTH WALES

FACULTY OF APPLIED SCIENCE
1967 HANDBOOK
FIFTY CENTS



THE UNIVERSITY OF NEW SOUTH WALES
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FOREWORD

The importance of the Applied Sciences in this University's development has always been recognised, and is especially referred to in our Act of Incorporation.

Undergraduate courses in the fields of Applied Geology, Chemical Engineering, Chemical Technology, Metallurgy, Mining Engineering, Textile Technology and Wool Technology are well established, and a new course in Geography will be offered for the first time in 1967. Many of the Faculty's research contributions have achieved international recognition.

It is hoped that students who enter the Faculty will share the enthusiasm and the dedication of those who have taken part in its development. It is of the greatest importance that students should acquire, from the very beginning, the right approach to their studies, and that they should achieve a proper balance between their work and their extra-curricular activities.

In addition to this Handbook, pamphlets and brochures issued in conjunction with the enrolment period and Orientation Week are available. These should be consulted, together with the University Calendar, for further information on problems associated with courses.

It is hoped that this Handbook will be of value to present and prospective students in the Faculty and to employers.

M. CHAIKIN,

Dean,

Faculty of Applied Science.

CALENDAR OF DATES FOR 1967

Term 1	March 6 to May 20
Term 2	June 5 to August 12
Term 3	September 4 to November 4

JANUARY—

Monday 23	Last day for acceptance of applications to enrol by new students and students repeating first year.
Monday 30	Australia Day—Public Holiday.
Tuesday 31	Deferred examinations begin.

FEBRUARY—

Saturday 11	Deferred examinations end.
Monday 20	Enrolment week begins for new students and students repeating first year.
Monday 27	Enrolment week begins for students re-enrolling.

MARCH—

Monday 6	First term begins.
Friday 17	Last day for enrolment of new students.
Friday 24 to Monday 27	Easter
Friday 31	Last day for enrolment of later year students.

APRIL—

Friday 7	Conferring of degrees — Wollongong University College.
Tuesday 25	Anzac Day—Public Holiday.

MAY—

Wednesday 17	Conferring of degrees—Faculty of Applied Science.
Saturday 20	First term ends.

JUNE—

Monday 5	Second term begins.
Monday 12	Queen's Birthday—Public Holiday.
Friday 30	Last day for acceptance of applications for re-admission after exclusion under rules governing re-enrolment.

JULY—

- Tuesday 4 Foundation Day.
Friday 14 Last day for acceptance of applications for
examinations.

AUGUST—

- Saturday 12 Second term ends.

SEPTEMBER—

- Monday 4 Third term begins.
Saturday 23 Annual examinations begin—24-week courses.

OCTOBER—

- Monday 2 Six-Hour Day—Public Holiday.
Saturday 7 Annual examinations end—24-week courses.
Sunday 8 Survey camps begin.
Saturday 14 One week survey camp ends.
Monday 17 Industrial training begins for students attending
survey camp.
Saturday 21 Two-week survey camp ends.

NOVEMBER—

- Saturday 4 Third term ends.
Saturday 11 Annual examinations begin—30-week courses.

DECEMBER—

- Saturday 2 Annual examinations end.

1968

- Term 1 March 4 to May 18
Term 2 June 3 to August 10
Term 3 September 2 to November 2

JANUARY—

- Tuesday 30 to
Saturday, Feb. 10 .. Deferred examinations.

FEBRUARY—

- Monday 19 Enrolment week begins for first year students.
Monday 26 Enrolment week begins for students re-enrolling.

MARCH—

- Monday 4 First term begins.

FACULTY OF APPLIED SCIENCE

DEAN—Professor M. Chaikin

CHAIRMAN—Professor F. W. Ayscough

SCHOOL OF APPLIED GEOLOGY*

PROFESSOR OF GEOLOGY AND HEAD OF SCHOOL

J. J. Frankel, MSc *Rhodes*, DSc *Cape T.*, FRSSAfr, FGS, MSAInstMM
MSocSigmaXi, AMIMM

ASSOCIATE PROFESSOR

L. J. Lawrence, DSc DipCom *Syd.*, PhD *N.S.W.*, DIC, AMAusIMM

SENIOR LECTURERS

A. N. Carter, BSc PhD *Melb.*, MSc *Adel.*

H. G. Golding, BSc *Lond.*, MSc *N.S.W.*, ARCS, AMAusIMM

L. V. Hawkins, MSc *Syd.*, FGS

L. E. Koch, DrPhilHabil *Cologne*, MSwissMin&PetSoc

F. C. Loughnan, BSc *Syd.*, PhD *N.S.W.*, AMAusIMM

C. T. McElroy, MSc PhD *Syd.*

N. L. Markham, BSc *Adel.*, AM PhD *Harv.*

LECTURERS

A. D. M. Bell, BSc *Lond.*, FGS, MAusIMM

J. C. Cameron, BSc MA *Edin.*, DIC, AMAusIMM

TUTOR DEMONSTRATORS

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Maren Krysko von Tryst, BSc GradDip *N.S.W.*

Carole M. Williams, BSc *Syd.*

SENIOR DEMONSTRATORS

D. C. Craig, BSc *Syd.*, MSc *N.S.W.*

J. C. Standard, BA *Colorado*, PhD *Syd.*

TEACHING FELLOW

J. Ringis, BE *N.S.W.*

PROFESSIONAL OFFICER

G. T. See, BSc *N.S.W.*, ASTC

SCHOOL OF CHEMICAL ENGINEERING

PROFESSOR OF CHEMICAL ENGINEERING AND HEAD OF SCHOOL

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MInstF, MIEAust, AIM

*Includes Department of Oceanography.

PROFESSOR OF CHEMICAL ENGINEERING

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ADMINISTRATIVE ASSISTANT

G. Dusan, BEc *Syd.*

Department of Chemical Engineering

ASSOCIATE PROFESSOR

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N. Standish, MSc *N.S.W.*, PhD *Otago*, ASTC, ANZIC, AMAusIMM

TUTOR

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TEACHING FELLOW

S. Marich, BSc *N.S.W.*

BROKEN HILL DIVISION

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LECTURER

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SCHOOL OF MINING ENGINEERING

SENIOR LECTURER

D. R. Cooley, BE *N.S.W.*, AMAusIMM, AMIEAust

SCHOOL OF PHYSICS

SENIOR TUTOR

G. S. Shell, BSc *N.S.W.*

GENERAL INFORMATION

ADMISSIONS OFFICE

The Admissions Office provides intending students (both local and overseas) with information regarding courses, admission requirements, and enrolment.

Applications for special admission or admission with advanced standing to courses should be made at the Admissions Office. Local residents should apply prior to 31st December of the year preceding that in which admission is sought. Where applicable, documentary evidence should be tendered with the application and copies should accompany original documents, as this will allow the immediate return of the latter. Students applying from overseas for admission to undergraduate courses and to those post-graduate courses which require completion of formal lecture courses should lodge their applications prior to 1st October of the year preceding that in which admission is sought.

Applications for admission to undergraduate courses from students who do not satisfy the requirements for admission (see section on "requirements for admission") from students seeking admission with advanced standing, and from students who have had a record of failure at another university, are referred by the Admissions Office to the Admissions Committee of the Professorial Board.

Students seeking to register as higher degree candidates should discuss their proposals initially with the Head of the School in which they wish to register. An application is then lodged on a standard form and the Admissions Office, after obtaining a recommendation from the Head of the School, refers the application to the appropriate Faculty or Board of Studies Higher Degree Committee.

The Admissions Office also receives applications from students who wish to transfer from one course to another, or seek any concession in relation to a course in which they are enrolled. These applications should, wherever possible, be lodged before

the commencement of the academic year in which the concession is to apply.

Students wishing to resume their studies after an absence of twelve months or more are required to apply to the Admissions Office for permission to re-enrol. It should be noted that, unless permission has been given to defer their studies for a specified period which will not normally exceed twelve months, students will be required to re-enter the course under the regulations prevailing at the time of resumption. This condition will apply also to students who have been re-admitted to a course after exclusion under the rules restricting students re-enrolling.

The Admissions Office operates an Enrolment Bureau for undergraduate students enrolling in the University for the first time. Details of the procedure to be followed by such students will be published in the preamble to the New South Wales Leaving Certificate results or may be obtained on application to the Admissions Office.

The Admissions Office is located on the upper campus in the Chancellery, telephone 663-0351. Office hours are from 9 a.m. to 1 p.m., and 1.45 p.m. to 5 p.m., Monday to Friday. An evening service is provided during the enrolment period.

REQUIREMENTS FOR ADMISSION

Introductory Information

Candidates may qualify for entry to undergraduate courses by complying with the matriculation requirements set out hereunder at the New South Wales Leaving Certificate Examination, or the University of Sydney Matriculation Examination.

It should be noted that with the introduction of the Higher School Certificate Examination in November, 1967, the matriculation requirements have been amended. The amended requirements, which will be applicable from 1st January, 1968, have been included in the handbook.

The New South Wales Leaving Certificate Examination is usually held in November and entries must be lodged with the Department of Education during August.

The Matriculation Examination is held in February, and applications must be lodged at the University of Sydney during the first ten days of January except by candidates who have taken

the Leaving Certificate Examination in the previous November. The closing date for such candidates will be announced when the Leaving Certificate results are published.

Matriculation Requirements in terms of the Leaving Certificate and the University of Sydney Matriculation Examination (To operate from 1st January, 1961)*

1. (i) A candidate for any first degree of the University must satisfy the conditions for admission set out hereunder before entering upon the prescribed course for a degree. Compliance with these conditions does not in itself entitle a student to enter upon a course.

(ii) A candidate who has satisfactorily met the conditions for admission and has been accepted by the University shall be classed as a "matriculated student" of the University after enrolment.

(iii) A person who has satisfactorily met the conditions for admission may be provided with a statement to that effect on the payment of the prescribed matriculation fee.

2. (i) For the purpose of matriculation approved subjects† are grouped as follows:

A. English.

B. Latin, Greek, French, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geography, Ancient History, Modern History, Economics.

C. Mathematics I, Mathematics II, Mathematics III.

D. Agriculture, Applied Mathematics, General Mathematics, Biology, Botany, Chemistry, Physics, Geology, Physics and Chemistry, Physiology, Zoology.

E. Accountancy, Art, Descriptive Geometry and Drawing, Music, Theory and Practice of Music.

(ii) In order to satisfy the conditions for admission to undergraduate courses leading to a degree, candidates must pass the New South Wales Leaving Certificate Examination conducted by

* With the introduction of the Higher School Certificate Examination in November, 1967, the matriculation requirements have been amended. The amended requirements for admission in 1968 are included in the handbook.

† It should be noted that certain subjects taken for the Leaving Certificate are not approved subjects for admission to the University of New South Wales.

the Department of Education, or the University of Sydney Matriculation Examination, in at least five approved subjects at the one examination; provided that:

- I. either (a) the five subjects include English and at least one subject from each of Groups B and C, but do not include more than one subject from Group E, except that candidates may qualify for admission to the Faculty of Arts only, by passing in one subject from Group D in lieu of the subject from Group C.
- or (b) the five subjects include English, and at least one subject from either Group B or Group C, but do not include more than one subject from Group E, and provided further that the five passes include either one first class Honours and two A's or two Honours of which one is first class.

and further provided that:

- II. (a) neither Physics nor Chemistry is offered with the combined subjects Physics and Chemistry;
- (b) neither Botany nor Zoology is offered with Biology;
- (c) neither Botany nor Zoology nor Biology is offered with Physiology;
- (d) neither Mathematics I, Mathematics II nor Mathematics III is offered with General Mathematics;
- (e) neither Mathematics I nor Mathematics II is offered with Mathematics III;
- (f) Mathematics I or Mathematics II may be counted as an approved subject only if the candidate presented himself for examination in both Mathematics I and Mathematics II;
- (g) Theory and Practice of Music is accepted only in cases where the pass was obtained at an examination in 1946 or subsequent years;
- (h) Ancient History is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years; and further both Modern History and Ancient History may be offered as qualifying subjects at the examinations held at the end of 1951 and subsequent years;

- (i) Agriculture is accepted only in cases where the pass was obtained at an examination held in 1945 or subsequent years;
- (j) Economics is accepted only in cases where the pass was obtained at an examination held in 1947 or subsequent years;
- (k) Descriptive Geometry and Drawing is accepted only in cases where the pass was obtained at an examination held in 1954 or subsequent years.

(iii) Candidates who have satisfactorily met the matriculation requirements of the University of Sydney, but who have not obtained the requisite pass in Mathematics where prescribed for entrance to the University of New South Wales, will be permitted to complete their qualifications to enter the University of New South Wales by passing only in a Mathematics subject from Group C, at a subsequent Leaving Certificate Examination or University of Sydney Matriculation Examination.

Revised Matriculation Requirements in terms of the Higher School Certificate Examination (To operate from 1st January, 1968)

1. (i) A candidate for any first degree of the University must satisfy the conditions for admission set out hereunder before entering upon the prescribed course for a degree. Compliance with these conditions does not in itself entitle a student to enter upon a course.

(ii) A candidate who has satisfactorily met the conditions for admission and has been accepted by the University shall be classed as a "matriculated student" of the University after enrolment.

(iii) A person who has satisfactorily met the conditions for admission may be provided with a statement to that effect on the payment of the prescribed matriculation fee.

2. Except as elsewhere provided a candidate before being admitted to matriculation shall have passed at the required standard the Higher School Certificate Examination in New South Wales in at least five subjects in accordance with the following conditions:

- (a) The subjects shall be chosen from the following subjects taken at the first, second or third level, in the Higher School Certificate Examination:

- A. English.
- B. (i) French, German, Greek, Latin.
(ii) Ancient History, Art, Economics, Geography, Modern History, Music, Bahasa Indonesia, Chinese, Dutch, Hebrew, Italian, Japanese, Russian, Spanish or such other language as may, in the case of any particular candidate, be approved by the Professorial Board.
- C. (i) Mathematics.
(ii) Agriculture, Science.
- D. Industrial Arts (1967 & 1968 Higher School Certificate Examinations only).
- (b) The subjects shall include:—
 - (i) English,
 - (ii) four subjects at the first or second level, and,
 - (iii) one subject chosen from each of the Groups B and C and of these two subjects at least one must be from Section (i) of either Group B or Group C at the first or second level.
- (c) The subjects shall NOT include both Art and Music.

3. Mathematics and Science both passed as full courses together shall, for the purpose of matriculation, be counted as three subjects, but otherwise each shall count as one subject.

4. The qualification for matriculation must be obtained at one examination.

5. In addition to the above requirements a candidate for admission to any particular faculty, course or subject shall satisfy the special requirements, if any, pertaining to that faculty, course or subject as set out in the following schedule. Where these additional requirements are not satisfied at the same examination as the requirements listed in paragraph 2 they may be met at a separate examination.

6. (a) Notwithstanding the provisions of Clauses 2, 3 and 5 of these requirements, any candidate who has taken the Higher School Certificate Examination in the subject of English and no fewer than any four other subjects named in Clause 2, at any level, may be admitted to matriculation provided he has reached a standard determined from time to time by the Professorial Board.

(b) Mathematics and Science both taken as full courses together shall, for the purpose of this clause, be counted as three subjects.

(c) A candidate qualifying for matriculation under this clause may also be admitted to a particular faculty, course or subject provided:—

- (i) he satisfies the special requirements pertaining to that faculty, course or subject as set out in the following schedule, or
- (ii) the Professorial Board deems that his programme of studies for, and his performance at, the Higher School Certificate Examination constitute an adequate preparation for his admission to the particular faculty, course or subject.

ADDITIONAL FACULTY, COURSE AND SUBJECT REQUIREMENTS

(a) Faculty Requirements

Applied Science, Medicine, Engineering, Science

Passes in **Mathematics** and **Science** at the *first* or *second* level full course.

Architecture

Passes in **Mathematics** at the *first* or *second* level full course and in **Science** at the *first* or *second* level full course or *second* level short course provided that the **Physics** option has been taken in the short course.

Commerce

Passes in **English** at the *first* or *second* level and **Mathematics** at the *first* or *second* level full course or *second* level short course.

Arts

Pass in **English** at the *first* or *second* level.

(b) Course Requirements

Industrial Arts (B.Sc.), Wool Technology (B.Sc) (Education option)

Passes in **Science** at the *first* or *second* level full course and in **Mathematics** at the *first* or *second* level full or short course provided that a student electing to include the subject **Mathematics I** in his University course shall have passed **Mathematics** at the *first* or *second* level full course.

(c) Subject Requirements*French I*

Pass in **French** at the *first* or *second* level.

German I

Pass in **German** at the *first* or *second* level or pass in **Introductory German**.

Introductory German, Introductory Spanish or Preliminary Italian.

Pass in any other **foreign language** at the *first* or *second* level.

Economics II or Economics III

Passes in **English** at the *first* or *second* level and **Mathematics** at the *first* or *second* level full course or *second* level short course.

Mathematics I

Pass in **Mathematics** at the *first* or *second* level full course.

Geology I

Pass in **Science** at the *first* or *second* level full course.

Chemistry I, Physics I or General Biology

Passes in **Mathematics and Science** at the *first* or *second* level full course.

ENROLMENT PROCEDURE FOR UNDERGRADUATE COURSES

The enrolment procedure for the different classes of undergraduate students is as follows:

First Enrolments. Application for enrolment in first year must wherever possible be made in person to the Student Enrolment Bureau, Kensington, as soon as the results of the Leaving Certificate Examination are published, but in any event not later than 23rd January.

Country residents who wish to enrol with the University should write to the Registrar, P.O. Box 1, Kensington, for a form on which to make their preliminary application. This form must be returned not later than 23rd January.

New students complete their enrolment at a specified appointment time in the second week before the start of First Term. Fees must be paid on the day of the appointment. However, in special circumstances and provided class places are still available students may be accepted for enrolment after the prescribed week subject to the payment of a late fee.

Applicants for enrolment with advanced standing or applicants relying on overseas examinations for matriculation should lodge an application with the Admissions Officer prior to 1st October of the year preceding that in which admission is sought.

First Year Repeats. First Year students who fail all subjects at the annual examinations and who are not granted any deferred examinations must apply for re-enrolment to the Student Enrolment Bureau at the time set out above for First Enrolments. Other first year repeat students follow the procedure set out below for Later Year Enrolments.

Later Year Enrolments. All students enrolling other than for the first time should enrol through the appropriate School and bring with them their notification of examination results for the previous year. This enrolment must be effected before or during the week before the commencement of First Term in accordance with the special arrangements made by the individual schools. However, Medical students in the third and later years of their course, enrol earlier since their academic year commences in advance of the normal commencement date.

Miscellaneous Subject Enrolments. Students may be permitted to enrol for miscellaneous subjects (i.e., as students not proceeding to a degree or diploma) provided the Head of the School offering the subject considers it will be of benefit to the student and there is accommodation available. Under no circumstances will subjects taken in this way count towards a degree or diploma.

Students who have completed the final examinations but have a thesis still outstanding are required to enrol for the period necessary to complete the thesis and to pay the requisite fees.

Course details must be completed during the prescribed Enrolment Week. For details of fee requirements, including late fee provisions, see under Fees.

Final Dates for Enrolment. No enrolments will be accepted from *new students* after the end of the second week of term (17th March, 1967) except with the express approval of the Registrar and the Head of the School concerned; no *later year enrolments* will be accepted after 31st March without the express approval of the Registrar which will be given in exceptional circumstances only.

University Union Card

All students other than miscellaneous students are issued with a University Union membership card. This card must be carried during attendance at the University and shown on request.

The number appearing on the front of the card in the space at the top right-hand corner is the student registration number used in the University's records. This number should be quoted in all correspondence.

The card must be presented when borrowing from the University libraries, when applying for travel concessions and when notifying a change of address. It must also be presented when paying fees on re-enrolment each year when it will be made valid for the year and returned. Failure to present the card could result in some inconvenience in completing re-enrolment.

A student who loses a Union card must notify the University Union as soon as possible.

New students will be issued with University Union cards by mail to their term address as soon as possible after fee payment. In the meantime, the fees receipt form should be carried during attendance at the University and shown on request. If the Union card is not received within three weeks of fee payment the University Union should be notified.

UNDERGRADUATE COURSE FEES

Where course fees are assessed on the basis of term hours of attendance the hours of each subject for purposes of fee assessment shall be those prescribed in the Calendar, irrespective of any variation from the prescribed hours which may be necessary in conducting the subject.

Fee determination for courses in the Faculty of Applied Science is on a term basis. **Fees quoted in this schedule are current at the time of publication and may be amended by the Council without notice.**

A full-time course fee will be charged for any term where more than 15 hours' per week instruction, etc., is involved.

- (i) Full-time Course Fee (more than 15 hours' attendance per week)—\$96 per term. In courses in which the Third Term is limited to three weeks of formal studies the fee for this term is \$48.

- (ii) Part-time Course Fee—over 6 hours' and up to 15 hours' attendance per week—\$48 per term.
- (iii) Part-time Course Fee—6 hours' or less attendance per week—\$24 per term.
- (iv) Course Continuation Fee—A fee of \$20 per annum (no term payment) is payable by:
 - (a) students who have once been enrolled for a thesis and have only that requirement outstanding, *or*
 - (b) students given special permission to take annual examinations without attendance at the University. (Students in this category are not required to pay the subscriptions to the University Union, the Students' Union, the Sports Association and the Library Fee.)

Miscellaneous Subjects

Undergraduate subjects taken as "miscellaneous subjects" (i.e., not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on an hourly basis in accordance with the schedule above.

Students given approval to enrol in a miscellaneous subject or subjects in addition to being enrolled in a course are assessed according to the total hours of attendance as if the additional subject formed part of the course.

OTHER FEES

In addition to the course fees set out above all registered undergraduates will be required to pay—

Matriculation Fee—\$6—payable at the beginning of first year.

Library Fee—annual fee—\$10.

Student Activities Fees

University Union*—\$12—annual subscription.

Sports Association*—\$2—annual subscription.

Students' Union*—\$4—annual subscription.

Miscellaneous—\$10—annual fee.

Total—\$28.

Graduation or Diploma Fee—\$6—payable at the completion of the course.

* Life members of these bodies are exempt from the appropriate fee or fees.

Depending on the course being taken, students may also be required to pay—

Biochemistry Kit Hiring Charge—\$4 per kit. Additional charge for breakages and losses in excess of \$1 may be required.

Chemistry Kit Hiring Charge—\$4 per kit. Additional charge for breakages and losses in excess of \$1 may be required.

Excursion Fee—\$2 per subject (biology, botany, zoology, entomology).†

Special Examination Fees

Deferred examination—\$4 for each subject.

Examinations conducted under special circumstances—\$6 for each subject.

Review of examination result—\$6 for each subject.

LATE FEES

First Enrolments

Fees paid on the late enrolment session and before the commencement of term	\$5
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Fees paid during the first and second weeks of term	\$10
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Fees paid after the commencement of the third week of term with the express approval of the Registrar and Head of the School concerned	\$20
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Re-Enrolments

First Term

Failure to attend enrolment centre during enrolment week	\$5
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Fees paid after the commencement of the third week of term to 31st March	\$10
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Fees paid after 31st March where accepted with the express approval of the Registrar	\$20
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† Students in the original Applied Biology degree course pay an excursion fee of \$1 per subject for botany, zoology and entomology.

Second and Third Terms

Fees paid in third and fourth weeks of term	\$10
Fees paid thereafter	\$20
Late lodgement of Application for Admission to Examinations (late applications will be accepted for three weeks only after the prescribed dates)	\$4

WITHDRAWAL FROM COURSE

Students withdrawing from a course are required to notify the Registrar in writing. Fees for the course accrue until a written notification is received.

PAYMENT OF FEES

Completion of Enrolment

All students are required to attend the appropriate enrolment centre during the prescribed enrolment period* for authorisation of course programme. Failure to do so will incur a late fee of \$5.

First year students (including students repeating first year) must complete enrolment (including fee payment) before they are issued with class timetables or permitted to attend classes. A first year student who has been offered a place in a course to which entry is restricted and fails to complete enrolment (including fee payment) at the appointed time may lose the place allocated.

Fees should be paid during the prescribed enrolment period but will be accepted without incurring a late fee during the first two weeks of First Term. (For late fees see below.) No student is regarded as having completed an enrolment until fees have been paid. Fees will not be accepted (i.e., enrolment cannot be completed) from new students after the end of the second week of term (i.e., 17th March, 1967), and after 31st March from students who are re-enrolling, except with the express approval of the Registrar, which will be given in exceptional circumstances only.

* The enrolment periods for Sydney students are prescribed annually in the leaflets "Enrolment Procedure for New Students" and "Enrolment Procedure for Students Re-enrolling".

Payment of Fees by Term

Students who are unable to pay their fees by the year may pay by the term, in which case they are required to pay First Term course fees and other fees for the year, within the first two weeks of First Term. Students paying under this arrangement will receive accounts from the University for Second and Third Term fees. These fees must be paid within the first two weeks of each term.

Assisted Students

Scholarship holders or Sponsored Students who have not received an enrolment voucher or appropriate letter of authority from their sponsor at the time when they are enrolling should complete their enrolment paying their own fees. A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

Extension of Time

Any student who is unable to pay fees by the due date may apply in writing to the Registrar for an extension of time. Such application must give year or stage, whether full-time or part-time, and the course in which the applicant wishes to enrol, state clearly and fully the reasons why payment cannot be made and the extension sought, and must be lodged before the date on which a late fee becomes payable. Normally the maximum extension of time for the payment of fees is until 31st March for fees due in First Term and for one month from the date on which a late fee becomes payable in Second and Third Terms.

Where an extension of time is granted to a first year student in First Term, such student is not permitted to attend classes until fees are paid, and if seeking to enrol in a restricted faculty may risk losing the place allocated.

Failure to Pay Fees

Any student who is indebted to the University and who fails to make a satisfactory settlement of his indebtedness upon receipt of due notice ceases to be entitled to membership and privileges of the University. Such a student is not permitted to register for a further term, to attend classes or examinations, or to be granted any official credentials.

No student is eligible to attend the annual examinations in any subject where any portion of his course fees for the year is outstanding after the end of the fourth week of Third Term (29th September, 1967).

In very special cases the Registrar may grant exemption from the disqualification referred to in the two preceding paragraphs upon receipt of a written statement setting out all relevant circumstances.

Cashier's Hours

The Cashier's office is open for the payment of fees from 9.30 a.m. to 1.00 p.m. and from 2.00 p.m. to 4.30 p.m. Monday to Friday. It is open for additional periods during the first three weeks of each term.

RULES RELATING TO STUDENTS

General Conduct

Acceptance as a member of the University implies an undertaking on the part of the student to observe the regulations, by-laws and other requirements of the University, in accordance with the declaration signed at the time of the enrolment.

In addition, students are expected to conduct themselves at all times in a seemly fashion. Smoking is not permitted during lectures, in examination rooms or in the University Library. Gambling is also forbidden.

Attendance at Classes

Students are expected to be regular and punctual in attendance at all classes in the course or subject in which they are enrolled. All applications for exemption from attendance at lectures or practical classes must be made in writing to the Registrar.

Where a student has failed a subject at the annual examinations in any year and re-enrols in the same course in the following year, he must include in his programme of studies for that year the subject in which he has failed. This requirement will not be applicable if the subject is not offered the following year; is not a compulsory component of a particular course; or if there is some other cause, which is acceptable to the Professorial Board, for not immediately repeating the failed subject.

Course Transfers

Students wishing to transfer from one course to another (including transfer from full-time to part-time study or vice versa) must make application to the Admissions Office as soon as possible and preferably before Enrolment Week. The Admissions Office will give each applicant an acknowledgement of his application to transfer.

Having made application to the Admissions Office students transferring are required to attend the School Enrolment Centre at the time set down for the year/stage of the new course in which they expect to enrol. They must present the letter granting approval of the transfer to the enrolling officer.

Students who have not received a letter granting approval to the transfer before the date on which they are required to enrol must present their acknowledgement to the enrolling officer who will decide whether to permit them to attend classes provisionally in the new course. Students who are permitted to attend classes provisionally should not pay fees until they have received their letter granting formal approval to transfer.

Changes in Course Programmes and Withdrawal from Subjects

Students seeking approval of a change in their course programme or seeking to withdraw from subjects must make application to the Head of the School responsible for the course on a form available from School offices. The Registrar will inform students of the decision. Approval of withdrawal from subjects is not automatic, each application being determined after considering the circumstances advanced as justifying withdrawal. It should be noted that a student is regarded as having failed in a subject if he enrolled in it in any year and did not pass the annual examination—not sitting for the examination is regarded as not passing the examination.

(Unless there are special circumstances, withdrawal from a subject after Term I will not be approved; students withdrawing after this date will therefore be held to have failed to satisfy the examiners.)

Resumption of Courses

Students wishing to resume their studies after an absence of 12 months or more are required to apply to the Admissions Office for permission to re-enrol. Students re-enrolling in this way will normally be required to satisfy conditions pertaining to the course at the time of re-enrolment. This condition applies also to students who have been re-admitted to a course after exclusion under the rules restricting students re-enrolling.

Annual Examinations

The annual examinations take place in November-December for students in 30-week courses, and in September for students in 24-week courses. Timetables showing time and place at which

individual examinations will be held are posted on the central notice boards. Misreading of the timetable is not an acceptable excuse for failure to attend an examination. Examination results are posted to the term addresses of students. No results will be given by telephone.

All students (including students enrolled for a thesis only) must lodge an application for admission to examinations by 14th July, 1967.

The Accountant is authorized to receive application forms during the three weeks immediately following the prescribed closing date if they are accompanied by a late fee of \$4. Applications forwarded more than three weeks after the closing date will not be accepted except in very exceptional circumstances and with the approval of the Registrar. Where an application is not accepted the student concerned is not eligible to sit for the examination.

Applications lodged prior to the due date will be acknowledged by postcard. Students who do not receive an acknowledgement within 10 days of lodging the application should contact the Examinations Branch or the office of the college attended.

As a result of the application of machine methods to the processing of examination results, all students in Sydney, Wollongong and Broken Hill receive a pro-forma application for admission to examinations listing the subjects for which the student has formally enrolled. The return of this pro-forma duly completed constitutes the application for admission to examinations. Pro-forma applications will be posted to students on 30th June. Any student who does not receive a pro-forma application must contact the Examinations Branch prior to the date prescribed for the return of applications.

Deferred Examinations

Deferred examinations may be granted in the following cases:

- (i) When a student through illness or some other acceptable circumstance has been prevented from taking the annual examination or has been placed at a serious disadvantage during the annual examinations.
- (ii) To help resolve a doubt as to whether a student has reached the required standard in a subject.

Applications for deferred examinations in the first category must be lodged with the Registrar with appropriate evidence of the circumstances (e.g., medical certificate) not later than seven days after the examination concerned.

A student eligible to sit for a deferred examination must lodge with the Accountant an application accompanied by the fee of \$4 per subject, by the date indicated on the notification of results.

Application For Admission to Degree or Diploma

Applications for admission to a degree or diploma of the University must be made on the appropriate form by 31st January. Applications for the award of a diploma of Associateship of Sydney Technical College (A.S.T.C.) awarded by the N.S.W. Department of Technical Education must be made on the appropriate form by 31st March. Applicants should ensure that they have completed all requirements for the degree or diploma, including industrial training where necessary.

Restriction Upon Students Re-enrolling

The University Council has adopted the following rules governing re-enrolment with the object of requiring students with a record of failure to show cause why they should be allowed to re-enrol and retain valuable class places. These rules will be applied retrospectively from January, 1962.

- (i) As from 1st January, 1962, a student shall show cause why he should be allowed to repeat a subject in which he has failed more than once. (Failure in a deferred examination as well as in the annual examination counts, for the purpose of this regulation, as one failure.) Where such subject is prescribed as a part of the student's course he shall be required to show cause why he should be allowed to continue the course. A student in the medical course shall show cause why he should be allowed to repeat the second year of the course if he has failed more than once to qualify for entry to the third year.
- (ii) Notwithstanding the provisions of clause (i), a student shall be required to show cause why he should be allowed to continue a course which he will not be able to complete in the time set down in the following schedule:

Number of years in course	Total time allowed from first enrolment to completion (years)
3	5
4	6
5	8
6	9
7	11
8	12

- * (iii) No full-time student shall, without showing cause, be permitted to continue a course unless all subjects of the first year of his course are completed by the end of his second year of attendance. No student in the Faculty of Arts shall, without showing cause, be permitted to continue a course unless he completes four subjects, one of which must be from Group VII, by the end of his second year of attendance.

No part-time student shall, without showing cause, be permitted to continue a course unless all subjects of the first two stages of his course are completed by the end of his fourth year of attendance and all subjects of the third and fourth stages of his course by the end of his seventh year of attendance.

No student in the Faculty of Medicine shall, without showing cause, be permitted to continue with the medical course unless he completes the second year of the course by the end of his third year of attendance, and the third year of the course by the end of his fourth year of attendance.

- (iv) A student who has a record of failure in a course at another University shall be required to show cause why he should be admitted to this University. A student admitted to a course at this University following a record of failure at another University shall be required to show cause, notwithstanding any other provisions in these rules, why he should be

* Rule (iii) in so far as it relates to students in the Faculty of Arts will apply retrospectively as from the 1st January, 1967, and in so far as it relates to students in the Faculty of Medicine, will apply to students enrolling for the first time in 1967 or thereafter.

permitted to continue in that course if he is unsuccessful in the annual examinations in his first year of attendance at this University.

- (v) Any student excluded under any of the clauses (i)-(iii) may apply for re-admission after two academic years and such application shall be considered in the light of any evidence submitted by him.
- (vi) A student wishing "to show cause" under these provisions shall do so in writing to the Registrar. Any such application shall be considered by the Professorial Board, which shall determine whether the cause shown is adequate to justify his being permitted to continue his course or re-enrol as the case may be.
- (vii) The Vice-Chancellor may on the recommendation of the Professorial Board exclude from attendance in a course or courses any student who has been excluded from attendance in any other course under the rules governing re-enrolment and whose record at the University demonstrates, in the opinion of the Board and the Vice-Chancellor, the student's lack of fitness to pursue the course nominated.
- (viii) A student who has failed, under the provisions of Clause (vi) of these rules, to show cause acceptable to the Professorial Board why he should be permitted to continue in his course, and who has subsequently been permitted to re-enrol in that course or to transfer to another course, shall also be required to show cause, notwithstanding any other provisions in these rules, why he should be permitted to continue in that course if he is unsuccessful in the annual examinations immediately following the first year of resumption or transfer of enrolment as the case may be.
- (ix) A student may appeal to an Appeals Committee constituted by Council for this purpose, against his exclusion by the Professorial Board from any subject or course.

Re-admission After Exclusion

Applications for re-admission must be made on the standard form and lodged with the Registrar not later than 30th June of

the year prior to that for which re-admission is sought. An application should include evidence of appropriate study in the subjects (or equivalents) on account of which the applicant was excluded. In addition, evidence that the circumstances which were deemed to operate against satisfactory performance at the time of exclusion are no longer operative or are reduced in intensity, should be furnished. An applicant may be required to take the annual examinations in the relevant subjects as qualifying examinations in which case re-admission does not imply exemption from the subject.

It should be noted that a person under exclusion may not be enrolled in miscellaneous subjects unless he has received the approval of the Professorial Board.

Persons who intend applying for re-admission to the University at a future date may seek advice as to ways in which they may enhance their prospects of qualifying for re-admission. Enquiries should be made on a form obtainable from the Examinations Branch, and lodged with the Registrar.

Ownership of Students' Work

The University reserves the right to retain at its own discretion the original or one copy of any drawings, models, designs, plans and specifications, essays, theses or other work executed by students as part of their courses, or submitted for any award or competition conducted by the University.

Change of Address

Students are requested to notify the Registrar in writing of any change in their address as soon as possible. Failure to do this could lead to important correspondence or course information not reaching the student. The University cannot accept responsibility if official communications fail to reach a student who has not notified the Registrar of a change of address.

Notices

Official University notices are displayed on the notice boards and students are expected to be acquainted with the contents of those announcements which concern them.

Lost Property

All enquiries concerning lost property should be made to the Chief Steward on Extension 2503 or to the Lost Property Office at the Union.

Parking Within the University Grounds

Because of the limited amount of parking space available, only full-time final year undergraduates and post-graduate students may apply for parking permits. Applications should be made to the Property Section (Bursar's Division). It should be noted that increasing demand for parking space may require the imposition of further restrictions.

Application of Rules*General*

Any student who requires information on the application of these rules or any service which the University offers, may make enquiries from the Admissions Office, the Student Counselling Centre or the Registrar.

Appeals

Section 5(c) of Chapter III of the By-laws provides that "Any person affected by a decision of any member of the Professorial Board (other than the Vice-Chancellor) in respect of breach of discipline or misconduct may appeal to the Vice-Chancellor, and in the case of disciplinary action by the Vice-Chancellor, whether on appeal or otherwise, to the Council".

STUDENT SERVICES**The Library**

The University Library is on the upper campus and adjacent to the Chancellery and the Arts and Commerce buildings. The Bio-Medical Library is in the Biological Sciences building with a branch at Prince Henry Hospital (phone: 661-0111). There are also branches at Broken Hill and Wollongong.

The University Union

The University Union is a common meeting ground for all students. Eating and general recreational facilities are available, as well as a shop for stationery and other student requisites, branches of several banks, a pharmacy, a branch of Anthony Horderns, and hairdressing facilities. Membership is compulsory for all registered students.

Student Accommodation*Residential Colleges*

Accommodation for students is provided within the complex of the Residential Colleges of the University which comprises

Basser College, Goldstein College, Philip Baxter College, and Post-Graduate Hall. The College complex houses 500 men and women students, as well as staff members. Tutors in residence provide tutorial assistance in a wide range of subjects.

Board and residence fees, which are payable on a term basis, amount to \$18.50 per week. Intending students should apply in writing to the Master, Box 24, Post Office, Kensington, N.S.W., from whom further information is available.

Other Accommodation

Students requiring other than Residential College accommodation may make personal application to the Student Amenities Service where current lists are kept of accommodation available at recognised boarding houses, private homes, and in serviced and unserviced apartments.

Student Amenities Service

The Amenities Service, working in close liaison with the Sports Association and the University authorities, assists various recognised clubs by arranging and providing facilities essential to their general development, and by handling on their behalf all inquiries and applications for membership.

Concession Fares

Application forms for travelling concessions may be obtained at the Inquiry Office, the Chancellery, Kensington, or at the Amenities Service Offices, Kensington.

Omnibus: Concessions are available to:

- (a) Students under 18 years of age irrespective of whether they are employed or receive income or remuneration;
 - (b) students between 18 and 30 years of age who are not in employment or in receipt of any income or remuneration.
- NOTE. Income or remuneration includes allowances paid to Colombo Plan students, Public Service trainees, etc., but does not include allowances paid to holders of Commonwealth Scholarships or Scholarships granted by the State Bursary Endowment Board.

Train:

- (a) Periodical tickets are available during term time to full-time students not in employment or in receipt of any remuneration.
- (b) Vacation travel concessions are available to students qualifying under (a) above.

Ferry: Concession fares are available for travel on ferries controlled by the Port Jackson & Manly Steamship Co. Ltd. and Sydney Harbour Ferries Pty. Ltd. All applicants must be registered full-time students under the age of 21 years.

Aircraft: Concession fares for travel overseas, inter-state and intra-state are available under the conditions ruling for the various operating companies.

Location:

The Student Amenities Service at Kensington is located opposite the Basser College end of the new Electrical Engineering Building. (Tel. 663-0351, Ext. 2235.)

Student Employment Service

Assistance is offered in finding vacation employment, continuous part-time employment, casual employment and odd jobs, full-time employment for evening students, and permanent employment after graduation. The Service is located in the Chancellery on the ground floor.

Chaplaincy Service

This Service is provided for the benefit of students and staff by six Christian Churches (Anglican, Roman Catholic, Methodist, Presbyterian, Baptist, Churches of Christ) and by the Jewish congregation. Chaplains are in attendance at the University at regular times.

Student Health Service

Director: M. A. Naphali, MB, BS (*Syd.*)

A student health and first aid centre is situated within the University, staffed by a qualified medical practitioner, and a nursing sister.

The centre is located in hut "E" on the northern side of the campus, adjacent to Basser College. The service is available to enrolled students, free of charge, between 9 a.m. and 5 p.m., Mondays to Fridays, and, in addition, from 6 p.m. to 8 p.m., Tuesdays to Thursdays during term.

The medical service is diagnostic, and in most instances therapeutic, but it is not intended to replace private or community health services. Thus, where chronic or continuing conditions are revealed or suspected, the student will be advised and may be referred to his own doctor or to an appropriate hospital for

specialist opinion and treatment. The health service is not responsible for fees incurred in these instances. The service is confidential and students are encouraged to attend the centre for advice on all matters pertaining to health.

Appointments may be arranged by calling at the centre or by telephoning 663-0351, extension 2679.

Student Counselling and Research Unit

Prospective students seeking advice or guidance regarding the selection and planning of courses (particularly in relation to a career), or advice regarding their suitability for a particular course, are invited to consult the University's Student Counselling and Research Unit. Appointments may be made by telephone (663-0351, extensions 2600 to 2605).

In addition to its counselling service, the Unit provides a variety of study skills programmes throughout the year, on a group or individual basis. Programmes offered in the past have included Reading Improvement, Study Methods, Written Expression, Note Taking, Studying Mathematics, Improving Listening, Preparing for Statistics.

Films, tape recordings and special reading equipment have been used as aids by the counsellors managing the group counselling activities.

Student Loan Fund

The Students' Union and the University have co-operated to provide assistance to students who are in financial difficulties which are considered likely to prejudice their progress with their studies.

Two forms of assistance are available. In the first, the University considers, in certain circumstances, deferment of the payment of fees; this scheme is not intended to replace the established procedure for granting deferment for short periods but rather to supplement it by making deferment over longer periods possible. Secondly, students in need may receive a cash

loan not exceeding \$200 from the Student Loan Fund established from contributions made by the Students' Union and the University.

In both cases assistance is limited to students with reasonable academic records and whose financial circumstances warrant loans. Students granted assistance of either kind are required to give an undertaking to repay the loan under the conditions agreed upon.

Applications are made personally to Mr. J. B. Rowe, Deputy Registrar (Student Services).

University Co-operative Bookshop Ltd.

Membership is open to all students, on payment of a fee of \$2, refundable when membership is terminated. Members receive an annual rebate on purchases of books.

UNDERGRADUATE SCHOLARSHIPS

Students undertaking courses in the Faculty of Applied Science are eligible to apply for the following scholarships.

Except where otherwise specified, applications on the forms obtainable from the Admissions Office ('phone: 663-0351, ext. 2485) must be lodged with the Registrar, the University of New South Wales, P.O. Box 1, Kensington, within seven days of the notification of the results of the N.S.W. Leaving Certificate Examination.

A separate application must be lodged for each category of scholarship, except that applicants for scholarships in Textile Technology and Wool Technology will automatically be considered for the scholarships which are offered in the same field by the Wool Research Trust Fund.

In addition to those scholarships made available by the University and other bodies as set out below, cadetships are offered by the Commonwealth Service, the New South Wales Public Service Board, the Department of Railways and a number of private industrial organizations. Cadets generally have their University fees paid by the employer, and are employed at cadet rates of pay during their course.

Commonwealth Scholarships

There are three types: *Open Entrance Scholarships*, which are awarded on the results of the Leaving Certificate examination to students who are under 25 years of age on 1st January of the year in which they begin their course and who, with their parents, are permanent residents of Australia; *Second or Later Year Scholarships*, which are available to students who have completed at least one year of a full-time or two years of a part-time course without failure (age and residential qualifications are the same as for Open Entrance); and *Mature Age Scholarships*, which are available to students who are over 25 on 1st January of the year for which the scholarship is desired and who have been

residents of Australia for at least two years immediately preceding the award of the scholarship. Benefits include payment of all tuition fees and other compulsory fees and living allowances (these latter being subject to a means test) up to \$520 per annum or \$793 per annum if living away from home. The closing date for applications is 30th September in the year immediately preceding that for which the scholarship is desired. Full particulars and application forms may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney (Telephone: 68-2911).

University Scholarships

The University annually awards up to 15 scholarships tenable in degree courses to students who have matriculated at the Leaving Certificate Examination; 10 scholarships to students who have completed certificate courses (Department of Technical Education); 10 scholarships to students who have completed Trade Courses (Department of Technical Education); and 10 scholarships to part-time students who have taken the Qualifying and Matriculation course of the Department of Technical Education. The scholarships exempt the holder from payment of course fees during the currency of the scholarship. Scholarships will be awarded in order of merit on Leaving Certificate Examination results. They may be held only by persons who do not hold another award. Applications must be lodged after publication of Leaving Certificate Examination results and after the announcement of the award of Commonwealth Scholarships, but not later than 31st January.

Bursaries

A number of Bursaries tenable at the University are awarded to candidates of merit at the Leaving Certificate Examination whose family income falls within certain limits prescribed by the Bursary Endowment Board. Applications should be made to the Secretary, Bursary Endowment Board, c/- Department of Education, Bridge Street, Sydney.

Public Service Association Scholarship

The Public Service Association of New South Wales is offering a scholarship to children of members of the Association who are entering the first year of any full-time course. It is valued at \$200 per annum and is tenable for the normal duration of the course.

South Sydney Junior Rugby League Club Ltd. Scholarships

Two scholarships each valued at \$300 are available to male residents in the South Sydney area who wish to enrol in a full-time course at the University. The scholarships, tenable for one year only, will be awarded on the results of the Leaving Certificate Examination in the immediately preceding year and may not be held concurrently with any other scholarship award. The scholarship is intended to enable a student to undertake the first year of a course with the possibility (provided that his first-year performance warrants it) of obtaining a later year Commonwealth Scholarship. Applications must be lodged with the Registrar after the announcement of the award of the Commonwealth Scholarships, but not later than 31st January, each year.

Mount Lyell Mining and Railway Company

The Company makes available each year a number of scholarships for students entering any full-time degree course. The scholarships have a value of \$700 per annum and are tenable for four years. Applications should be made to the Mount Lyell Mining and Railways Company Ltd., Queenstown, Tasmania.

The Fell Scholarship (University Residential Colleges)

The Fell Scholarship is available to any undergraduate who is or will be in residence at one of the Colleges under the administration of Kensington College Ltd. during 1967. The annual value of the Scholarship is \$100. It may be held concurrently with Commonwealth and other scholarships.

In awarding the scholarship the academic merit and financial need of the applicant will be taken into consideration.

Applications must be made on the appropriate form and lodged with the Master, Kensington College Ltd., Box 24, P.O., Kensington.

Food Technology Scholarships

A number of scholarships are usually made available by firms in the food processing industries. These scholarships have a value of \$800 per annum, payable as a living allowance to students enrolled full-time in the Food Technology degree course. These scholarships may be held concurrently with a Commonwealth Scholarship.

New South Wales State Brickworks Scholarship in Ceramic Engineering

The State Brickworks of the Department of Public Works of New South Wales has made available an undergraduate scholarship in Ceramic Engineering to the value of \$900 per annum. The scholarship will normally be tenable for four years.

Applicants must be British subjects and are expected to apply for a Commonwealth Scholarship to cover course and other University fees.

Steel Industry Scholarships in Metallurgy

Australian Iron and Steel Pty. Ltd. provides two scholarships for students enrolling in the full-time B.Sc. course in Metallurgy at Kensington. Each scholarship has a value of \$360 to \$700 per annum, which includes a living allowance of \$260 and an annual grant for books of \$100. Additional allowances are paid to students living away from home. The company also offers paid vacation employment to scholarship holders, together with three weeks' annual leave and a position on graduation. The scholarship will normally be tenable for four years, and applicants are expected to apply for a Commonwealth Scholarship to cover course and other University fees.

Metal Manufactures Clement Blazey Memorial Scholarship in Metallurgy

Metal Manufactures Ltd. of Port Kembla provide the Clement Blazey Memorial Scholarship for students enrolling in the full-time course in Metallurgy leading to the Degree of Bachelor of Science. The scholarship has a value of between \$200 to \$800 per annum payable to students as a living allowance and will normally be tenable for four years. It may be held concurrently with a Commonwealth Scholarship.

C.I.G.-E.M.F. Scholarships in Metallurgy

The Commonwealth Industrial Gases Ltd. has undertaken to provide scholarships tenable at the University of New South Wales for students wishing to enrol in the full-time course for the B.Sc. degree in Metallurgy. One scholarship will be offered each year: it will be tenable for a maximum of four years, and will have a value of \$1,000 per annum payable in fortnightly instalments as a living allowance. Applicants are expected to apply for a Commonwealth Scholarship to cover course and other University fees.

Consolidated Gold Fields (Australia) Pty. Ltd.

This Company provides one scholarship annually for students wishing to undertake a degree course in Mining Engineering, Metallurgy or Geology. The value of the scholarship is \$600 p.a., plus University fees, and is tenable for the duration of the course. Applications should be made to the Company, A.M.P. Building, Circular Quay, Sydney.

The John Heine Memorial Scholarship

This scholarship is designed to assist students to undertake the final two years of the degree course in Mechanical, Electrical, or Chemical Engineering, Applied Chemistry, Metallurgy, or Physics. Applicants must have qualified for admission to the third year of the course (fourth year for Chemical Engineering). The scholarship has a maximum total value of \$700. Applications should be made not later than 31st January each year to the Secretary, The John Heine Memorial Foundation, c/o the Metal Trades Employers' Association, 101 Walker Street, North Sydney.

N.S.W. Public Service (Department of Mines)

The Department makes scholarships available for students wishing to undertake degree courses in Mining Engineering, Geophysics, Applied Geology or Chemical Engineering. The scholarships are tenable for four years and are valued at \$850 p.a. for adults and from \$560 to \$850 p.a. for juniors, plus University fees and allowances. Applications to The Secretary, Public Service Board, Box 2, G.P.O., Sydney.

Rum Jungle Undergraduate Scholarship

One scholarship is made available annually for students wishing to do a degree course in Mining Engineering, Metallurgy or Geology. The scholarship is tenable for the duration of the course and is valued at \$800 p.a. with annual increments of \$100. Where a Commonwealth Scholarship is not held full University fees will be paid. Applications to The Manager, Territory Enterprises Pty. Ltd., P.O. Box 368, Darwin, N.T.

Mining and Metallurgical Bursaries

The Trustees of the Mining and Metallurgical Bursaries Fund offers bursaries to students who are British subjects and who have completed the first year of the B.E. course in Mining Engineering

or of the B.Sc. course in Applied Geology or Metallurgy, with a minimum of one distinction or two credits. The bursaries have a value of \$100 per annum, and are tenable for one year, although the same student may receive an award in successive years of his course. Closing date for applications is 31st March, and they must be lodged with the Head of the School of Mining Engineering, Metallurgy or Applied Geology.

Conzinc Riotinto of Australia Ltd.

The Company offers each year three scholarships for students entering the full-time degree course in Chemical Engineering, Mining Engineering, Metallurgy or Geology, and six scholarships for students entering the second year of one of these courses. The value of the scholarships is \$500 to \$700 per annum, plus University tuition fees and a book allowance of \$40. Applicants must also apply for a Commonwealth Scholarship. The tenure of the scholarships is for the duration of the course. Applications should be made to Conzinc Riotinto of Australia Ltd., Box 384D, Melbourne.

King Island Scheelite (1947) Limited

This Company provides up to four scholarships annually for students who have completed the first year of the degree course in Mining Engineering, Metallurgy or Geology. The scholarships which are valued at \$800-\$1,200 p.a., are tenable until the course has been completed. Applications to the Company at 100 Collins Street, Melbourne.

Peko-Wallsend Investments Ltd.

One or two scholarships are provided annually for students who have completed at least one year of the degree course in Mining Engineering, Metallurgy or Geology. The scholarships are valued at \$800 p.a., plus tuition fees, and are tenable for the duration of the course. Applications to the Company, 82 Elizabeth Street, Sydney.

The Broken Hill Pty. Co. Ltd.

Ten scholarships are provided each year for students who have completed at least one full-time year of the degree course in Engineering, Science, Commerce or Economics. Preference is given to Commonwealth Scholarship holders. Students receive an annual grant with increments in successive years. The tenure of

the scholarships is for the duration of the course. Application should be made to the nearest office of the Broken Hill Pty. Co. Ltd. or its subsidiaries.

Joint Coal Board and Australian Coal Industry Research Laboratories Limited Scholarships

The Joint Coal Board and Australian Coal Industry Research Laboratories Ltd. offer scholarships in full-time courses in Mining Engineering, Mechanical Engineering, Electrical Engineering, Fuel Engineering, Chemical Engineering and Applied Geology. The value of these scholarships ranges from \$700 to \$1,200 per annum (including allowance for books and instruments). These scholarships will be awarded on the understanding that applicants will normally hold a Commonwealth Scholarship which covers the cost of University fees. However, applicants without Commonwealth Scholarships may be given consideration. While scholarship holders are not under bond it is expected that they will obtain employment in Coal Mining or a related industry on graduation. Applications on forms obtainable from headmasters or from the Secretary, Joint Coal Board, Box 3842, G.P.O., Sydney, must be lodged with the Board's secretary not later than seven days after the notification of Leaving Certificate results.

Overseas Companies Scholarships in Mining Engineering

A number of overseas companies associated with the development of the mining industry in Australia have combined to provide scholarships for students wishing to qualify for the degree of Bachelor of Engineering in Mining Engineering (Pass or Honours). The Companies are: Consolidated Mining & Smelting Co. of Canada Ltd., Consolidated Tin Smelters Ltd., Derby & Co. (Aust.) Pty. Ltd., Freeport Sulphur Co., Geoscience Incorporated, Kenneth McMahon & Partners Pty. Ltd. Applicants must have completed the first two years of the Mining, Mechanical, Civil or Electrical Engineering full-time courses at University level, or the third year of the full-time Mining Engineering course at this University, or have satisfied the Professorial Board that they are qualified to enter the third year of the Mining Engineering full-time course. These scholarships have a value of \$1,000 per annum, payable in fortnightly instalments over the academic year, and will normally be tenable for one or two years. They may be held concurrently with a Commonwealth Scholarship.

Scholarships Tenable at the Broken Hill Division

A number of mining companies operating in the Broken Hill district offer scholarships, tenable in any degree course, to students who are residents of Broken Hill. The companies are:

Broken Hill South Ltd., Broken Hill.

Zinc Corporation Ltd., P.O. Box 444, Broken Hill.

Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd., P.O. Box 444, Broken Hill.

Applications should be made to the office of the appropriate Company.

Textile Technology Scholarships

The textile companies listed below have undertaken to provide a number of scholarships for students wishing to enrol in courses leading to the degree of Bachelor of Science (Pass and Honours) in Textile Technology: Bradford Cotton Mills Ltd., Bond's Industries Ltd., Davies Coop (N.S.W.) Pty. Ltd., Felt and Textiles of Australia Ltd., Fibremakers Ltd., Prince-Smith and Stells Ltd., John Vicars and Co. Ltd. Each scholarship has a value of \$1,000 per annum and may be held concurrently with a Commonwealth Scholarship. An applicant for this scholarship will also receive consideration for the Wool Research Trust Fund Scholarships in Textile Technology.

Wool Technology Scholarships

Several firms and banks associated with the wool industry endow scholarships in courses leading to the Bachelor of Science degree in Wool Technology. The Scholarships now current have been made available by William Cooper & Nephews (Aust.) Pty. Ltd., the Commercial Banking Company of Sydney Ltd. and the National Council of Wool Selling Brokers of Australia. Valued from \$600 to \$1,000 per annum, these scholarships are normally tenable for four years, and may be held concurrently with a Commonwealth Scholarship. An applicant for these scholarships will also receive consideration for the Wool Research Trust Fund Scholarships in Wool Technology.

**Wool Research Trust Fund Scholarships in Wool Technology
and Textile Technology**

Eight scholarships (two for courses in Wool Technology and six for courses in Textile Technology) have been made available by the Wool Research Trust Fund (Commonwealth Government). The scholarships provide an allowance of \$800 per annum for living expenses for four years, and successful applicants may hold a Commonwealth Scholarship concurrently.

FACULTY REGULATIONS

RULES OF PROGRESSION

Progression in Full-Time Courses Where Progression is by the Year

1. No full-time student (except those in the Science course, the Arts course, or in the Commerce course) will be permitted to attend lectures or sit for examination in any subject in any year until he has passed in all subjects of the previous year, unless special permission has been granted by the faculty in which he is enrolled.
2. A student who fails to qualify to progress to the next year of the course where progression is by years may be granted, by the Head of the School conducting the course, exemption from further attendance and examination in any subject in which he has achieved a pass at a satisfactory standard. Such student may repeat those subjects required to complete the year by attendance at either day or evening classes.
3. Any student who elects to transfer to the related part-time course is not eligible to be considered for additional deferred examinations at the time of transfer and may not qualify for progression to the next year of the full-time course merely by completing the part-time equivalents of the subjects in which he has failed.
4. In general, students who fail in full-time courses, and who transfer to part-time courses, shall not be re-admitted with standing to the full-time course until they have graduated from the part-time course.

Rules Relating to Common First Year Subjects in the Faculties of Applied Science, Science, Engineering and Medicine

1. Each student intending to follow any course leading to the degree of Bachelor in any of the faculties of Science (with the exception of the Applied Psychology course), Applied Science (with the exception of the Geography course), Medicine or

Engineering must have satisfied the examiners in the subjects of 1.001 Physics I, 2.001 Chemistry I, 10.001 Mathematics I, and in a fourth subject (elective) chosen from 5.001 Engineering I, 25.511 Geology I, 12.011 Psychology I, 17.001 General Biology or 27.001 Geography I, before progressing further in his course, except that progression may be permitted with outstanding subjects if faculty regulations permit, provided that for students intending to follow the course leading to the Bachelor of Surveying degree, the subject 2.001 Chemistry I above shall be replaced by the subject 8.801 Surveying I.

2. Notwithstanding faculty regulations to the contrary, full-time students will be required to complete the four subjects of Rule 1 in not more than two years' study and part-time students in not more than four years' study.

The re-enrolment of students who have not complied with this rule shall be subject to the general rules governing re-enrolment.

3. At enrolment, each student to whom Rule 1 applies will be required to nominate and apply for admission to the course which he desires to follow.

Although application for transfer from one course to another within these faculties may be made at any time students are advised that such transfers are most readily effected prior to re-enrolment in the second year of full-time courses and the third stage of part-time courses.

All such transfers will be subject to the regulations of relevant faculties and the concurrence of the Professorial Board.

UNDERGRADUATE COURSES

The Faculty of Applied Science consists of the Schools of Applied Geology, Chemical Engineering, Chemical Technology, Geography, Metallurgy, Mining Engineering, Textile Technology and Wool Technology. These Schools offer full-time undergraduate courses leading to the degrees of Bachelor of Science, Bachelor of Engineering, and part-time courses leading to the degree of Bachelor of Science (Technology).

Full-Time Courses

Full-time courses of four years' duration are offered in Food Technology, Industrial Chemistry, Ceramic Engineering, Polymer Science, Geography, Metallurgy, Applied Geology, Textile Technology and Wool Technology leading to the degree of Bachelor of Science. Four-year courses in Chemical Engineering, Fuel Engineering and Mining Engineering are offered, leading to the degree of Bachelor of Engineering. Candidates for honours are required to undertake special reading and other assignments as directed by the Head of the School concerned.

Honours: Candidates for honours are required to undertake special reading and other assignments as directed by the Head of the School concerned. In considering the award of Honours special attention is paid to the performance of a candidate in the final research project, for which a thesis describing a theoretical or experimental study is required. Honours are awarded in Class I, Class II division (I), and Class II division (II).

Common First Year: All courses in the Faculty, except Geography, include Chemistry, Physics and Mathematics in first year. The first year of Geography comprises Geography and Mathematics and two of General Biology, Chemistry and Physics. Students take as the fourth subject of first year General Biology in Wool Technology and Food Technology; Geology I in Applied Geology; either Engineering, General Biology or Geology in Industrial Chemistry; and Engineering in all other courses. This arrangement allows for some degree of transferability.

Industrial Training Requirements: In the scientific and technological courses close association with industry is maintained on the practical aspects of the professions. This is achieved in most of the courses of the Faculty by requiring students to complete an approved industrial training programme prior to graduation. All full-time courses in the Faculty of Applied Science, with the exception of the Applied Geology Course, require the completion of at least eight weeks of approved industrial training before graduation. This is normally carried out during the Christmas vacations. In the case of Wool Technology students are required to complete 36 weeks' approved practical work. In Mining Engineering the second and third years of the course are of 24 weeks' duration and students will undertake a programme of practical training in the last part of the Third Term and the long vacation of these years.

Part-Time Courses

The Schools of Chemical Engineering, Chemical Technology, Metallurgy and Mining Engineering offer six-year part-time courses leading to the degree of Bachelor of Science (Technology) in Chemical Engineering, Fuel Engineering, Food Technology, Industrial Chemistry, Ceramics, Polymer Science, Metallurgy, and Mining Engineering (Wollongong and Broken Hill).

Students who qualify for the B.Sc.(Tech.) degree in the Faculty of Applied Science and who wish to proceed to a B.Sc. or B.E. degree will normally be required to complete further work which will involve at least one year of full-time attendance.

Holders of the B.Sc.(Tech.) degree will be eligible to proceed to the degrees of Master of Science, Master of Engineering or Master of Technology, subject to the regulations relating to these degrees.

Transfer is also possible from full-time courses to the part-time B.Sc.(Tech.) courses, but one of the conditions for the award of the B.Sc.(Tech.) degree is that at least three years of approved industrial experience be gained before graduation. This requirement will apply to students transferring from full-time courses.

B.Sc. (Tech.) Courses With Partial Full-Time Attendance

B.Sc.(Tech.) courses may be completed by a combination of full-time and part-time study. The first two stages are to be completed part-time; in the following two years students complete the second and third years of the corresponding full-time course;

and in the fifth stage a special programme is prepared. Full details are set out below under the Schools which provide the courses.

General Studies Programme

All undergraduates in Faculties other than Arts are required to complete a General Studies programme. In this way the University hopes to give its students a general understanding of the different aspects of the world in which they live. Full-time students will do an initial 45-hour course 26.501 English or 26.571 An Introduction to Modern Drama, plus two electives and, where applicable, an advanced elective, from the following groups:

(A) *Electives* (30 hours in 1967, 45 hours thereafter)

- 11.011H History of Fine Arts
- 11.021H History of Architecture
- 26.121 Psychology
- 26.151 Economics
- 26.301 Music
- 26.511 History
- 26.521 Philosophy
- 26.531 Sociology
- 26.541 Political Science
- 26.601 History of Technology

Students who have chosen 26.571 An Introduction to Modern Drama (formerly 57.011H) as their initial course may select only one of the following electives:

- 26.301 Music
- 26.601 History of Technology
- 11.011H History of Fine Arts
- 11.021H History of Architecture

(B) *Advanced Electives* (60 hours in 1967 and 1968, 45 hours thereafter)

- 11.031H History of Fine Arts and Architecture
- 26.122 Psychology
- 26.152 Economics
- 26.502 English Literature
- 26.503 English Language
- 26.512 History
- 26.522 Philosophy
- 26.532 Sociology
- 26.542 Political Science

All of the above courses except 11.031H require a previous course in the same subject as a pre-requisite. 11.031H may not be taken as an advanced elective if either 11.011H or 11.021H has previously been taken as an elective.

Selection of electives in the general studies programme is governed strictly by Faculty requirements. Before selecting a particular elective, students should ascertain that their choice is in accordance with Faculty requirements. In fulfilment of these requirements certain subjects offered by the Faculty of Arts to its own students may be taken in place of general studies subjects. Details of this arrangement are given in the University Calendar.

Part-time students will follow the same programme, less the Advanced Elective.

Allocation of Study Hours

In the outlines of the courses in the Faculty of Applied Science set out below the following scheme for indicating the allocation of study hours is used. The first three figures for each subject indicate the number of hours spent each week in lectures, tutorials and laboratory work respectively. The fourth figure is intended to be a guide to the average student as to the time he should devote to private study of the particular subject if he expects to reach pass standard in that subject. The academic load for most full-time courses is in the range of 45 to 50 hours per week.

SCHOOL OF APPLIED GEOLOGY

The development of natural resources and the allied engineering activities make essential a type of training for geologists which embraces basic geological instruction and various features of its application in practice. The structure and syllabus of the course in Applied Geology are designed to enable graduates to enter immediately into various aspects of applied geology and to play an effective part in associated engineering and technological practice.

In the early part of the course students receive instruction in the allied fundamental sciences and basic engineering subjects as well as introductory geology. Later geological instruction is developed and emphasis is placed progressively on engineering application and on economic aspects of geology.

The applied nature of the course is indicated by the inclusion of such subjects as Engineering I, Materials and Structures, Soil Mechanics, Mining and Mineral Process Engineering. A course in Surveying and courses in Geophysics, Exploration and Mining Geology, Engineering Geology and Petroleum Geology are added to the basic geology subjects in the later stages of the course.

Attendance at the University for students taking the full-time course in Applied Geology is for thirty weeks per year on a three-term basis, the Third Term of the fourth year being devoted to work on a project.

A three-year course (full-time) and a seven-year course (part-time) in Geology is available to students in the Faculty of Science. Selected students in the Faculty of Science may also read for an honours degree in Geology.

In order to meet the demands for trained Geophysicists in the Commonwealth a Graduate Diploma in Applied Geophysics is offered.

APPLIED GEOLOGY — FULL-TIME COURSE

Bachelor of Science

FIRST YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Prac.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
10.001	Mathematics I	4	2	0	4
25.511	Geology I*	2	0	4	4
		11	3	10	16½

* Three field tutorials, up to five days in all, are an essential part of the course.

SECOND YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Prac.	Private Study
1.212	Physics	1½	½	1	2
2.022	Chemistry II (M)*	3	0	2½	5
5.011	Engineering I†	2	0	3	3½
10.031	Mathematics	1	1	0	2
25.512	Geology II‡	4	0	5	6
26.501	English <i>or</i>	1	½	0	2
26.571	An Introduction to Modern Drama				
		12½	2	11½	20½

Fieldwork, up to two weeks in all, is an essential part of the course. It includes a field training period of approximately one week.

* Hours for Terms 1 and 3 only.

Hours for Term 2	4	0	3	6½
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† Hours for Terms 1 and 2 only.

Hours for Term 3	1	0	1	1½
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‡ Hours for Terms 1 and 2 only.

Hours for Term 3	4	4	1	6
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THIRD YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
8.112	Materials and Structures	1	1	1	1½
8.243S	Soil Mechanics	1	0	1	2
10.331	Statistics	1	0	1	1½
25.513/1	Geology III, Part 1 } *	7	0	6	16
25.513/2	Geology III, Part 2 }				
25.513/3	Geology III, Part 3 }				
Two 30-hour General Studies Electives		2	0	0	4
		12	1	9	25

Fieldwork is an essential part of the course. It includes approximately one week's geological survey camp, which may be held before First Term, at least one other field session of approximately one week, and a one-day Geophysics field tutorial. In all, up to three weeks may be spent in the field.

* Hours for Term 1 only.

Hours for Term 2	7	2	5	16
Hours for Term 3	5	2	5	12

FOURTH YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Prac.	Private Study
*7.551	Mining and Mineral Process Engineering†	2	2	0	2
*8.421S	Surveying	1½	0	1½	3
*25.514/1	Geology IV, Part 1 } ‡	5	2	4	13
*25.514/2	Geology IV, Part 2 }				
*25.514/3	Geology IV, Part 3 }				
25.591	Project**	0	4	0	0
General Studies Advanced Elective §		3	0	0	6
		11½	8	5½	24

Four short visits to civil engineering works and mine workings are included in the course.

* These courses run for 24 weeks.

† Hours for Term 1 only.

Hours for Terms 2 and 3	1	0	3	3
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‡ Hours for Term 1 only.

Hours for Term 2	5	1	7	15
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Hours for Term 3	6	1	7	15
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** Hours for Term 1 only.

Hours for Term 3	0	0	10	40
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In the last six weeks of Term 3, students should spend 10 hours per week in laboratory and other supporting work on the Project; 40 hours (approx.) will be devoted to field work.

§ Terms 1 and 2 only.

SCHOOL OF CHEMICAL ENGINEERING

The School offers courses in Chemical Engineering, Fuel Engineering and Food Technology.

Chemical engineering is the application of the principles of the physical sciences, together with the principles of economics and human relations, to fields in which matter undergoes a change in state, energy content or composition. The chemical engineer is generally responsible for the design, construction and operation of plant and equipment used in the chemical processing industries.

Fuel engineering is primarily concerned with the practical and economic applications of scientific knowledge and engineering experience to the production, processing and utilization of fuels and energy. The industrial future of a nation is largely dependent on the success of its fuel industries, on which all other industries depend. In Australia, fuel and combustion engineers are needed in a wide and varied field of activity: in management and design, in supervision and control of equipment to maintain optimum performance, in technical services and air pollution control, and in research and development to seek better and more efficient methods of energy production and utilization.

Food technologists are concerned with the management of foods from the time of production until they reach the consumer. It is their responsibility that they do not spoil or perish. This covers handling, transportation, storage and packaging of fresh and prepared foods and the techniques for preservation such as cold storage, freezing, canning, dehydration and packaging.

Chemical Engineering—Full-Time Course Bachelor of Engineering

This course extends over four years and students study full-time during the day for 30 weeks of each year (excluding examination and vacation periods). For the award of honours, students will be required to have distinguished themselves in formal work, in additional assignments as directed by the Head of the School and in the final year project for which a thesis will be required.

FIRST YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

SECOND YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics II	1½	½	1	2
2.002	Chemistry II (S)*	4	0	5	7
3.111	Chemical Engineering I	1	3	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
8.112	Materials and Structures	1	1	1	1½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501	English <i>or</i>	1	½	0	2
26.571	An Introduction to Modern Drama				
		12½	7	7	20

* Hours for Terms 1 and 3 only.

Hours for Term 2	5	0	4	9
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THIRD YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.121	Chemical Engineering IIA	4	2	0	5
3.122	Chemical Engineering IIB	6	3	3	10
6.801	Electrical Engineering	1	0	2	2
10.032	Mathematics	1	1	0	2
Two 30-hour General Studies Electives		2	0	0	4
		14	6	5	23

FOURTH YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.131S	Chemical Engineering IIIA*	2	2	6	8
3.132S	Chemical Engineering IIIB*	6	4	3	12
3.140}	Projects†	0	3	0	0
3.150}	General Studies Advanced Elective	2	0	0	4
		10	9	9	24

* Terms 1 and 2 only.

† Hours for Terms 1 and 2 only.

Hours for Term 3

0 0 15 29

Chemical Engineering—Part-Time Course* Bachelor of Science (Technology)

This course is designed to meet the requirements of students who are employed in the chemical processing industries. It extends over six years of part-time study.

This course covers approximately the same subject matter as the first three years of the full-time course. Students who have completed the requirements of this course and have qualified for the degree of Bachelor of Science (Technology) may proceed to the degree of Bachelor of Engineering by attending for one full-time year and completing the subjects listed in the fourth year of the full-time course. Students desiring to proceed to a Bachelor of Engineering degree must apply to the Head of the School not later than December 31 of the year in which the sixth stage is completed.

FIRST AND SECOND STAGES

Two of the following subjects will be taken in the first year and the other two in second year (as directed).

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

* See below for outline of this course involving combined full-time and part-time study.

THIRD STAGE (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics II	1½	½	1	2
2.002	Chemistry II (S)*	4	0	5	7
26.501	English	1	½	0	2
		6½	1	6	11
* Terms 1 and 3 only.					
Hours for Term 2		5	0	4	9

FOURTH STAGE (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.111	Chemical Engineering I	1	3	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
8.112	Materials and Structures	1	1	1	1½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501/2	English	1	0	0	2
		7	6	1	11

FIFTH STAGE (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.121	Chemical Engineering IIA	4	2	0	5
6.801	Electrical Engineering	1	0	2	2
10.032	Mathematics	1	1	0	2
One 30-hour General Studies					
Elective		1	0	0	2
		7	3	2	11

SIXTH STAGE* (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.122	Chemical Engineering IIB	6	3	3	10
One 30-hour General Studies					
Elective		1	0	0	2
		7	3	3	12

* Students are required also to sit for an examination embracing the principles of unit operations and of design at the end of the sixth year (3.123 Combined Chemical Engineering Examination).

Chemical Engineering B.Sc. (Tech.) in Full-Time—Part-Time Study

Students enrolling in the Chemical Engineering, B.Sc.(Tech.) course may reduce the time required for completion by undertaking the following programme of combined part-time/full-time study:

- Stage 1.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 2.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 3AFull-time (as for second year of full-time B.E. course above)
- Stage 4AFull-time (as for third year of full-time B.E. course above)
- Stage 5APart-time (as set out below)

STAGE 5A

A programme of 6-9 hours per week selected from the following subjects on the advice of the Head of the School of Chemical Engineering:

- 22.111 Industrial Chemistry I
 - 22.211 Ceramics I
 - 22.311 Polymer Science I
 - 4.011 Metallurgy I
 - 7.311 Mineral Dressing
 - 3.321 Fuel Engineering II
 - 17.201/2 Microbiology I, Part 2
- Any other subject approved by the Professorial Board on the recommendation of the Head of School or Department.

DEPARTMENT OF FUEL TECHNOLOGY

This Department, the first of its kind in Australia, was established to meet the important and growing need of Australian industrial and research establishments for graduates trained in the science and technology of fuels and their utilization.

One constant problem of the fuel industries is that of improving and developing methods of processing and using solid, liquid and gaseous fuels to meet the continuously shifting patterns of demand. It is in this field of activity that the university-trained fuel technologist has a most important part to play.

In Australia, there is a growing need for people trained in the technology of fuels, and opportunities for employment and advancement of fuel engineers are therefore particularly good.

Many exciting and revolutionary possibilities are apparent in the fuel and power industries, and there is a wide and varied

field of activity which offers opportunity and challenge in the application of chemistry, physics and engineering to the problems of Fuel Science and Engineering.

The Department offers two undergraduate courses: a four-year full-time course leading to the degree of Bachelor of Engineering (pass or honours) and a six-year part-time course leading to the degree of Bachelor of Science (Technology) in Fuel Engineering. A course leading to a graduate diploma is also offered by the Department, details being given in Section C of the Calendar.

The Council of the Institute of Fuel has accepted the degree courses in Fuel Engineering as providing exemption from the examination required for admission to corporate membership of the Institute. In addition, the fuel subjects in the course, if taken separately, carry exemption from the advanced fuel subjects of the London City and Guilds Institute, conducted on behalf of the Institute of Fuel, and are thus a recognised qualification for admission to corporate membership.

Fuel Engineering—Full-Time Course

Bachelor of Engineering

The full-time undergraduate course, which leads to the degree of Bachelor of Engineering, is planned to emphasize the importance of scientific principles and their application in practice. The course extends over four years and students study full-time during the day. The training in the first three years is almost identical with that of the first three years in the Chemical Engineering course and consists essentially of instruction and laboratory work in the basic sciences and engineering.

The final year is devoted entirely to professional subjects which cover refractories and insulating materials, constitution, processing and utilization of fuels, flames and gas reactions, progress and developments in fuel science and fuel and combustion engineering. The latter includes the design, construction and performance evaluation of boilers and furnaces, instrumentation and automatic control.

The student is required to spend at least eight weeks in industry gaining practical experience in some field of fuel engineering. He also attends seminars and discussion groups, visits works and undertakes an individual research or design project in his final year.

FIRST YEAR
(30 weeks' day course)

Hours per week for three terms
Private

		Lec.	Tut.	Lab.	Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

SECOND YEAR
(30 weeks' day course)

Hours per week for three terms
Private

		Lec.	Tut.	Lab.	Study
1.212	Physics IIT	1½	½	1	2
2.002	Chemistry II (S)*	4	0	5	7
3.111	Chemical Engineering I	1	3	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
8.112	Materials and Structures	1	1	1	1½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501	English <i>or</i>	1	1	0	2
26.571	An Introduction to Modern Drama				
		12½	7	7	20

* Hours for Terms 1 and 3 only.
Hours for Term 2

5 0 4 9

THIRD YEAR
(30 weeks' day course)

Hours per week for three terms
Private

		Lec.	Tut.	Lab.	Study
3.121	Chemical Engineering IIA	4	2	0	5
3.122	Chemical Engineering IIB	6	3	3	10
3.321	Fuel Engineering II*	2	0	1	2
6.801	Electrical Engineering	1	0	2	2
Two 30-hour General Studies Electives		2	0	0	4
		15	5	6	23

* 10.032 Mathematics may be substituted.

FOURTH YEAR
(30 weeks' day course)

	Hours per week for three terms			
	Lec.	Tut.	Lab.	Private Study
3.331S* Fuel Engineering IIIA	4	2½	4	8
3.332S* Fuel Engineering IIIB	4	2½	4	8
3.340† Projects‡	0	3	0	2
General Studies Advanced Elective	2	0	0	4
	10	8	8	22

* Terms 1 and 2 only.

† Hours for Terms 1 and 2 only.

Hours for Term 3

‡ Students who have taken 10.032 Maths in third year will have to take the subject 3.321 Fuel Engineering II as part of their assignments.

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Fuel Engineering—Part-Time Course*
Bachelor of Science (Technology)

The part-time course, leading to the B.Sc.(Tech.) degree in Fuel Engineering, is of six years' duration. It is designed to meet the needs of persons engaged in the fuel industry who desire to obtain formal educational training in this technology. Candidates for this degree are required to complete an approved programme of industrial training over a period of not less than three years, concurrently with attendance in the course.

FIRST AND SECOND STAGES
(30 weeks' part-time course)

Two of the following subjects will be taken in the first year and the other two in second year (as directed).

	Hours per week for three terms			
	Lec.	Tut.	Lab.	Private Study
1.001 Physics I	3	1	2	3½
2.001 Chemistry I	2	0	4	5
5.001 Engineering I	3	3	0	4½
10.001 Mathematics I	4	2	0	4
	12	6	6	17

* See below for outline of this course involving combined full-time and part-time study.

THIRD STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics IIT	1½	½	1	2
2.002	Chemistry IIS*	4	0	5	7
26.501	English	1	½	0	2
		6½	1	6	11

* Hours for Term 1 only.

Hours for Term 2	5	0	4	9
Hours for Term 3	4	0	5	7

FOURTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.111	Chemical Engineering I	1	3	0	3
3.311	Fuel Science and Engineering I	2	0	0	2
8.112	Materials and Structures	1	1	1	1½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501/2	English	1	0	0	2
		7	6	1	11

FIFTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.121	Chemical Engineering IIA	4	2	0	5
3.321	Fuel Engineering II	2	0	1	2
6.801	Electrical Engineering	1	0	2	2
One 30-hour General Studies					
Elective		1	0	0	2
		8	2	3	11

SIXTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.333	Fuel Engineering IIIM	5	3	4	10
One 30-hour General Studies					
Elective		1	0	0	2
		6	3	4	12

Fuel Engineering B.Sc. (Tech.) in Full-Time/Part-Time Study

Students enrolling in the Fuel Engineering B.Sc.(Tech.) course may reduce the time required for completion by undertaking the following programme of combined part-time/full-time study:

Stage 1.....	Part-time (as for B.Sc.(Tech.) course above)
Stage 2.....	Part-time (as for B.Sc.(Tech.) course above)
Stage 3A.....	Full-time (as for second year of full-time B.E. course above)
Stage 4A.....	Full-time (as for third year of full-time B.E. course above)
Stage 5A.....	Part-time (as set out below)

STAGE 5A

Report and Seminar	3 hours
Elective subjects	4 to 6 hours

The students taking the accelerated B.Sc.(Tech.) degree course may select subjects from existing Fuel subjects or the following list to the extent of a total weekly allocation of 4 to 6 hours.

22.211/1	Ceramics IA	3 hours
22.221	Chemical Thermodynamics and Kinetics	3 hours
4.931S	Metallurgy	1½ hours
18.111	Industrial Administration	2 hours
18.321	Methods Engineering	2 hours
14.041	Industrial and Commercial Law	2 hours
3.122/2	Chemical Engineering IIB (Design I)	4 hours
3.121/2	Chemical Engineering IIA	1 hour
(Management and Data Processing)		

Selection from the above list will be subject to students possessing the necessary pre-requisites and to the availability of the courses.

The topic for the report will be submitted to the Head of the Department for approval before the end of the third week of the First Term. The report may take the form of a literature survey or a topic connected with the student's employment activities.

DEPARTMENT OF FOOD TECHNOLOGY

Food technologists are concerned with the storage, processing, preservation, packaging and distribution of foods. Food technology—a branch of applied science—covers the management of fresh foods of all kinds, the canning, freezing, refrigeration, and dehydration of foods, and the utilization of the by-products of the food industries.

The food scientist acquires new knowledge by laboratory experiments. The food technologist applies such knowledge to practice in manufacture and commerce. He must, therefore, be entirely familiar with food science in its many facets.

Food technology is a profession equally suitable to men and women, and offers much in reward to the adequately trained person prepared to accept responsibility as the guardian of the quality and safety of man's food supplies.

There is great need for food technologists to help solve the prime problem of our age—to make food supplies increase faster than the world's population, to let nothing perish that could serve as food for man or beast.

The Department of Food Technology offers a four-year full-time course leading to the degree of Bachelor of Science and a six-year part-time course leading to the degree of Bachelor of Science (Technology). Graduates of the B.Sc. course qualify for membership of the Royal Australian Chemical Institute and the Institute of Food Technologists.

A Graduate Diploma course in Food Technology of one year full-time or two years' part-time is designed for graduates in science or agriculture wishing to familiarise themselves with the principles of food technology.

Food Technology—Full-Time Course **Bachelor of Science**

The full-time course has been revised, and the new course described below was introduced in 1966. (Transition arrangements for students who completed third year of the old course in 1966 are given on p. 71.)

This course is designed to provide depth and breadth in the relevant physical and biological sciences on which food technology is based. Graduates will be able to pursue more advanced studies in any of these sciences.

FIRST YEAR **(30 weeks' day course)**

Hours per week for three terms

		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
10.001	Mathematics I	4	2	0	4
17.001	General Biology	2	0	4	4
		11	3	10	16½

SECOND YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.002	Chemistry II (S)*	4	0	5	7
3.111/1	Chemical Engineering I—				
	Principles I	1	1	0	2
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
17.111	Biochemistry†	3	0	6	6
26.501	English <i>or</i>				
26.571	An Introduction to Modern Drama }	1	½	0	2
		11	3½	11	20½

* Hours for Terms 1 and 3 only.

Hours for Term 2

† There is no laboratory work in Third term.

5 0 4 9

THIRD YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.261	Applied Organic Chemistry	2	0	4	3½
3.211	Food Technology I, Part 1*	1½	0	3	3½
3.212	Food Technology I, Part 2†	4	0	8	10
3.231	Chemical Engineering	2	0	0	4
17.201/1	Microbiology I, Part 1‡	4	0	8	10
	Two 30-hour General Studies				
	Electives	2	0	0	4
		11½	0	15	25

* Includes 17.311 Botany.

† Operates for **second** fifteen weeks of academic year.

‡ Operates for **first** fifteen weeks of academic year.

FOURTH YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.221	Food Technology II*	3	0	4	6
3.222	Project	0	0	8	4
	General Studies Advanced				
	Elective	2	0	0	4
		5	0	12	14

* Includes 17.511 Entomology.

Plus one Elective from—

17.112 Biochemistry †	3	0	10	7
17.201/2 Microbiology I, Part II‡	4	0	8	10

† Operates for **first** fifteen weeks of academic year.

‡ Operates for **second** fifteen weeks of academic year.

Students electing to take biochemistry will be expected to adjust appropriately the time devoted to the Project.

During the third and fourth years of the course excursions will be made to various food industries. Detailed reports of some of these visits are required.

A detailed report of the student's activities during his period in industry will be required, and will be taken into account in the classification for the Honours list.

Transition Arrangements—Full-Time Course

Students who completed third year in 1966 will follow the Transitional Fourth Year in 1967.

TRANSITIONAL FOURTH YEAR

	Hours per week for three terms			
	Lec.	Tut.	Lab.	Private Study
3.111/1 Chemical Engineering I—				
Principles I	1	1	0	2
3.221 Food Technology II	2	0	2	3
3.222 Project	0	0	8	4
3.231 Chemical Engineering	2	0	0	4
General Studies Advanced				
Elective	2	0	0	4
Food Technology Elective	2	0	4	5
	9	1	14	22

Food Technology—Part-Time Course*

Bachelor of Science (Technology)

The part-time course has been revised, and the new course described below was introduced in 1966. (For transition arrangements see p. 74.)

This course has been designed for students already gaining practical experience in a related occupation in the food industry. The course, which covers the same subject matter as the first three years of the full-time course, extends over six years. For the first

* See below for outline of this course involving combined full-time and part-time study.

two years students follow a common course in which general biology is taken, and thereafter specialize in the biological sciences, which are fundamental to the study of food science and technology.

Students who have completed the requirements of this course and have qualified for the degree of Bachelor of Science (Technology) may proceed to the degree of Bachelor of Science by attending for one full-time year and completing the subjects listed in fourth year of the full-time course. Students desiring to proceed to a B.Sc. degree must apply to the Head of the School not later than December 31 of the year in which the sixth stage is completed.

FIRST AND SECOND STAGES

Two of the following subjects will be taken in first year and the other two in second year (as directed):

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
10.001	Mathematics I	4	2	0	4
17.001	General Biology	2	0	4	4
		11	3	10	16½

THIRD STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.002	Chemistry II (S)*	4	0	5	7
10.031	Mathematics	1	1	0	2
26.501	English	1	½	0	2
		6	1½	5	11

* Hours for Terms 1 and 3 only.
Hours for Term 2

5 0 4 9

FOURTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private
					Study
3.111/1	Chemical Engineering I— Principles I	1	1	0	2
10.331	Statistics	1	1	0	2
17.111	Biochemistry*	3	0	6	6
26.501/2	English	1	0	0	2
		6	2	6	12

* There is no laboratory work in Term 3.

FIFTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
					Private
		Lec.	Tut.	Lab.	Study
3.231	Chemical Engineering	2	0	0	4
3.211	Food Technology I, Part 1*	1½	0	3	3½
2.261	Applied Organic Chemistry	2	0	4	3½
	One 30-hour General Studies Elective	1	0	0	2
		6½	0	7	13

* Includes 17.311 Botany.

SIXTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private
					Study
3.212	Food Technology I, Part 2*	4	0	8	10
17.201/1	Microbiology I, Part 1†	4	0	8	10
	One 30-hour General Studies Elective	1	0	0	2
		5	0	8	12

* Operates for **second** fifteen weeks of academic year.

† Operates for **first** fifteen weeks of academic year.

Food Technology B.Sc. (Tech.) in Full-Time/Part-Time Study

Students enrolling in the Food Technology B.Sc.(Tech.) course may reduce the time required for completion by undertaking the following programme of combined part-time/full-time study:

- Stage 1.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 2.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 3AFull-time (as for second year of full-time B.Sc. course above)
- Stage 4AFull-time (as for third year of full-time B.Sc. course above)
- Stage 5APart-time (as set out below)

STAGE 5A

A programme of 6-9 hours per week selected from the following subjects on the advice of the Head of the Department of Food Technology:

- 22.111 Industrial Chemistry I
 - 22.211 Ceramics I
 - 22.311 Polymer Science I
 - 4.011 Metallurgy I
 - 7.311 Mineral Dressing
 - 3.311 Fuel Science and Engineering I
 - 3.321 Fuel Engineering II
 - 17.201/2 Microbiology I, Part 2
- Any other subject approved by the Professorial Board on the recommendation of the Head of the Department of Food Technology.

Transition Arrangements—Part-Time Course

- Stage 1 } Students who completed Stage 1 or Stage 2 in 1965 will follow
- Stage 2 } the new course pattern in subsequent years.
- Stage 3 } Students who completed Stage 4 or Stage 5 in 1966
- Stage 4 } will follow the former course pattern in 1967 and subsequent
- Stage 5 } year.

SCHOOL OF CHEMICAL TECHNOLOGY

Courses are offered on a four-year full-time basis in the fields of Industrial Chemistry, Ceramic Engineering and Polymer Science leading to the award of the degree of Bachelor of Science. Six-year part-time courses are also available in Industrial Chemistry, Ceramics and Polymer Science.

The first year of the Industrial Chemistry course provides for a choice between Engineering I, General Biology or Geology I. Where Engineering I is elected, the first two years of the full-time courses in Industrial Chemistry, Ceramic Engineering and Polymer Science, and the first four stages of the part-time courses in Industrial Chemistry, Ceramics and Polymer Science follow a common academic programme. This feature enables these students to leave open until the third year or fifth stage respectively, the final decision on whether they will take their professional qualification as an Industrial Chemist, Ceramic Engineer, or Polymer Scientist. Industrial Chemistry students who prefer to elect General Biology or Geology I rather than Engineering I will be at no disadvantage in following their course since Engineering I is not a pre-requisite subject. The only effect will be that they will be required to include Engineering I in their programme if they transfer to Ceramic Engineering or Polymer Science at a later date.

INDUSTRIAL CHEMISTRY

The courses in Industrial Chemistry are designed to provide scientists trained for industries and organisations concerned with the development, manufacture and use of inorganic and organic industrial chemicals. Graduates from these courses will play an effective role in the research and development, production control, quality control and technical sales and service aspects of the chemical industries.

CERAMIC ENGINEERING

The Department of Ceramic Engineering offers courses designed to provide scientists and engineers fitted for service in industries and organisations concerned with the development, manufacture and use of materials in the fields of: whitewares, structural ceramic productions, high-temperature materials, electrical ceramics, glass, ceramic surface coatings, abrasives, cermets and nuclear ceramics. Graduates from these courses would be able to find employment in the general field of ceramics in the following capacities: ceramist or ceramic engineer on research and development, production control, quality control, product evaluation, technical sales and service.

POLYMER SCIENCE

The Department of Polymer Science provides courses in Polymer Science designed to train scientists fitted for service in industries concerned with surface coatings, plastics and rubber (natural and synthetic). Graduates from these courses would be capable of satisfactorily applying their training in the following functions in these industries: research and development, production control, quality control, product evaluation and technical sales and service.

Industrial Chemistry—Full-Time Course Bachelor of Science

FIRST YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
10.001	Mathematics I	4	2	0	4
Plus one of:—					
5.001	Engineering I	3	3	0	4½
17.001	General Biology	2	0	4	4
25.511	Geology I*	2	0	4	4

* Three field excursions, up to five days in all, are an essential part of the course.

Hours per week for three terms
Private

		Lec.	Tut.	Lab.	Study
1.212	Physics	1½	0	1½	3½
2.032	Chemistry II—				
	Inorganic/Analytical	2	0	3	3½
	Physical	2	0	3	3½
	Organic	2	0	3	3½
10.031	Mathematics II	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501	English <i>or</i>				
26.571	An Introduction to Modern Drama	1	½	0	2
		10½	2½	10½	19½

Hours per week for three terms
Private

		Lec.	Tut.	Lab.	Private Study
2.211	Applied Organic Chemistry	1	0	3	2½
3.111	Chemical Engineering I	2	2	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
22.111	Industrial Chemistry I	7½	2	2½	14
	Two 30-hour General Studies				
	Electives	2	0	0	3
		14½	4	5½	23½

Hours per week for three terms			Private
Lec.	Tut.	Lab.	Study

22.112	Industrial Chemistry II*	8	0	4	16
22.121	Industrial Chemistry Seminar	0	3	0	5
22.191	Project†	0	0	3	3
	General Studies Advanced Elective	2	0	0	4
		10	3	7	28

Hours for Term 3

Industrial Chemistry—Part-Time Course***Bachelor of Science (Technology)****FIRST AND SECOND STAGES**

Two of the following subjects will be taken in the first year, the other two in second year (as directed).

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
10.001	Mathematics I	4	2	0	4
Plus one of:—					
5.001	Engineering I	3	3	0	4½
17.001	General Biology	2	0	4	4
25.511	Geology I*	2	0	4	4

* Three field excursions, up to five days in all, are an essential part of the course.

THIRD STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	0	1½	3½
2.311	Physical Chemistry	2	0	3	3½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
		5½	2	4½	10½

FOURTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.451	Inorganic/Analytical Chemistry ...	2	0	3	3½
2.611	Organic Chemistry	2	0	3	3½
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		5	½	6	9

* See below for outline of this course involving combined full-time and part-time study.

FIFTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Private			
		Lec.	Tut.	Lab.	Study
3.111	Chemical Engineering I.....	2	2	0	2
3.311	Fuel Science and Engineering I.....	2	0	0	2
22.111/1	Industrial Chemistry I, Part I.....	2½	0	2½	6
One 30-hour General Studies					
Elective		1	0	0	1½
		7½	2	2½	11½

SIXTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private
					Study
2.211	Applied Organic Chemistry	1	0	3	2½
22.111/2	Industrial Chemistry I, Part I	5	2	0	8
One 30-hour General Studies					
Elective		1	0	0	1½
		7	2	3	12

Ceramic Engineering—Full-Time Course
Bachelor of Science

FIRST YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private
					Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

SECOND YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.032	Chemistry II—				
	Inorganic/Analytical	2	0	3	3½
	Organic	2	0	3	3½
	Physical	2	0	3	3½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501	English <i>or</i>				
26.571	An Introduction to Modern Drama	1	½	0	2
		10½	3	10	18

THIRD YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.111	Chemical Engineering I	2	2	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
8.112	Materials and Structures	1	1	1	1½
22.211	Ceramics I	3	0	5	7
22.221	Chemical Thermodynamics and Kinetics	2	1	0	3
25.551	Mineralogy	1	0	2	2
	Two 30-hour General Studies Electives	2	0	0	4
		13	4	8	21½

FOURTH YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
22.212	Ceramics II	3	0	3	6
22.231	Ceramic Engineering	2	0	2	4
22.241	Instrumentation Process Control*	3	0	4	5
22.251	Operation Research and Seminars	1	0	0	2
22.291	Project†	0	0	6	3
	General Studies Advanced Elective	2	0	0	4
		11	0	15	24

* Terms 1 and 2 only.

† In Term 3, 18 hours per week are devoted to laboratory work on the Project.

Ceramics—Part-Time Course***Bachelor of Science (Technology)****FIRST AND SECOND STAGES**

Two of the following subjects will be taken in the first year and the other two in the second year (as directed).

(30 weeks' part-time course)

Hours per week for three terms

		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

THIRD STAGE

(30 weeks' part-time course)

Hours per week for three terms

		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.311	Physical Chemistry	2	0	3	3½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
		5½	2½	4	9

FOURTH STAGE

(30 weeks' part-time course)

Hours per week for three terms

		Lec.	Tut.	Lab.	Private Study
2.451	Inorganic/Analytical Chemistry	2	0	3	3½
2.611	Organic Chemistry	2	0	3	3½
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		5	½	6	9

* See below for outline of this course involving combined full-time and part-time study.

FIFTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
8.112	Materials and Structures	1	1	1	1½
22.211/1	Ceramics I, Part I	1	0	2	2
22.221	Chemical Thermodynamics and Kinetics	2	1	0	3
25.551	Mineralogy	1	0	2	2
One 30-hour General Studies Elective		1	0	0	2
		6	2	5	10½

SIXTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.111	Chemical Engineering I	2	2	0	2
3.311	Fuel Science and Engineering I	2	0	0	2
22.211/2	Ceramics I, Part II	2	0	3	5
One 30-hour General Studies Elective		1	0	0	2
		7	2	3	11

Polymer Science—Full-Time Course
Bachelor of Science

FIRST YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

SECOND YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.032	Chemistry II—				
	Inorganic/Analytical	2	0	3	3½
	Organic	2	0	3	3½
	Physical	2	0	3	3½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
26.501	English <i>or</i>				
26.571	An Introduction to Modern Drama }	1	½	0	2
		10½	3	10	18

THIRD YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.322	Physical Chemistry	2	0	3	4½
2.632	Organic Chemistry	2	0	3	4½
3.111/1	Chemical Engineering I				
	(Principles I)	1	1	0	1
22.311	Polymer Science I	3	0	6	8
	Two 30-hour General Studies				
	Electives	2	0	0	3
		10	1	12	21

FOURTH YEAR (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.331	Applied Physical Chemistry	1	0	3	2½
22.312	Polymer Science II* (Terms 1 and 2)	4	0	9	12
22.321	Seminar (Terms 1 and 2)	0	2	0	3
22.391	Project†	0	0	3	3
	General Studies Advanced				
	Elective	2	0	0	4
		7	2	15	24½

* Hours for Term 1 only.

Hours for Term 2

† Hours for Term 1 only.

Hours for Term 2

Hours for Term 3

4 0 8 12

0 0 6 3

0 0 30 6

Polymer Science—Part-Time Course***Bachelor of Science (Technology)****FIRST AND SECOND STAGES**

Two of the following subjects will be taken in the first year and the other two in the second year (as directed).

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

THIRD STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.311	Physical Chemistry	2	0	3	3½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
		5½	2½	4	9

FOURTH STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.451	Inorganic/Analytical Chemistry ...	2	0	3	3½
2.611	Organic Chemistry	2	0	3	3½
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		5	½	6	9

* See below for outline of this course involving combined full-time and part-time study.

FIFTH STAGE (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.322	Physical Chemistry	2	0	3	4½
2.632	Organic Chemistry	2	0	3	4½
	One 30-hour General Studies Elective	1	0	0	2
		5	0	6	11

SIXTH STAGE (30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
3.111/1	Chemical Engineering I (Principles I)	1	1	0	1
22.311	Polymer Science I	3	0	6	8
	One 30-hour General Studies Elective	1	0	0	2
		5	1	6	11

B.Sc. (Tech.) Courses in Full-Time/Part-Time Study

Students enrolling in the B.Sc.(Tech.) courses in Industrial Chemistry, Ceramics or Polymer Science may reduce the time required for completion by undertaking the following programme of combined part-time/full-time study.

- Stage 1.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 2.....Part-time (as for B.Sc.(Tech.) course above)
- Stage 3A.....Full-time (as for second year of full-time B.Sc. course above)
- Stage 4A.....Full-time (as for third year of full-time B.Sc. course above)
- Stage 5A.....Part-time (as set out below)

STAGE 5A

A programme of 6-9 hours per week selected from the following subjects on the advice of the Head of the School of Chemical Technology:

- 22.111 Industrial Chemistry I
- 22.211 Ceramics I
- 22.311 Polymer Science I
- 4.011 Metallurgy I
- 7.311 Mineral Dressing
- 3.321 Fuel Engineering II
- Any other subject approved by the Professorial Board on the recommendation of the Head of School.

SCHOOL OF GEOGRAPHY

Geographers study the spatial relationships of the phenomena which make up man's physical and social environment, and aim to establish principles which govern those relationships. The geographer may concentrate on selected variables, as in systematic geography, or may deal with variables operative in a specific area, as in regional geography.

The cultural significance of geography lies in its contribution to an understanding of the total environment, but the geographer's skills also find practical application in the conservation and planned development of resources. Increasing numbers of geographers are finding such professional employment; for instance, geomorphologists and biogeographers are undertaking resource-inventory surveys in northern Australia, and economic geographers are engaged as regional planners and market researchers.

Geography—Full-Time Course

Bachelor of Science

This four-year full-time undergraduate course is being planned to train professional geographers equipped for entry into applied fields, particularly as physical or economic geographers. In the first year the physical basis of geography is treated systematically and students receive training in allied sciences. In the second year, human geography will be similarly treated. There will be progressive specialization within physical or economic geography in subsequent years with, however, a common strand of regional geography.

GEOGRAPHY—FULL-TIME COURSE

Bachelor of Science

FIRST YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
27.001	Geography I*	2	1	3	4
10.001	Mathematics I	4	2	0	4
	and any two from				
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
17.001	General Biology**	2	0	4	4

* Three one-day excursions are an essential part of the course.

** Students omitting General Biology will not be eligible to proceed to Advanced Biogeography.

LATER YEARS

The course outline for the second, third and fourth years will be available in the 1968 Calendar and Handbook.

SCHOOL OF METALLURGY

The metallurgical profession is developing rapidly in importance in Australia, in keeping with the recent spectacular growth of our metal and mineral industry. In terms of value of production this industry has become recognized as one of Australia's most important, especially in terms of export earnings. Expansion of the industry has greatly enhanced the need for metallurgists.

Industrial development in metallurgy has been accompanied by, and is based on, the development of metallurgical research. This is being carried on in a number of laboratories run by industry, government, and the universities.

The graduate metallurgist may choose from a wide range of different types of employment with a great choice of location. He may work in production, technical control or development, either in the metal extraction plants of Newcastle, Port Kembla, Broken Hill, Mt. Isa, Mt. Morgan, Port Pirie, Whyalla or Tasmania; or in the metal manufacturing plants, including the automobile, aircraft, ship-building and other industries, of the main centres and capital cities. In the metal industry in general the opportunities for a career in management are excellent, since it is a tradition in this industry that management should be in the hands of technical men. If the graduate is inclined towards research and development, he will find considerable scope in various government, University, and industrial research laboratories.

The undergraduate courses in metallurgy have been designed to prepare students for employment in metallurgical industries and research institutions, and involve a general training in basic sciences and engineering. These fundamental principles are then extended to cover studies of the extraction, refining, working, fabrication and use of metals.

These courses meet the formal educational requirements for admission to the professional metallurgical institutes, such as the Australasian Institute of Mining and Metallurgy and the Institution of Metallurgists (London). Further details about membership of these institutes, the Australian Institute of Metals and the under-

graduate Metallurgical Society of the University, all of which students are encouraged to join. may be obtained from the Head of the School.

While the emphasis in the course is on providing a broad fundamental background in all branches of metallurgy, provision is made for a limited amount of specialization of the student's own choice in the final year.

Metallurgy—Full-Time Course **Bachelor of Science**

Students in this course attend the University for 30 weeks over three terms from March to November (excluding examinations and vacations).

Students are required, before graduation, to have gained at least four months of approved industrial experience. This is normally achieved by working during the Christmas vacations at the end of the second and third years. During the second, third, and fourth years of the course, visits are made to various metallurgical works, and students are required to submit reports on some of these.

FIRST YEAR **(30 weeks' day course)**

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

THE UNIVERSITY OF NEW SOUTH WALES

SECOND YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.022	Chemistry II (M)*	3	0	2½	5
4.011	Metallurgy†	5	0	5	8
10.031	Mathematics	1	1	0	2
25.551	Mineralogy	1	0	1	2
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama }				
		12½	2	9½	21

* Hours for Term 1 only.

Hours for Term 2 4 0 3 7

Hours for Term 3 3 0 2½ 5

† Hours for Term 1 only.

Hours for Terms 2 and 3 4 1 5 7

THIRD YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.012	Metallurgy II	9	1*	9	17
6.801	Electrical Engineering	1	0	2	2
	Two 30-hour General Studies	2	0	0	4
	Electives				
		12	1	11	23

* Two hours in terms 2 and 3.

FOURTH YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.013	Metallurgy III*	6	2	9	13½
4.021	Metallurgy Project†	0	0	5	5
	General Studies Advanced	2	0	0	4
	Elective				
		8	2	14	22½

* Hours for Term 1 only.

Hours for Term 2 6 2 6 13

Hours for Term 3 6 0 0 12

† Hours for Term 1 only.

Hours for Term 2 0 0 8 8

Hours for Term 3 0 0 12 12

Metallurgy—Part-Time Course***Bachelor of Science (Technology)**

The part-time course extends over six years of three terms each. Students are required to obtain at least three years' approved experience in a metallurgical industry or research establishment concurrently with studies.

During the last three years of the course visits are made to various metallurgical works, and students are required to submit reports on some of these.

FIRST AND SECOND STAGES

(30 weeks' part-time course)

(Two subjects to be taken in each year)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

THIRD STAGE

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.022	Chemistry II (M)†	3	0	2½	5
10.031	Mathematics	1	1	0	2
26.501	English	1	½	0	2
		6½	2	3½	11

†Hours for Term 1 only.

Hours for Term 2

Hours for Term 3

4 0 3 7

3 0 2½ 5

* See below for outline of this course involving combined full-time and part-time study.

FOURTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.011	Metallurgy I*	5	0	5	8
25.551	Mineralogy	1	0	1	2
26.501/2	English	1	0	0	2
		7	0	6	12

* Hours for Term 1 only.

Hours for Terms 2 and 3	4	1	5	7
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FIFTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.012/1	Metallurgy IIA*	4	0	5	8
6.801	Electrical Engineering	1	0	2	2
	One 30-hour General Studies Elective	1	0	0	2
		6	0	7	12

* Hours for Terms 1 and 2 only.

Hours for Term 3	4	2	3	8
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SIXTH STAGE
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.012/2	Metallurgy IIB	5	1	5	10
	One 30-hour General Studies Elective	1	0	0	2
		6	1	5	12

Students enrolling in the Metallurgy B.Sc.(Tech.) course may reduce the time required for completion by undertaking the following programme of combined part-time/full-time study:

Stage 1.....Part-time (as for B.Sc.(Tech.) course above)
 Stage 2.....Part-time (as for B.Sc.(Tech.) course above)
 Stage 3AFull-time (as for second year of full-time
 B.Sc. course above)
 Stage 4AFull-time (as for third year of full-time
 B.Sc. course above)
 Stage 5APart-time (as set out below)

Hours per week for three terms

	Lec.	Tut.	Lab.	Private Study
4.012/3 Metallurgy IIC	2	0	2	3½
4.013/1 Seminar	0	0	1	1
4.012/4 Report	0	0	0	2
	2	0	3	6½

SCHOOL OF MINING ENGINEERING

The School of Mining Engineering offers a full-time course in Mining Engineering leading to the degree of Bachelor of Engineering (pass or honours).

The School also offers two courses at graduate level requiring one year of full-time or two years of part-time study leading to the Graduate Diploma (Grad.Dip.) in Mining Engineering or Mineral Technology.

Part-time courses in Mining Engineering are conducted at the Wollongong University College and at the Broken Hill Division of the University, leading to the award of the B.Sc. (Tech.) degree. Students in the B.Sc. (Tech.) course may complete the requirements for the Bachelor of Engineering degree at Kensington after obtaining the approval of the Head of the School.

The courses within the School prepare graduates for employment in the mineral industries and in research institutions which are linked with those industries.

Since 1850 the mining industry has been a pioneering force in the development of Australia. If mining engineers are to carry on this tradition they must realise that the problems of today are complex and require great technical skill. They also must be aware that the future offers an increasing number of opportunities for all grades and all types of mining engineers.

It is obvious that the mining industry, now ranking third in Australia, will become, because of its spectacular rate of growth, an even greater influence in the development of this and neighbouring countries than it has been in the past. Vigorous expansion faces the industry. For example, extensive and successful prospecting is already taking place, particularly in those areas which in the past received little attention, and hidden, sub-surface deposits are being discovered on established mining fields. After the discovery of a promising deposit there is a period of testing, proving and assessment followed by a period of development and

construction. Finally, there is the production period with which is associated some extension of activities which includes smelting and refining.

Mining Engineering—Full-Time Course

Bachelor of Engineering

The first two years of the course are common with the first and second years of the Civil Engineering course. The third year of the programme is under revision, and in 1967 will consist of the options as shown. The fourth year programme, which is also under revision, is concerned with the professional Mining Engineering subjects which include Geology and Geophysics, Mining Engineering and Mineral Processing.

The aim of the training is to give students a thorough foundation in mining engineering and so permit them to enter "coal mining", "metalliferous mining" or the "petroleum industry", and to be employed in any of the phases of these industries, ranging from exploration to production.

To cater for the varied needs of the industry and to develop the special talents of individual students an elective subject is offered in the final year of the course. In addition, during the final year of the course students are given a project which may be linked with the elective and for which a thesis must be submitted.

During the undergraduate course students will spend portion of the long vacations obtaining practical experience in mines. Mining companies prepare programmes so that the students obtain a comprehensive experience in many aspects of mining work. This experience is important; it is related to the academic training received within the School, and can contribute to the experience record of candidates for the Mine Manager's Certificate.

After graduation it is normal for mining engineers to obtain the abovementioned statutory certificate of competency from one of the State Government Departments of Mines. Graduates in Mining Engineering are exempt from certain parts of the relevant examination.

FIRST YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

SECOND YEAR
(30 weeks' day course)

		Hours per week for three terms	
		Lec.	Lab./Tut.
5.511	Fluid Mechanics	1½	1½
5.711	Thermodynamics	1	½
6.801	Electrical Engineering	1	2
8.151	Mechanics of Solids	2	1
8.251	Properties of Materials	1½	1½
8.441	Engineering Surveying*	1½	1½
8.621	Engineering Construction	2	0
10.022	Mathematics	3	1
25.531	Geology I	1	1½
26.501	English <i>or</i>	1	1†
26.571	An Introduction to Modern Drama		
		15½	11

* A one week survey camp must be attended in third term.

† Given in alternate weeks.

THIRD YEAR*
(24 weeks' day course)

	Option 1				Option 2				Option 3			
	Terms 1, 2, 3				Terms 1, 2, 3				Terms 1, 2, 3			
	Lec.	Tut.	Lab.	Private Study	Lec.	Tut.	Lab.	Private Study	Lec.	Tut.	Lab.	Private Study
4.931S Metallurgy	—	—	—	—	1	0	1	2	—	—	—	—
5.402S Mechanics of Solids	1½	1½	0	1½	1½	1½	0	1½	1½	1½	0	1½
5.501S Fluid Mechanics	—	—	—	—	1	1½	0	2	1	1½	0	2
6.801S Electrical Engineering	1½	0	2½	2½	1½	0	2½	2½	1½	0	2½	1
7.111S Mining Engineering I	6	0	4	8	6	0	4	8	6	0	4	8
8.421S Surveying†	1½	0	1½	2½	—	—	—	—	1½	0	1½	2½
25.531S Geology**	2	0	1	2	—	—	—	—	2	0	1	2
Two 30-hour General Studies Electives‡	3	0	0	5	3	0	0	5	3	0	0	5
	15½	1½	9	21½	14	3	7½	21	16½	3	9	22

* Course under revision.

† A survey camp of one week's duration will be conducted in the sixth week of the third term.

** Two-one-day Geology excursions are an essential part of the course.

‡ Terms 1 and 2 (21 weeks) only.

FOURTH YEAR*
(Common to the three options)
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
7.112	Mining Engineering II and Project†	4	1	4	7
7.113	Mining Engineering Elective	1	1	0	2
7.121	Mine Surveying	1	0	1	1½
7.311	Mineral Dressing	1	0	3	2
25.532	Geology for Mining Engineers**	4	0	3	6
	General Studies Advanced Elective	2	0	0	4
		13	2	11	22½

* Course under revision.

† Project for the award of honours will be more advanced than that required for the award of the pass degree.

** A Geology excursion will be conducted during the year.

THIRD TERM

During the third term of the fourth year, students will devote time to the professional elective subjects and the preparation of their thesis.

Mining Engineering—Part-Time Course

Bachelor of Science (Technology)

(Broken Hill Division and Wollongong University College)

The School of Mining Engineering offers at Broken Hill and Wollongong part-time courses in Mining Engineering leading to the degree of Bachelor of Science (Technology).

FIRST AND SECOND YEARS

(30 weeks' part-time course)
(Two subjects to be taken in each year)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	6
		12	6	6	19

THIRD YEAR

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212S	Physics IIT	1½	½	1	2
5.301	Engineering Mechanics	1	½	½	2
7.111/1	Mining Engineering I, Part I	1	0	0	1
8.112	Materials and Structures	1½	1½	0	1½
10.022/1	Mathematics II, Part I	1	1	0	2
26.501	English	1	½	0	2
		7	4	1½	10½

FOURTH YEAR

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
4.911	Materials Science	1	0	1	1
5.501	Fluid Mechanics	1	½	½	2
5.701	Thermodynamics	1	½	½	2
7.111/2	Mining Engineering I, Part II	2	0	0	4
*8.421	Engineering Surveying	1½	0	0	2
10.022/2	Mathematics II, Part II	1	1	0	2
26.501/2	English	1	0	0	2
		8½	2	2	15

* Including practical work.

FIFTH YEAR

(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
5.402	Mechanics of Solids	1½	1½	0	2
6.801	Electrical Engineering	1	1	1	2
7.111/3	Mining Engineering I, Part III	2	0	1	5
25.531	Geology*	1	0	1	2
Two 30-hour General Studies Electives		2	0	0	4
		7½	2½	3	15

* Two short Geology excursions are an essential part of the course.

SIXTH YEAR
(30 weeks' part-time course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
7.112/1	Mining Engineering II and Project*	2	0	1	4
7.121/1	Mine Surveying†	1½	0	0	1½
7.311/1	Mineral Dressing	2	0	2	3
25.532/1	Geology for Mining Engineers‡	2	0	2	4
		7½	0	5	12½

* A mining excursion of five days will be conducted during the year.

† Including practical work.

‡ A Geology excursion will be conducted during the year.

SCHOOL OF TEXTILE TECHNOLOGY

The field of textile technology is so broad in scope that students are given the opportunity of choosing from four courses, viz., Textile Chemistry, Textile Physics, Textile Engineering and Textile Manufacture. Each course extends over four years. The aim of all four courses is to produce graduates who have acquired a comprehensive knowledge of all the textile sciences and technologies, the courses themselves differing in the fundamental subjects offered in the second and third years. All students take a common first year, and they need not choose the option they desire to follow until the end of that year. Students are required to undertake a minimum of eight weeks' industrial training during the second and third year vacations. The fourth year is common to all four Textile Technology courses.

Although Australia converts only ten per cent of her wool clip and imports 90 per cent of her manufactured cotton and synthetic requirements, the textile industry is nevertheless the second largest manufacturing group in this country. Present-day textile technology is based on engineering and the fundamental sciences, and excellent opportunities await university-trained scientists and technologists in the textile and allied industries, and in research and development organisations.

The conversion of textile raw materials into their finished products is simply a succession of, and an interaction between, a number of chemical, physical and engineering processes. Graduates with a good background in physics, chemistry or engineering, together with a broad training in the whole range of textile sciences and technologies, as provided in these courses, will substantially meet the present and future technological requirements of industry. They will also play a decisive part in bridging the gap which exists between fundamental research and its industrial application. The course in Textile Manufacture, which includes subjects in Commerce and Applied Psychology, is especially designed to meet the undoubted need for executives in industry who have been given a comprehensive technological training.

Textile Technology—Full-Time Course
Bachelor of Science

FIRST YEAR
 (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics I	3	1	2	3½
2.001	Chemistry I	2	0	4	5
5.001	Engineering I	3	3	0	4½
10.001	Mathematics I	4	2	0	4
		12	6	6	17

TEXTILE CHEMISTRY

SECOND YEAR
 (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
2.062	Chemistry II—				
	Organic Chemistry	2	0	3	3½
	Physical Chemistry	2	0	3	3½
10.331	Statistics	1	1	0	1½
13.111	Textile Technology I	5	0	5	5
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		12½	2	12	17½

THIRD YEAR
 (30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
2.451	Chemistry II—				
	Inorganic/Analytical	2	0	3	3½
13.112	Textile Technology II	6	0	7	10
13.211	Textile Science I	1	1	0	3
13.311	Textile Engineering I	1	0	0	1½
	Two 30-hour General Studies				
	Electives	2	0	0	4
		12	1	10	22

TEXTILE PHYSICS

SECOND YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.112	Physics II	4	0	3	4
10.111	Pure Mathematics II	3	2	0	4
10.331	Statistics	1	1	0	1½
13.111	Textile Technology I	5	1	5	5
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		14	4½	8	16½

THIRD YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.213	Physics III	4	0	3	5
13.112	Textile Technology II	6	0	7	10
13.211	Textile Science I	1	0	0	2
13.311	Textile Engineering I	1	0	0	1½
Two 30-hour General Studies Electives		2	0	0	4
		14	0	10	22½

TEXTILE ENGINEERING

SECOND YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
5.301	Engineering Mechanics	1½	½	0	2
5.501	Fluid Mechanics	1	½	½	2
8.112	Materials and Structures	1	1	1	1½
10.031	Mathematics	1	1	0	2
10.331	Statistics	1	1	0	1½
13.111	Textile Technology I	5	1	5	5
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		13	6	7½	18

THIRD YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
5.101/1	Mechanical Engineering Design ...	0	2	0	1
5.302	Theory of Machines	1½	1	0	2
6.801	Electrical Engineering	1	0	2	2
13.112	Textile Technology II	6	0	7	10
13.211	Textile Science I	1	0	0	2
13.311	Textile Engineering I	1	0	0	1½
	Two 30-hour General Studies				
	Electives	2	0	0	4
		12½	3	9	22½

TEXTILE MANUFACTURE

SECOND YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.212	Physics	1½	½	1	2
10.331	Statistics	1	1	0	1½
12.101	Psychology	2	1	0	2
13.111	Textile Technology I	5	1	5	5
14.101	Accounting I	2	2	0	4
15.101	Economics I	2	1	0	3
26.501	English or	1	½	0	2
26.571	An Introduction to Modern Drama				
		14½	7	6	19½

THIRD YEAR
(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
12.501	Social Psychology	2	0	0	2
13.112	Textile Technology II	6	0	7	10
13.211	Textile Science I	1	0	0	2
13.311	Textile Engineering I	1	0	0	1½
14.321	Business Finance	2	0	0	3
28.101	Principles of Marketing	2	0	0	3
	Two 30-hour General Studies				
	Electives	2	0	0	4
		16	0	7	25½

FOURTH YEAR

(30 weeks' day course)

Common to all four courses

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
13.113	Textile Technology III	5	0	3	8
13.212	Textile Science II	2	1	3	6
13.312	Textile Engineering II	1½	0	0	3
13.411	Project	0	0	7	2
	General Studies Advanced				
	Elective	2	0	0	4
		10½	1	13	23

SCHOOL OF WOOL TECHNOLOGY

To meet a potential threat from cheaply-produced man-made fibres, wool producers, by the implementation of the Wool Use Promotion Act of 1945 and subsequent legislation, have undertaken a programme to improve efficiency through research, increased extension services, and adequate publicity for wool. The full development of this programme will require specialist personnel trained to give service to the pastoral industry.

To meet this need the School of Wool Technology offers a full-time course in wool technology, leading to the degree of Bachelor of Science (pass or honours). (Courses in Wool Commerce leading to the degree of Bachelor of Commerce are offered in the Faculty of Commerce). The School also offers a course at the graduate level requiring one year of full-time or two years of part-time study leading to the Graduate Diploma in Applied Science in Wool Technology, and there are further courses leading to the research degrees of Master of Science and Doctor of Philosophy.

The Wool Technology courses aim to provide a pool of graduates in whom has been inculcated a liberal scientific outlook, and the habit of exact and logical thought. These men are familiar with the latest developments in fields relating to wool production, wool commerce, and wool utilization. They are also good practical wool men, capable of handling wool and recognizing its technical characteristics, through facility in subjective appraisal on which the whole wool trade is based. Graduates of the School are keenly sought after for positions as research workers, teachers, extension workers, agricultural journalists, valuers, and managers of estates, and for other professional occupations in the pastoral industry.

The first year of the B.Sc. course consists of a basic training in general science; vocational subjects essential to all branches of

the wool industry are given in the second, third and fourth years. The fourth year work will include a project which will give each student an opportunity to express initiative and originality. By association with lecturers, and teachers who are all engaged in research, we aim to provoke both curiosity and interest in students who will themselves endeavour to contribute to the advance of efficiency.

From time to time obligatory excursions and farm tours are arranged for senior students.

Requirements for Industrial Training

Each student is required to complete satisfactorily thirty-six weeks' practical work on approved sheep properties, twenty-four weeks of which work should be concurrent with the course. If a student has done practical work before entering the course, this may be taken into consideration in determining any further work required.

In order to obtain recognition of practical work carried out students shall:

1. Make application for the approval of the properties where they intend to carry out the required practical work, such application to contain a brief description of the property and to be in the hands of the Head of the School at the earliest possible date. Students should endeavour to obtain experience in the pastoral, sheep-wheat, and high rainfall sheep zones.

2. At the conclusion of the work, produce certificates from employers stating periods of employment and reporting on the quality of the student's work.

3. Supply reports as hereunder:

- (i) On work carried out in the long vacation—

- (a) Monthly interim reports setting out briefly the nature of the work engaged in, with any notes of topical interest. The first interim report shall include a description of the property, including details of farm buildings, dip and yards, plant and equipment, stock numbers (in age and sex groups), and such features as water supplies, improved pastures, crops, etc. A sketch plan of the property should also be included.

- (b) A final report to be submitted within a month of resumption of lectures. The final report should embody a report on a district basis in general and the property on which the student has worked in particular. The development of farming practices, the salient features of management in relation to the environment, pasturage, rainfall and distribution, water supplies, type of stock and breeding policies, statistics, etc., should receive consideration. The size and capacity of the farm buildings should be mentioned. Sketch plans with the principal measurements and photographs to illustrate features will be of value. Where applicable, details of pasture mixtures, rate of sowing for crops and fertiliser treatment should be recorded, as should also labour performances (both manual and with machines), and costs.
- (ii) On work carried out in short vacations—A brief report to be submitted within one week of the resumption of the term.
- (iii) By students who carry out work for thirty-six weeks on a property or properties—
 - (a) Interim reports to be submitted every two months.
 - (b) Final reports to be submitted by March 31 in the year of resumption of studies. The nature of the interim and final reports shall be as required for work carried out in the long vacation.

Note.—Students will find that a loose-leaf note-book suitably indexed will be of great value for recording factual material, costs, material requirements for various jobs, et cetera.

Students are also encouraged to submit questions relating to any problems they may meet in the course of their practical work.

Wool Technology—Full-Time Course**Bachelor of Science****FIRST YEAR**

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
1.001	Physics	3	1	2	3½
2.001	Chemistry	2	0	4	5
10.001	Mathematics	4	2	0	4
17.001	General Biology	2	0	4	4
		11	3	10	16½

SECOND YEAR

(30 weeks' day course)

		Hours per week for three terms			
		Lec.	Tut.	Lab.	Private Study
9.101	Livestock Production I	3	0	0	4½
9.221	Agronomy	2	0	2	4
9.531	Wool Technology I	2	0	4	4
10.331	Statistics	1	1	0	1½
17.111	Biochemistry	3	0	6	6
26.501	English <i>or</i>	1	½	0	2
26.571	An Introduction to Modern Drama				
		12	1½	12	22

THIRD YEAR
(30 weeks' day course)

		Term 1				Term 2				Term 3			
					Private				Private				Private
		Lec.	Tut.	Lab.	Study	Lec.	Tut.	Lab.	Study	Lec.	Tut.	Lab.	Study
9.122	Livestock Production II	3	0	0	4½	6	0	0	10½	3	0	0	6
9.311	Economics	2	0	0	4	2	0	0	4	1	0	0	2
9.411	Agricultural Chemistry ...	1	0	3	2	1	0	3	2	1	0	3	2
9.532	Wool Technology II	2	0	3	4	1	0	3	2	2	0	3	4
9.601	Animal Physiology I	2	0	3	3	1	0	3	1½	2	0	2	4
9.801	Genetics I	2	0	1	4	1	0	1	2	2	0	1	4
	Two 30-hour General Studies Electives	2	0	0	4	2	0	0	4	2	0	0	4
		14	0	10	25½	14	0	10	26	13	0	9	26

FOURTH YEAR
(30 weeks' day course)

		Hours per week											
		Term 1				Term 2				Term 3			
				Private				Private				Private	
		Lec.	Tut.	Lab.	Study	Lec.	Tut.	Lab.	Study	Lec.	Tut.	Lab.	Study
9.001	Project	0	0	7*	0	0	0	7*	0	0	0	11*	0
9.533	Wool Technology III	0	0	1	0	0	0	1	0	0	0	1	0
9.123	Livestock Production III	1	1	0	2	1	1	0	2	2	0	0	4
9.231	Pastoral Agronomy	1	1	0	2	1	1	0	2	1	1	0	2
9.421	Animal Nutrition	2	0	0	4	2	0	0	4	—	—	—	—
	General Studies												
	Advanced Elective	2	0	0	4	2	0	0	4	2	0	0	4
		6	2	8	12	6	2	8	12	5	1	12	10

Plus two of the following subjects, the choice to be approved by the Head of the School.

9.312	Farm Management	2	2	0	4	2	2	0	4	2	2	0	4
9.534	Wool Technology IV	2	0	2	4	2	0	2	4	2	0	2	4
9.901	Rural Extension	2	2	0	4	2	2	0	4	2	2	0	4
9.602	Animal Physiology II	2	0	2	4	2	0	2	4	2	0	2	4
17.122	Biochemistry	3	1	6*	6	3	1	6*	6	3	1	10*	6
9.802	Genetics II	2	0	2	4	2	0	2	4	2	0	2	4
9.811	Biostatistics	2	0	2	4	2	0	2	4	2	0	2	4

* Students electing the Biochemistry option must undertake an approved project in a related field.

Table of Pre-requisite and Co-requisite Subjects

<i>Subject</i>	<i>Pre-Requisite</i>	<i>Co-Requisite</i>
<i>1st Year</i>		
1.001 Physics	Nil	Nil
2.001 Chemistry	"	"
10.001 Mathematics	"	"
17.001 General Biology	"	"
<i>2nd Year</i>		
9.101 Livestock Production I	17.001 General Biology	9.221 Agronomy 9.531 Wool Technology I 17.111 Biochemistry
9.221 Agronomy	2.001 Chemistry 17.001 General Biology	
9.531 Wool Technology I	17.001 General Biology 2.001 Chemistry	9.101 Livestock Production I
<i>3rd Year</i>		
9.122 Livestock Production II	9.101 Livestock Production I	9.601 Animal Physiology
9.532 Wool Technology II	9.531 Wool Technology I 9.101 Livestock Production I	9.122 Livestock Production II
9.601 Animal Physiology I	17.001 General Biology 1.001 Physics 17.111 Biochemistry 2.001 Chemistry	9.122 Livestock Production II
9.801 Genetics I	17.001 General Biology 10.331 Statistics 9.101 Livestock Production I	
9.411 Agricultural Chemistry	1.001 Physics 2.001 Chemistry 17.111 Biochemistry	
9.311 Economics		
<i>4th Year</i>		
9.001 Project		
9.123 Livestock Production III		
9.231 Pastoral Agronomy	In general these subjects require the subjects of the 1st, 2nd and 3rd year or their equivalents.	Compulsory subjects of the 4th year gain by being taught as a group but could be taken singly, with the approval of Head of School. Optional subjects are to be approved by the Head of the School.
9.312 Farm Management		
9.421 Animal Nutrition		
17.122 Biochemistry		
9.533 Wool Technology III		
9.534 Wool Technology IV		
9.602 Animal Physiology II		
9.802 Genetics II		
9.811 Biostatistics		
9.901 Rural Extension		

All students take common subjects up to and including third year. They have, therefore, all the pre-requisites for any two optional subjects they choose. There are no co-requisites for the two subjects chosen, all of which will have had a logical development during the first three years of the course.

FACULTY OF ENGINEERING

The Faculty of Engineering consists of the Schools of Civil Engineering (with its associated Department of Surveying), Electrical Engineering, and Mechanical Engineering (with its associated Department of Industrial Engineering), and the Schools of Highway Engineering, Nuclear Engineering and Traffic Engineering.

The Schools of the Faculty offer four-year full-time courses leading to the degrees of Bachelor of Engineering and Bachelor of Surveying (pass or honours), and six-year part-time courses leading to the degree of Bachelor of Science (Technology) and a seven-year part-time course leading to the degree of Bachelor of Surveying.

Common First Year: There is a common first-year syllabus in Physics, Mathematics, Chemistry and Engineering for all courses in the Faculty, except Surveying, making it possible for students to transfer from one course to another at the end of their first year without loss of standing. This first year is also equivalent to the first two stages of the part-time Engineering courses which lead to the degree of Bachelor of Science (Technology). Transfer to and from certain courses in the Faculties of Science and Applied Science without loss of standing is also possible at the end of the first year.

Rules relating to the operation of these common first-year subjects in the Faculties of Engineering, Science, Medicine and Applied Science are set out in the Calendar and also on page 50 of this Handbook.

POST-GRADUATE STUDY

The Faculty provides facilities for students to proceed to the higher degrees of Doctor of Philosophy, Master of Engineering, Master of Science and Master of Technology. Courses leading to the award of a Graduate Diploma are also offered. The degree of Doctor of Science is awarded for a contribution of distinguished merit in the fields of science, engineering or applied science.

The degrees of Doctor of Philosophy, Master of Engineering and Master of Science are all awarded for research and require the preparation and submission of a thesis embodying the results of an original investigation or design. Candidates for the Doctorate of Philosophy may read for the degree in this Faculty and are normally involved in three years' work. The work for the Master's degree may be completed in a minimum of one year, but normally requires two years of study.

The Faculty offers courses leading to the award of the degree of Master of Technology. The institution of this degree springs from the recognition of the considerable advance of knowledge in the fields of applied science and engineering which have marked recent years and the consequent increased scope for advanced formal instruction in these fields. Students are usually in attendance at the University for one year on a full-time basis, or for two years part-time.

A number of courses are also offered at the post-graduate level leading to the award of a Graduate Diploma. Students are required to attend courses of study for one year full-time or two years part-time. The courses available for the Graduate Diploma are Applied Geophysics, Process Chemical Engineering, Polymer Technology, Corrosion Technology, Food Technology, Fuel Technology, Mineral Technology, Mining Engineering and Wool Technology.

Courses leading to the degree of Master of Technology and to Graduate Diplomas are available in Sydney only. Candidates may register for all the research degrees at Sydney. At Wollongong

University College and the University Division at Broken Hill they may register for the degrees of Master of Science and Master of Engineering subject to adequate research facilities and satisfactory supervision being available in the candidate's particular field of study. Where these special conditions can be met the Professorial Board may grant permission to a candidate to register for the degree of Doctor of Philosophy in these centres.

The conditions governing the award of the various higher degrees and graduate diplomas are set out in the Calendar.

Short, intensive graduate and special courses are provided throughout each year designed to keep practising scientists and technologists in touch with the latest developments in their various fields.

POST-GRADUATE ENROLMENT PROCEDURE

Courses Requiring Attendance at Formal Lectures

Students wishing to enrol in Master Technology or Graduate Diploma courses must make application on the appropriate form to the Registrar at least one month before the commencement of the course.

Applicants will be advised whether they are eligible to enrol in the course concerned and of the subsequent procedure to be followed. Later year enrolments must be made during Enrolment Week in accordance with the special arrangements made by the individual Schools.

No enrolments will be accepted after March 31 without the express approval of the Registrar which will be given in exceptional circumstances only.

Fees may be paid without penalty up to the end of the second week of term.

Students who have completed the final examinations but have a thesis still outstanding are required to enrol for the period necessary to complete the thesis and to pay the requisite fees.

Research Degrees

Details of the procedure to be followed in order to enrol for a research degree are given in the statement of the conditions of award of the various higher degrees as set out in the Calendar.

POST-GRADUATE COURSE FEES*

MASTER OF TECHNOLOGY AND GRADUATE DIPLOMA COURSES

Completion of Enrolment

Students enrolling in post-graduate courses which include formal instruction are required to attend the appropriate enrolment centre during the prescribed enrolment period† for authorisation of course programme.

Fees should be paid during the prescribed enrolment period but will be accepted without incurring a late fee during the first two weeks of First Term. (For late fees see below.) No student is regarded as having completed an enrolment until fees have been paid. *Fees will not be accepted (i.e. enrolment cannot be completed) after March 31* except with the express approval of the Registrar, which will be given in exceptional circumstances only.

Payment of Fees by Term

Students who are unable to pay their fees by the year may pay by the term in which case they are required to pay First Term course fees and other fees for the year within the first two weeks of First Term. Students paying under this arrangement will receive accounts from the University for Second and Third Term fees. These fees must be paid within the first two weeks of each term.

Assisted Students

Scholarship holders or sponsored students who have not received an enrolment voucher or appropriate letter of authority from their sponsor at the time when they are enrolling should complete their enrolment paying their own fees. A refund of fees paid will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

* Fees quoted in the schedule are current at time of publication and may be amended by the Council without notice.

† The enrolment periods for Sydney are prescribed annually in the leaflet "Enrolment Procedure for Students Re-enrolling".

Extension of Time

Any student who is unable to pay fees by the due date may apply in writing to the Registrar for an extension of time. Such application must give year of study, whether full-time or part-time and the course in which the applicant wishes to enrol, state clearly and fully the reasons why payment cannot be made and the extension sought, and must be lodged before the date on which a late fee becomes payable. Normally the maximum extension of time for payment of fees is until March 31 for fees due in First Term and for one month from the date on which a late fee becomes payable in Second and Third Term.

Failure to Pay Fees

Any student who is indebted to the University and who fails to make a satisfactory settlement of his indebtedness upon receipt of due notice ceases to be entitled to membership and privileges of the University. Such a student is not permitted to register for a further term, to attend classes or examinations, or to be granted any official credentials.

No student is eligible to attend the annual examinations in any subject where any portion of his course fees for the year is outstanding after the end of the fourth week of Third Term.

In very special cases the Registrar may grant exemption from the disqualification referred to in the two preceding paragraphs upon receipt of a written statement setting out all relevant circumstances.

Basis of Fee Assessment

Where course fees are assessed on the basis of term hours of attendance, the hours for each subject for purposes of fee assessment shall be those prescribed in the calendar. The granting of an exemption from portion of the requirements of a subject in which a student is enrolled does not carry with it any exemption from the payment of fees.

(a) Master of Technology Courses

- | | | |
|---|-------|-----|
| (i) Registration Fee | | \$4 |
| (ii) Graduation Fee | | \$6 |
| (iii) Course Fee — calculated on the basis of a term's attendance at the rate of \$5 per hour per week. Thus the fee for a programme requiring an attendance of 24 hours per week for the term is $24 \times \$5 = \120 per term. | | |

- (iv) Thesis or Project Fee — \$30 (an additional fee of \$20* is payable by students who have completed their final examinations for the degree but have not completed the thesis or project for which they have been previously enrolled).

(b) Graduate Diploma Courses

- | | |
|--|-----|
| (i) Registration Fee | \$4 |
| (ii) Award of Diploma Fee | \$6 |
| (iii) Course Fee — calculated on the basis of a term's attendance at the rate of \$5 per hour per week. Thus the fee for a programme requiring an attendance of 24 hours per week for the term is $24 \times \$5 = \120 per term. | |
| (iv) Thesis or Project Fee — \$30 (an additional fee of \$20* is payable by students who have completed final examinations for the diploma but have not completed the thesis or project for which they have been previously enrolled). | |

(c) Miscellaneous Subjects

Post-graduate subjects taken as "Miscellaneous Subjects" (i.e. not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on the basis of a term's attendance at the rate of \$5 per hour per week. Thus the fee for a subject requiring an attendance of 2 hours per week for the term is $2 \times \$5 = \10 per term.

Other Fees

In addition to the course fees set out above, students in categories (a) and (b) are required to pay:

Library Fee—

Annual Fee, \$10.

Student Activities Fees—

University Union†—\$12—annual subscription.

Sports Association†—\$2—annual subscription.

Students' Union†—\$4—annual subscription.

Miscellaneous—\$10—annual fee.

Total—\$28.

* Students paying this fee who are not in attendance at the University are not required to pay the Student Activities Fees or the Library Fee.

† Life members of these bodies are exempt from the appropriate fee or fees.

Examinations conducted under special circumstances
—\$6 for each subject.

Review of examination result—\$6 for each subject.

Late Fees

First Term

Fees paid from commencement of third week of term
to March 31 \$10

Fees paid after March 31 where accepted with the
express approval of the Registrar (see above) \$20

Second and Third Terms—

Fees paid in third and fourth weeks of term \$10

Fees paid thereafter \$20

Late lodgement of application for admission to
examinations. (Late applications will be accepted
for three weeks only after the prescribed dates.) \$4

Withdrawal

Students withdrawing from a course are required to notify the Registrar in writing. Fees for the course accrue until a written notification is received.

Where notice of withdrawal from a course is received by the Registrar before the first day of First Term a refund of all fees paid other than Registration Fee will be made.

Where a student terminates for acceptable reasons a course of study before half a term has elapsed, one half of the term's fee may be refunded. Where a student terminates a course of study after half a term has elapsed, no refund may be made in respect of that term's fees.

The Library Fee is an annual fee and is not refundable where notice of withdrawal is given after the commencement of First Term. On notice of withdrawal a partial refund of the Student Activities Fees is made on the following basis:

University Union—\$2 in respect of each half term.

University of New South Wales Students' Union—where notice is given prior to the end of the fifth week of First term \$2, thereafter no refund.

† Life members of this body are exempt from the appropriate fee or fees.

University of New South Wales Sports Association—where notice is given prior to April 30 a full refund is made, thereafter no refund.

Miscellaneous—where notice is given prior to April 30 \$2, thereafter no refund.

RESEARCH DEGREES — FEES

(a) Master of Science* and Master of Engineering*

Fees are payable from the commencement date of a candidate's registration and remain payable until the candidate's thesis is presented to the Examinations Branch.

(i) Qualifying Examination	\$10
(ii) Registration Fee	\$4
(iii) Internal full-time student annual fee	\$60
Internal full-time student term fee	\$20
(iv) Internal part-time student annual fee	\$30
Internal part-time student term fee	\$10
(v) External student annual fee†	\$20
(vi) Final Examination (including Graduation Fee)	\$30

(b) Doctor of Philosophy

(i) Qualifying Examination	\$10
(ii) Registration Fee	\$4
(iii) Annual Fee	\$60
(iv) Final Examination (including Graduation Fee)	\$42

(c) Doctor of Science

(i) Registration Fee	\$63
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(d) Miscellaneous Subjects

Post-graduate subjects taken as "Miscellaneous Subjects" (i.e. not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on the basis of a term's attendance at the rate of \$5 per hour per week. Thus the fee for a subject requiring an attendance of 2 hours per week for the term is $2 \times \$5 = \10 per term.

* Candidates registered under the conditions governing the award of this degree without supervision will pay the following fees; Registration fee \$4; Examination of thesis \$60. They are not required to pay the Student Activities Fees or the Library Fee.

† Students in this category are not required to pay the Student Activities Fees or the Library fee.

Research

- (a) One day per week—\$20 per annum.
- (b) Two or three days per week—\$40 per annum.
- (c) Four or five days per week—\$60 per annum.

OTHER FEES

In addition to the fees set out above, all students in the categories (a) to (c) are required to pay:

Library Fee—Annual fee, \$10.

Student Activities Fees—

University Union†—\$12—annual subscription.

Sports Association†—\$2—annual subscription.

Students' Union†—\$4—annual subscription.

Miscellaneous—\$10—annual fee.

Total—\$28.

LATE FEES**Initial Registration**

Fees paid from commencement of sixth week after date of offer of registration to end of eighth week	\$10
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Renewal at Commencement of each Academic Year

Fees paid from commencement of third week of term to March 31	\$10
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Fees paid after March 31 where accepted with the express approval of the Registrar	\$20
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† Life members of these bodies are exempt from the appropriate fee or fees.

POST-GRADUATE SCHOLARSHIPS TENABLE AT THE UNIVERSITY OF NEW SOUTH WALES

Brief particulars of scholarships tenable at this University are listed below. Additional scholarships in a variety of fields become available from time to time, and the Dean of the Faculty of Applied Science and the Heads of the Schools in the Faculty will be pleased to receive inquiries concerning the availability of such scholarships.

Students completing the final year of a course may apply but, in general, applicants should hold degrees with honours or equivalent qualifications.

Applications should be lodged during November with the Registrar, P.O. Box 1, Kensington, New South Wales, on forms available from the University's Post-Graduate Scholarships Unit. Each applicant from outside this University must arrange for a transcript (in triplicate) of his academic record to be forwarded by his University to reach the Registrar at about the same time as his application. He must also arrange for reports (in triplicate) by three referees, to be forwarded direct to the Registrar. If possible, one of the reports should be from a professor, and all three should be from people familiar with the applicant's academic and professional performance.

Unless otherwise stated, the annual stipends for all scholarships range from \$2,350 per annum for scholars without dependants to \$2,650 per annum for a scholar wholly maintaining a wife and one or more children.

University Post-Graduate Scholarships

The University of New South Wales provides each year a number of scholarships for post-graduate study and research in any field approved by the University.

These awards are normally for graduates of Australian Universities who are domiciled in Australia. They are tenable for up to a maximum of four years, subject to annual renewal.

Commonwealth Post-Graduate Awards

The Commonwealth Government is providing each year a number of awards for post-graduate study and research. The awards will be tenable for one year but may be extended for a period of up to four years.

Persons domiciled in Australia and who are University graduates or who will graduate in the current academic year, are eligible.

University Post-Doctoral Research Fellowships

From time to time the University offers Fellowships in specified fields to enable advanced research to be undertaken by graduates holding the degree of Doctor of Philosophy or equivalent qualifications. Salary will range from \$4,400 to \$5,800 per annum, and will be subject to income tax. The fellowships will normally be awarded for two years but may be extended for a third year.

Atmospheric Pollution Research Fellowships

Fellowships for research on atmospheric pollution, having an annual value of \$2,350-\$4,000 each, are available to graduates in Science or Chemical Engineering. The fellowships are tenable for one year but may be re-awarded for a second or third year.

The Broken Hill Pty. Co. Ltd. Post-Graduate Scholarship in Metallurgy

This scholarship is designed to promote study and research for a higher degree in some branch of Metallurgy which has a direct relation to the activities of the donor Company. Graduates in Science or Engineering are eligible to apply. The award carries an annual stipend of \$2,400, and is tenable for one to four years.

G. J. Coles & Co. Ltd. Research Scholarship in Engineering, Science or Applied Science

This scholarship is available to graduates or graduands of any Australian University domiciled in Australia who wish to undertake post-graduate study and research leading to the degree of Doctor of Philosophy in the Faculties of Engineering, Science or Applied Science. It carries an annual stipend of \$2,500, and is tenable for one to four years.

The Imperial Chemical Industries of Australia and New Zealand Research Fellowship

Imperial Chemical Industries of Australia and New Zealand has established a Fellowship to help promote knowledge in fields which have a direct relation to the scientific interests of ICIANZ, such as pure and applied chemistry, biochemistry, agricultural science, chemotherapy, pharmacology, physics, engineering, mining and metallurgy. The Fellowship is open to British subjects who are graduates of a recognised University. It has an annual value of \$2,500, and is tenable for two years.

Broken Hill Associated Smelters Pty. Ltd.

A number of scholarships are made available each year to enable graduates or diplomates in Metallurgy or an allied science to undertake post-graduate work connected with the donor Company's activities. The maximum tenure of the scholarship is three years. Applications should be made to Broken Hill Associated Smelters Pty. Ltd., Port Pirie, S.A.

The General Motors-Holdens Post-Graduate Research Fellowships

General Motors-Holdens provide annually a number of post-graduate research fellowships. Graduates in any Faculty may apply, but preference will be given to graduates in Engineering, Science, Commerce or Economics. The fellowships are normally tenable for one year but may be renewed to allow fellowship holders to complete their course of study.

Australian Wool Board Research Fellowships in Textile Technology

Several fellowships are provided by the Australian Wool Board for graduates in Physics, Chemistry or Engineering for research in the fields of wool textile physics, wool textile chemistry or wool textile engineering. The fellowships have a value of not less than \$2,700 and are tenable for up to a maximum of four years subject to annual renewal.

Australian Wool Board Research Scholarships in Wool and Animal Science—Wool Production

Scholarships provided by the Australian Wool Board are available for graduates in Science, Agricultural Science, or Veterinary

Science, wishing to work in the fields of Wool Science and Animal Husbandry.

The scholarships have a value of not less than \$2,400 per annum and are tenable for up to a maximum of four years, subject to annual renewal.

OTHER POST-GRADUATE AWARDS WHICH MAY BE HELD AT THE UNIVERSITY OF NEW SOUTH WALES

Commonwealth Service Awards

The field of study is unrestricted. The awards are available only to officers of the Commonwealth Service. Enquiries should be directed to the Commonwealth Public Service Board, Canberra.

Rothmans Fellowships Award

The field of study is unrestricted. The range of value of the awards is: Junior, Grade 1—\$2,200 to \$3,200* p.a.; Junior, Grade 2—Not more than \$6,000* p.a.; and Senior—Not more than \$10,000* p.a. The duration of the awards is not specified. Applications should be lodged with the Secretary, Rothmans University Endowment Fund, Sydney University, by 17th September.

Commonwealth Scientific and Industrial Research Organization

Pre-doctoral awards in areas of general interest to C.S.I.R.O. are available to students with a good Honours degree. Value \$2,500-\$2,800 p.a.* Awards are made on an annual basis, subject to renewal.

Applications should be lodged with the Secretary, C.S.I.R.O., 314 Albert Street, East Melbourne, C.2, Victoria, by 11th November.

Australian Institute of Nuclear Science and Engineering

The Institute provides awards for students holding an Honours degree to proceed to higher degrees in specified fields, including Metallurgy. The awards are tenable for one to three years, and have a value ranging from \$2,300 to \$2,800. The Institute also provides awards for post-doctoral research for one year renewable. The value of these awards is \$4,500 to \$6,000 p.a.

* Exempt University tuition fees.

Royal Australian Chemical Institute Masson Scholarship

One scholarship is provided annually for students proceeding to a higher degree in specified fields, including Chemical Engineering, Industrial Chemistry and Metallurgy. The scholarships are tenable for one year and have a value of \$1,200. Applications to the Executive Secretary, R.A.C.I., 55 Exhibition Street, Melbourne.

Australian Meat Research Committee

The range of value of the awards is: Junior Studentships \$1,000 to \$1,400 p.a. (one year only). Senior studentships \$2,000 to \$2,400 p.a. (two years). Applications to the Secretary, C.S.I.R.O., 314 Albert Street, East Melbourne.

Conzinc Riotinto of Australia Limited

The award is given for post-graduate study and research in the fields of Mining, Chemical Engineering, Geology or Metallurgy. The value of the award is \$2,000 p.a. for one to three years. Applications should be lodged with Conzinc Riotinto of Aust. Ltd., Box 384D, Melbourne, Victoria, by 1st December.

Zinc Corporation Ltd. and New Broken Hill Consolidated Ltd.

The award is given for post-graduate study and research in the fields of Mining, Metallurgy and allied fields. Its value is \$1,200 p.a. for a two-year period. (Preference given to Broken Hill residents.) Applications should be lodged with the Zinc Corporation Ltd., P.O. Box 444, Broken Hill, N.S.W.

Department of Supply Post-Graduate Studentships

Studentships for full-time study and research for the degree of Doctor of Philosophy are available in the fields of Science, Applied Science and Engineering. Candidates are expected to have graduated with first or second class honours. The salary per annum is: first year \$3,396; second year \$3,696; third year \$4,038; fourth year \$4,412. Candidates holding a Master's Degree will commence on the second year rate. A bond of service is required. Applications should be lodged with the Secretary, Department of Supply, Commonwealth Centre, Hunter Street, Sydney.

Wheat Industry Research Council Award

The range of value of the award is: Junior Studentships—\$1,000 to \$1,400* p.a. and allowances for one year; Senior Studentships—\$2,000 to \$2,400* p.a. for two years. Applications should be lodged with the Secretary, Wheat Industry Research Council, C/- Department of Primary Industry, Canberra, A.C.T.

Australian Dairy Produce Board

The award is for post-graduate study and research in a field connected with the Dairy Industry. The range of value of the award is: Junior Studentships—\$1,000 to \$1,400* p.a., and allowances for one year; Senior Studentships: \$2,000 to \$2,400* p.a., and allowances for two years. Applications should be lodged with the Research Secretary, Australian Dairy Produce Board, 406 Lonsdale Street, Melbourne, C.1, Victoria, by 25th October.

* Exempt University Tuition Fees.

OUTLINES OF POST-GRADUATE COURSES

Facilities are provided for students to carry out research for the degrees of Doctor of Philosophy, Master of Engineering or Master of Science. A number of schools of the Faculty also offer courses leading to a Graduate Diploma (Grad. Dip.). The School of Applied Geology offers a diploma course in Applied Geophysics; the School of Chemical Engineering offers diploma courses in Process Chemical Engineering, Corrosion Technology, Food Technology and Fuel Technology; the School of Chemical Technology offers a course in Polymer Technology, the School of Mining Engineering offers courses in Mineral Technology and Mining Engineering, and the School of Wool Technology a course in Wool Technology.

SCHOOL OF APPLIED GEOLOGY

Applied Geophysics Graduate Course (Graduate Diploma)

The aim of this course is to train suitable graduates in Applied Science, Science and Engineering who wish to become applied or exploration geophysicists. The pre-requisites for the course are Physics and a Mathematics to second-year level, and Geology to first year level, in a first degree in Applied Science, Science or Engineering.

The Graduate Diploma in Applied Geophysics (Grad. Dip.) will be awarded on the successful completion of one year of full-time study.

30 Weeks' Course

		Hours per week for three terms	
		Lec./Lab.	Private Study
6.168G	Potential and Systems Theory in Geophysics	2	4
6.841	Electronic Instrumentation	2	4
8.421S	Surveying*	3	3
10.351	Statistics†	1½	2
25.571G	Geophysics	6	12
25.572G	Geology	4	3
		18½	28

* A survey camp of one week in third term is part of this course.

† Students who have satisfactorily completed a statistics course equivalent to 10.351 may elect to take the statistics component of 10.061G in the M.Tech. course in Electrical Engineering.

SCHOOL OF CHEMICAL ENGINEERING

Process Chemical Engineering Graduate Course
(Graduate Diploma)

The Graduate Diploma course in Process Chemical Engineering is a new course designed to provide professional training at an advanced level in the development and applications of chemical reactor engineering theory and design. It is intended primarily for graduates in Chemical Engineering though graduates in Science and Engineering may be admitted, provided that qualifying subjects are completed where necessary.

Two years of study on a part-time basis are required for the completion of this course, which leads to the Graduate Diploma in Process Chemical Engineering (Grad. Dip.).

FIRST YEAR

(30 weeks' part-time course)

Hours per week for three terms

	Lec./Lab.	Private Study
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Introductory Stage

3.191G	Chemical Reactor Engineering I	3	—	6
3.193G	Industrial Process Kinetics	2	—	4
	Co-requisites*	4	—	4
		9	—	14

* Co-requisites will be determined by the Head of the School offering the course. In general, a standard equivalent to completion of the following undergraduate courses will be required:—

- 3.111 Chemical Engineering I
- 3.121 Chemical Engineering IIA—Thermodynamics and Kinetics
- 3.122 Chemical Engineering IIB—Design I
- 22.111 Industrial Chemistry I—Processes

Students who have attained this standard prior to entry may be permitted to enrol for an equivalent period of undergraduate instruction in an appropriate area of interest with the approval of the Head of the School.

SECOND YEAR

(30 weeks' part-time course)

Hours per week for three terms

	Lec./Lab.	Private Study
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Advanced Stage

3.192G	Chemical Reactor Engineering II	2	—	4
3.194G	Kinetic Models and Parametric Studies	2	—	4
3.195G	Reactor Design Project	3	—	6
		7	—	14

In addition to the formal course work set out above, it is expected that students will be involved in tutorial, experimental, and/or computer work throughout the course.

Corrosion Technology Graduate Course (Graduate Diploma)

The Graduate Diploma course in Corrosion Technology has been designed as a post-graduate course for graduates in Engineering, Applied Science and Science, who may be faced with corrosion problems in industry.

Two years of study on a part-time basis are required for the completion of this course which leads to the Graduate Diploma in Corrosion Technology (Grad. Dip.).

FIRST YEAR

(30 weeks' part-time course)

		Hours per week for three terms	
		Lec./Lab.	Private Study
<i>Introductory Stage</i>			
3.161G	Corrosion Technology I	1	— 2
3.171G	Corrosion Literature Assignment	2	— 4
4.111G	Corrosion Metallurgy I	1	— 2

In addition, candidates not sufficiently qualified may be required to complete one of the following subjects:

2.002	Chemistry IIS	9	— 7
4.911	Materials for Engineers	2	— 4

SECOND YEAR

(30 weeks' part-time course)

		Hours per week for three terms	
		Lec./Lab.	Private Study
<i>Advanced Stage</i>			
3.162G	Corrosion Technology II	2	— 4
3.172G	Corrosion Assignments	2	— 4
4.112G	Corrosion Metallurgy	2	— 4
22.351G	Organic Surface Coatings	2	— 4
		8	— 16

Food Technology Graduate Course (Graduate Diploma)

The graduate diploma course in Food Technology is designed to provide professional training at an advanced level in food technology for graduates in science, applied science or engineering who have not had previous training in this field.

In addition to a first degree, candidates may also be required to undertake assignments or complete successful examinations as directed by the Head of the School.

The course is a blend of formal lectures and laboratory work at the undergraduate and post-graduate levels. The Diploma in Food Technology (Grad. Dip.) is awarded on the successful completion of one year full-time study (18 hours a week), or two years of part-time study (9 hours a week). It involves the following programme:

30 Weeks' Course

		Hours per week for three terms		
		Lec./Lab./Tut.		Private Study
2.271G	Chemistry and Analysis of Foods	3	—	3
3.231	Chemical Engineering	2	—	4
3.241G	Food Technology	4	—	7
17.901G	Biology	1	—	1
17.902G	Biochemistry and Microbiology	8	—	10
		18	—	25

Students who have successfully completed 3.211 and 3.212 Food Technology towards the award of a degree must substitute an approved undergraduate programme of an equivalent number of hours.

Fuel Technology Graduate Course (Graduate Diploma)

The Graduate Diploma Course in Fuel Technology has been designed to provide professional training and specialization in fuel science and engineering for graduates in Science, Applied Science or Engineering who have not had previous training in this field.

Applicants holding an appropriate degree or equivalent qualification in Science, Applied Science or Engineering are eligible for admission to the course. They may also be required to undertake assignments or complete successfully examinations as directed by the Head of the School.

The Graduate Diploma in Fuel Technology is awarded on the successful completion of one year of full-time study (18 hours per week) or two years of part-time study (9 hours per week). The course is a blend of formal lectures and laboratory work at undergraduate and post-graduate levels and allows of elective specializations in various branches of Fuel Science or Fuel Engineering, viz., Combustion Engineering, Gas Engineering, Coal

Science, Coal Preparation, Carbonization, Liquid Fuels, and Fuel Plant Design. It involves the following programme:

30 Weeks' Course

		Hours per week for three terms	
		Lec./Lab.	Private Study
<i>A. Introductory Stage (up to nine hours per week)</i>			
3.381	Principles of Fuel Technology	3	4
3.382	Combustion Engineering	3	4
3.383	Fuel Plant Evaluation and Assignments	3	4
		9	12
<i>B. Advanced Stage (up to nine hours per week)</i>			
3.390G	Post-graduate Seminar	1	2
	Advanced Electives*	8	13
		9	15
* Subjects to be selected from the following according to availability and specialisation required:—			
3.391G	Atmospheric Pollution and Control ...	2	2
3.392G	Fuel Science	3	4
3.393G	Fuel Engineering Plant Design	3	5
3.394G	Thermal Engineering and Fuel Processing	3	5
3.395G	Research Techniques and Extension Methods	2	3

When appropriate, up to three hours per week may be selected from approved courses, e.g., Coal Preparation, Instrumentation and Automatic Control, Ceramics, Nuclear Engineering, etc., offered by other Schools within the University.

SCHOOL OF CHEMICAL TECHNOLOGY

Polymer Technology Graduate Course (Graduate Diploma)

The Graduate Diploma course in Polymer Technology is designed for persons holding a degree, or equivalent qualifications, in Science or Engineering who wish to specialize in Polymer Technology and extend their theoretical knowledge and practical experience in fields such as plastics, rubbers, synthetic resins, adhesives and surface coatings.

Two years of study on a part-time basis are required for completion of this course, which leads to the Graduate Diploma in Polymer Technology (Grad. Dip.). However, candidates may be required, depending upon their formal training in Organic

Chemistry, Physical Chemistry, Statistics and Mathematics, to spend a preliminary period of study before actually embarking upon the formal programme of the diploma.

FIRST YEAR

(30 weeks' part-time course)

	Term 1 Hours per week Lec. Lab. Priv. /Tut. Study	Term 2 Hours per week Lec. Lab. Priv. /Tut. Study	Term 3 Hours per week Lec. Lab. Priv. /Tut. Study
22.321G			
Polymer Engineering I			
(a) Polymer Compound Design	2—5—4	0—0—0	0—0—0
(b) Polymer Processing	0—0—0	2—5—4	0—0—0
(c) Physical Testing I	0—0—0	0—0—0	2—0—4
22.331G			
Polymer Chemistry I			
(a) Processes	2—0—4	0—0—0	0—0—0
(b) Mechanisms and Kinetics	0—0—0	2—0—4	0—0—0
(c) Polymer Analysis	0—0—0	0—0—0	2—0—4
(d) Laboratory	0—0—0	0—0—0	0—5—0
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SECOND YEAR

(30 weeks' part-time course)

	Term 1 Hours per week Lec. Lab. Priv. /Tut. Study	Term 2 Hours per week Lec. Lab. Priv. /Tut. Study	Term 3 Hours per week Lec. Lab. Priv. /Tut. Study
22.322G			
Polymer Engineering II			
(a) Polymer Physical Properties	2—0—4	0—0—0	0—0—0
(b) Engineering Application of Polymers	0—0—0	2—0—4	0—0—0
(c) Physical Testing II	0—0—0	0—0—0	2—5—4
22.332G			
Polymer Chemistry II			
(a) Polymer Structure and Characterisation	2—0—4	0—0—0	0—0—0
(b) Natural Polymers	0—0—0	2—0—4	0—0—0
(c) Inorganic Polymers	0—0—0	0—0—0	2—0—4
(d) Laboratory	0—5—0	0—5—0	0—5—0
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SCHOOL OF METALLURGY

Although at present the main graduate activity of the School of Metallurgy is research, formal lecture courses for graduates in Metallurgy or related fields are presented from time to time.

Courses which have been conducted in previous years are listed below. Other courses will be introduced from time to time as required.

- (i) X-ray diffraction and its application in metallurgy.
- (ii) Reactor materials and fuel elements.
- (iii) Nuclear materials.
- (iv) Corrosion.
- (v) Refresher course in physical metallurgy.
- (vi) Refresher course in chemical and extractive metallurgy.
- (vii) Welding technology.
- (viii) Metallurgical microscopy.
- (ix) Radiography and non-destructive testing.

Graduates who wish to obtain information about these formal courses should contact the Head of the School.

Graduates in Metallurgy, Science or Engineering who are interested in doing research in the field of metallurgy may apply for registration as candidates for the degrees of Master of Science or Doctor of Philosophy.

The Head of the School will be pleased to give information about research scholarships, fellowships and grants-in-aid. Graduates are advised to consult him before making a formal application for registration.

SCHOOL OF MINING ENGINEERING

The School offers two post-graduate courses, one in Mineral Technology and the other in Mining Engineering, leading to the award of a Graduate Diploma (Grad. Dip.).

Mineral Technology Graduate Course (Graduate Diploma)

The Graduate Diploma Course in Mineral Technology is designed to provide professional training for graduates in Science, Applied Science or Engineering who wish to specialize in the fields of mineral processing, including coal preparation. The course is concerned primarily with instruction in the scientific and engineering principles associated with processes for the physical and physico-chemical separation and concentration of minerals or coal for subsequent use.

The Graduate Diploma in Mineral Technology (Grad. Dip.) will be awarded on the successful completion of one year of full-time or two years of part-time study. The course is a blend of lecture and laboratory work and allows the choice of elective specialization in either the beneficiation of minerals or the preparation of coal.

30 Weeks' Course

		Hours per week for three terms		
		Lec./Lab.		Private Study
STAGE A. <i>Introductory component</i>				
7.311	Mineral Processing I	4	—	4
7.151	Mining Engineering	2	—	2
25.551	Mineralogy	2	—	2
		8	—	8
STAGE B. <i>Advanced component</i>				
7.391G	Mineral Processing II	6	—	11
7.392G	Mineral Engineering—Laboratory	4	—	4
		10	—	15

When appropriate, up to 3 hours per week may be selected from approved courses offered by other Schools within the University.

Mining Engineering Graduate Course (Graduate Diploma)

The post-graduate course leading to a Graduate Diploma in Mining Engineering (Grad. Dip.) has been established to provide graduate students in the fields of engineering, surveying, and some areas of applied science with advanced training in the following aspects of mining engineering:

Tunnelling and quarrying.

Metalliferous and coal mining.

Petroleum engineering and other non-entry methods.

It should be noted that some degree of specialization will be possible in the mining engineering laboratory investigations.

The following programme may be completed in one year of full-time study or over two years on a part-time basis.

30 Weeks' Course

		Hours per week for three terms		
		Lec./Lab.		Private Study
STAGE A. <i>Introductory component</i>				
7.121	Mine Surveying	2	—	3
7.331S	Mining and Mineral Process Engineering*	4	—	3
25.532/1	Geology for Mining Engineers	4	—	4
		10	—	10
STAGE B. <i>Advanced component</i>				
7.191G	Mining Engineering	6	—	10
7.192G	Mining Engineering Laboratory Investigations	3	—	5
		9	—	15

SCHOOL OF WOOL TECHNOLOGY

Wool Technology Graduate Course (Graduate Diploma)

The Graduate Diploma Course in Wool Technology is specially designed for graduate students preparing themselves for careers in the pastoral industry. One of the principal functions of the course is to provide a bridge from other disciplines such as Agriculture, Veterinary Science and Pure Science, for graduates who wish to study and work in the field of Wool Technology, which is of such overall importance to Australia.

Recently the course was made more flexible to permit prospective students to specialize in particular graduate aspects of Wool Technology, and at the same time, to do supporting work in related undergraduate fields which they may not have covered in their undergraduate training, or which they may have covered and wish to revise.

The normal requirement for admission to the course is a degree in Agriculture, Veterinary Science or Science, in an appropriate field. In addition, students may be required to take a qualifying examination in the basic disciplines of the Wool Technology B.Sc. degree course, viz. General Biology, Agronomy and/or Livestock Production. Such qualifying examination will be of a standard which will ensure that the student has sufficient knowledge of the subject and the principles involved to profit by the course.

* This course extends over 24 weeks only.

The following programme may be completed either in one year on a full-time basis or over two years on a part-time basis:

(30 weeks' course)

		Hours per week for three terms		
		Lec.	Lab.	Private Study
9.503G	Wool Study	2	4	4
Plus one of the following optional subjects:				
9.105G	Advanced Livestock Production	4	0	6
9.711G	Advanced Wool Technology	2	2	6
9.902G	Techniques of Laboratory and Field Investigation	2	2	6
	Approved undergraduate subjects	4	4	8
		8	10	18

The undergraduate subjects may be chosen to suit the requirements of the student, subject to their availability. The Graduate Diploma students are expected to work at the level of honours students in the undergraduate course and to carry out prescribed study of current research material in the field.

Successful completion of the course leads to the award of a Graduate Diploma (Grad.Dip.).

SCHOOLS OF INSTRUCTION IN THE UNIVERSITY

This Handbook has outlined the courses available in the Faculty of Applied Science. A wide range of courses is offered by the other six Faculties of the University. The Schools and Departments offering courses are listed below:

Identifying Number	School or Department
1	School of Physics.
2	School of Chemistry.
3	*School of Chemical Engineering.
4	*School of Metallurgy.
5	School of Mechanical Engineering.
6	School of Electrical Engineering.
7	*School of Mining Engineering.
8	School of Civil Engineering.
9	*School of Wool Technology.
10	School of Mathematics.
11	School of Architecture and Building.
12	School of Applied Psychology.
13	*School of Textile Technology.
14	School of Accountancy.
15	School of Economics.
16	School of Hospital Administration.

17	School of Biological Sciences.
18	Department of Industrial Engineering, School of Mechanical Engineering.
19	School of Traffic Engineering.
20	School of Highway Engineering.
21	Department of Industrial Arts.
22	*School of Chemical Technology.
23	School of Nuclear Engineering.
24	School of Business Administration.
25	*School of Applied Geology.
26	Department of General Studies.
27	*School of Geography
28	Department of Marketing.
50	School of English.
51	School of History.
52	School of Philosophy.
53	School of Sociology.
54	School of Political Science.
55	School of Librarianship.
56	School of Western European Languages.
57	School of Drama.
58	School of Education.
62	School of History and Philosophy of Science.
70	School of Anatomy.
71	School of Medicine.
72	School of Pathology.
73	School of Physiology.
74	School of Surgery.
75	School of Obstetrics and Gynaecology.
76	School of Paediatrics.
77	School of Psychiatry.
78	School of Human Genetics.
79	Public Health and Social Medicine.

* Schools of the Faculty of Applied Science.

DESCRIPTION OF SUBJECTS

SCHOOL OF APPLIED GEOLOGY

25.511 Geology I

Physical Geology—The structure and main surface features of the earth; geological cycle—processes of erosion, transportation, sedimentation and lithification. Surface and sub-surface water. Weathering, lakes, rivers, glacial phenomena. Vulcanism, earthquakes, orogenesis and epeirogenesis. Introductory physiography.

Crystallography and Mineralogy—Introduction to crystal symmetry, systems, forms, habit, twinning. Occurrence, form and physical properties of minerals. Mineral classification. Descriptive mineralogy. Principal rock forming minerals.

Petrology—Field occurrence, lithological characteristics and structural relationships of igneous, sedimentary and metamorphic rocks. Introduction to coal, oil and ore deposits.

Stratigraphy and Palaeontology—Basic principles of stratigraphy; introductory palaeontology. The geological time scale. The geological history of the Australian continent and more specifically that of New South Wales in introductory outline.

Practical Work—Preparation and interpretation of geological maps and sections. Map reading and use of simple geological instruments. Study of simple crystal forms and symmetry. Identification and description of common minerals and rocks in hand specimen. Recognition and description of examples of important fossil groups. Supplemented by three field tutorials, attendance at which is compulsory.

TEXT BOOKS

Longwell and Flint. *Introduction to Physical Geology*. Wiley.

Morley Davies. *An Introduction to Palaeontology*.

Read. *Rutley's Elements of Mineralogy*. Murby, London.

Dana's *Minerals and How to Study Them*. 1963 Third Science Ed. Revised by C. S. Hurlbut, Jr.

McElroy. *Explanatory Notes to accompany the Sydney 4-mile Geological Map* (with map). Bureau of Mineral Resources, Canberra.

REFERENCE BOOKS

Holmes. *Principles of Physical Geology*. Revised ed. Nelson & Sons, London, 1965.

Ford. *Dana's Textbook of Mineralogy*. Wiley.

Dunbar. *Historical Geology*. Wiley.

25.512 Geology II

Crystallography and Mineralogy—Morphological and physical crystallography; the stereographic projection, its properties and use in crystallography. Introduction to the crystalline state and the use of X-ray methods in crystallography. The atomic arrangements in crystals. Elements of optical crystallography. Descriptive mineralogy of ores and minerals. Study of the

major rock-forming mineral families based on the principles of crystal chemistry. *Practical work*: Recognition of crystal forms. Exercises in stereographic projection. Interpretation of a simple X-ray diffraction photograph. Recognition and description of ores and minerals in hand specimen. Simple determinations of optical properties of mineral fragments. Examination of orientated crystal plates in convergent light.

Petrology—Principles and theories relating to the occurrence, genesis and diversification of igneous rocks. Introduction to sedimentary and metamorphic rocks. *Practical Work*: Megascopic and microscopic examination of selected rocks. *Field Work*: One field trip of approximately one week and at least one other shorter field tutorial to illustrate the above course will be held during the year. Attendance at these field instruction tutorials is compulsory.

Palaeontology—Systematic classification of the Invertebrate phyla, with detailed morphological study of their important subdivisions. Introduction to the principles of palaeontology and its stratigraphical applications. Introduction to palaeobotany. *Practical Work*: Examination and diagnostic description of representative fossils from the various phyla and study of their stratigraphical distribution.

Stratigraphy—Geological mapping. The stratigraphic column. Principles of stratigraphy, including related structural aspects. Sedimentary environments, processes and products. The stratigraphy of selected geological provinces in Australia. *Field work*: to illustrate the above course will be held during the year, attendance at which is compulsory. This includes one field tutorial of approximately one week and at least one short field tutorial.

TEXT BOOKS *Petrology I*

Kerr. *Optical Mineralogy*. McGraw-Hill, 1959.

Williams, Turner and Gilbert. *Petrography*, Freeman, 1954.

REFERENCE BOOKS

Harker. *Petrology for Students*.

Hatch, Wells and Wells. *The Petrology of the Igneous Rocks*.

Tyrrell. *The Principles of Petrology*.

Turner and Verhoogen. *Igneous and Metamorphic Petrology*.

Harker. *Metamorphism*.

Wahlstrom. *Theoretical Igneous Petrology*. Wiley.

TEXT BOOKS *Palaeontology I*

Moore, Lalicker and Fischer. *Invertebrate Fossils*. McGraw-Hill, 1952 or

Beerbower. *Search for the Past*. Prentice-Hall, 1960.

REFERENCE BOOKS

Arnold. *An Introduction to Palaeobotany*. McGraw-Hill, 1947.

Woods. *Palaeontology Invertebrate*. Cambridge University Press.

Schrock and Twenhofel. *Principles of Invertebrate Palaeontology*. McGraw-Hill.

TEXT BOOKS *Stratigraphy I*

Krumbein and Sloss. *Stratigraphy and Sedimentation*. 2nd ed.

REFERENCE BOOKS

David, ed., Browne. *Geology of the Commonwealth of Australia*. 3 vols. Arnold, 1950.

Schrock. *Sequence in Layered Rocks*.

Woodford. *Historical Geology*. Freeman, 1965.

TEXT BOOKS—*Mineralogy*

Phillips. *An Introduction to Crystallography*.

Hurlbut, edited by. *Dana's Manual of Mineralogy*.

REFERENCE BOOKS

Wahlstrom. *Optical Crystallography*. 3rd ed.

25.513/1, 25.513/2 and 25.513/3 Geology III**Parts I, II and III****Part I**

Stratigraphy—Regional stratigraphy with emphasis on environmental aspects. Evolution of selected basins and geosynclines. Studies of systems in type areas. The facies concept. Mapping procedures and stratigraphic maps.

Structural Geology—Diastrophic and non-diastrophic deformations and dislocations; structures associated with igneous rocks; alpine style tectonics. Geotectonics. An introduction to structural analysis. *Practical*: Advanced structural mapping; structural problems, including use of the stereographic net.

Palaeontology—Applications of palaeontology to stratigraphy (geochronology and palaeoecology). Vertebrate palaeontology.

Part II

Mineralogy—Optical theory of biaxial crystals, optical dispersion. An introduction to the theory of the Universal Stage. Selected topics in crystal chemistry. The nature of X-ray diffraction, theory and interpretation of X-ray powder and single crystal photographs. *Practical*: Determination of optical constants, use of immersion media for refractive index determination. Use of Universal Stage. Construction of a simple crystal structure model. Preparation and interpretation of X-ray powder and single crystal photographs.

Petrology—**Sedimentary Petrology**—The influence of transportation, deposition and diagenesis on the composition, texture and structure of the sedimentary rocks. Chemical weathering. The classification of detrital sediments. The non-clastic sediments. **Igneous Petrology**—Magma types and differentiation trends. **Metamorphic Petrology**—Metamorphic zones and metamorphic facies. *Practical*: Micropetrography. Techniques of sedimentary petrology.

Part III

Geophysics—Physics, shape, structure and constitution of the earth; geotectonics, seismology, gravity, geodesy, geothermy, geomagnetism, palaeomagnetism, geoelectricity, aeronomy and geochronology. Practical work includes a one day field tutorial.

Mineral Deposits—Principles and theories of ore deposition; ore magmas—synmagmatic, epimagmatic and post-magmatic processes. Submarine exhalative deposits. Sedimentary biogenetic deposits. Alluvial and residual deposits. Non-metallic ores. *Practical*: Macroscopic study of ores and country rock. Study of ores and associated rocks in thin and polished section.

Fuels—Nature and origin of coal and coal seams and of petroleum and petroliferous strata. Coal petrography. Techniques of petroleum geology. *Field work* will be carried out during the year. This includes a geological survey camp which may be held before first term, at least one tutorial of approximately one week, and such short trips as may be arranged. Attendance is compulsory.

TEXT BOOKS Petrology II

Kerr. *Optical Mineralogy*. McGraw-Hill, 1959.

REFERENCE BOOKS

Turner and Verhoogen. *Igneous and Metamorphic Petrology*.

Harker. *Metamorphism*. Methuen.

TEXT BOOKS Stratigraphy II

Kuenen. *Marine Geology*.

Gignoux. *Stratigraphic Geology* (English Translation).

David ed., Browne. *Geology of the Commonwealth of Australia*. 3 vols., 1950.

Dunbar and Rodgers. *Principles of Stratigraphy*. Wiley, 1957.

TEXT BOOKS *Stratigraphical Palaeontology*

Colbert. *Evolution of the Vertebrates*.

Von Koenigswald. *The Evolution of Man*.

REFERENCE BOOKS *Mineralogy*

Azaroff and Buerger. *The Powder Method*. McGraw-Hill.

Buerger. *X-ray Crystallography*. Wiley.

Henry, Lipson and Wooster. *The Interpretation of X-ray Diffraction Photographs*. Macmillan.

Bunn. *Chemical Crystallography*. Oxford.

Wahlstrom. *Optical Crystallography*. 3rd ed, Wiley.

Evans. *Crystal Chemistry*. Cambridge.

TEXT BOOKS *Geophysics*

Howell. *Introduction to Geophysics*. McGraw-Hill, 1959.

REFERENCE BOOKS

Bullen. *Introduction to Theory of Seismology*. Cambridge, 1963.

Garland. *The Earth's Shape and Gravity*. Pergamon, 1964.

Gutenberg. *Physics of the Earth's Interior*. Academic, 1959.

Heiskanen and Vening Meinesz. *The Earth and its Gravity Field*.

Jacobs. *The Earth's Core and Geomagnetism*. Pergamon, 1963.

Irving. *Palaeomagnetism*. Wiley, 1964.

Chapman. *The Earth's Magnetism*. Methuen, 1951.

Hill. *The Sea*, Vol. 3. Wiley, 1963.

TEXT BOOKS *Structural Geology*

Hills. *Outlines of Structural Geology*. 3rd ed., 1953.

Phillips. *Use of Stereographic Projection in Structural Geology*. 1954.

REFERENCE BOOKS

De Sitter. *Structural Geology*. 1956.

Billings. *Structural Geology*. 1954.

Turner. *Mineralogical and Structural Evolution of the Metamorphic Rocks*.

Mem. No. 30 Geol. Soc. America, 1948.

Turner and Weiss. *Structural Analysis of Metamorphic Tectonics*. McGraw-Hill, 1963.

Hills. *Elements of Structural Geology*. 1963.

TEXT BOOK *Economic Geology*

(i) *COAL*

Raistrick and Marshall. *The Nature and Origin of Coal and Coal Seams*, 1952.

REFERENCE BOOK

Francis. *Coal, Its Formation and Composition*.

TEXT BOOK

(ii) *OIL*

Levorsen. *Petroleum Geology*. 1954.

REFERENCE BOOK

LeRoy. *Subsurface Geologic Methods*.

(iii) *ORE DEPOSITS*

REFERENCE BOOKS

Lindgren. *Mineral Deposits*. 4th ed., 1933.

Fiftieth Anniversary Volume of Economic Geology. Vol. I and II, Society of Economic Geologists, Urbana, Illinois.

Edwards. *Textures of the Ore Minerals*. 2nd ed., 1954.

Geology of Australian Ore Deposits. 2nd ed., Melbourne, 1965. Aust. Inst. Min. and Met.

25.514/1, 25.514/2 and 25.514/3 Geology IV**Parts I, II and III****Part I**

Engineering Geology—An introduction to rock mechanics. The strength, deformability, permeability and chemical stability of rocks. Discontinuities in rock masses. Mass movement and stability of slopes. An introduction to hydrogeology. The application of geology to engineering practice. A compulsory field tutorial which includes inspection of civil engineering projects.

Photogeology—An introduction to the principles of photogrammetry and photointerpretation. Methods of photogeological mapping using stereoscopes and stereoplotters. The recognition of geological features on air photos. Laboratory work consists of exercises in the use of stereoscopes, the study of air photographs illustrating typical geological features, and the production of photogeological maps using mirror stereoscopes.

Part II

Exploration Geophysics—The theory, interpretation and practice of geophysical methods in exploration, including and extending beyond 25.521 Geology III (Supplementary) *Exploration Geophysics*.

Students in the Faculty of Applied Science will be required to carry out some additional laboratory assignments.

Part III

Exploration and Mining Geology—Selection of prospecting areas, methods of mineral search, assessment of new discoveries and subsequent development as underground or open cut mines, re-evaluation of old mines. The work of a geologist in operating mines, ore prediction, exploratory drilling. Evaluation of coalfields. Mine geology of leading Australian mines. **Laboratory:** Solution of mining geology problems involving drill core assays and developmental procedures. Exercises in geochemical prospecting.

Petroleum Engineering—Chemistry of drilling fluids, design of casing strings. Reservoir assessment and computation of reserves. Petroleum production techniques, artificial lift and secondary recovery methods. Drill stem testing, reservoir stimulation techniques including acidising, hydraulic fracturing. Controlled directional drilling.

TEXT BOOK Mining Geology

Lawrence (edited by). *Exploration and Mining Geology*. Melbourne, 1965. Aust. Inst. Min. Met.

REFERENCE BOOK

McKinstry. *Mining Geology*. Prentice Hall.

REFERENCE BOOKS Photogeology

Krynine and Judd. *Principles of Engineering Geology and Geotechnics*. McGraw-Hill, 1957.

Leuder. *Aerial Photo Interpretation*. McGraw-Hill, 1959.

Manual of Photographic Interpretation. Am. Soc. of Photogrammetry, Washington, 1960.

TEXT BOOKS Geophysics

Dobrin. *Introduction to Geophysical Prospecting*. McGraw-Hill, 1960.

Parasnis. *Principles of Applied Geophysics*. Methuen, 1962.

REFERENCE BOOKS

Pirson. *Handbook of Well Log Analysis*. Prentice-Hall, 1963.

Dix. *Seismic Prospecting for Oil*. Harper, 1952.

Edge and Laby. *The Principles and Practice of Geophysical Prospecting*. Cambridge, 1931.

Grant and West. *Interpretation Theory in Applied Geophysics*. McGraw-Hill, 1964.

Heiland. *Geophysical Exploration*. Prentice Hall, 1940.

Jakosky. *Exploration Geophysics*. Trija, 1950.

Engineering Geology

See list for Geology for Engineers (25.531).

REFERENCE BOOK *Petroleum Engineering*

Uren. *Petroleum Production Engineering Development*.

25.521 Geology III (Supplementary)

For Science students. Consists of section (a) and two components of section (b) approved by the Head of School.

Section (a)

Geology of Fuels—Ten advanced lectures on the geology of coalfields and the petrology and mineralogy of coal. Ten advanced lectures on the geology of oil and oilfields including natural gas. *Practical*: Lithological, petrological and mineragraphic examination of various coals.

Geomorphology and Photogeology—The principles of geomorphology and landscape development. The geomorphology of New South Wales. Principles of photogeology and of photo-interpretation. *Practical*: Geomorphological and photogeological exercises will be carried out in the laboratory and the field.

Structural Geology—Structural analysis of metamorphic tectonites. Construction of block diagrams based on the orthographic projection.

Oceanography—Dynamic properties of the oceanic water-masses. Physics and chemistry of sea water. Submarine geology and cartography. Recent sedimentation and its correlation with terrestrial stratigraphy. Sediments of organic origin. Oceanic materials of economic importance.

Geochemistry—Principles of geochemical distribution of elements. The geochemical cycle. Mineral thermodynamics and phase equilibria. Oxidation and reduction potentials. Isotope geology. Meteorites.

Exploration Geophysics—The theory, interpretation and practice of geophysical methods in exploration: Seismic, electric, electromagnetic, gravity, magnetic, radioactive and well logging. Applications in hydrology, engineering, petroleum and mining geophysics. Laboratory requirements include conducting model experiments illustrating the different methods. Field requirements include five days spent in field tutorials on the practice of geophysical methods.

Section (b)

Mineragraphy—Reflected light optics—orthoscopic and conosopic, measurement of optical parameters in reflected light, microhardness and reflectivity—photometric and photoelectric measurements. Methods of ore mineral identification in reflected light. Microparagenesis and ore textures. Phase equilibrium studies. *Laboratory*: Mineragraphic preparations, polishing methods. Measurement of optical properties. Mineralogical and textural features of selected suites of ore minerals.

Clay Mineralogy—The structures and properties of the clay mineral groups. Techniques for their recognition. Clay-water systems and ion exchange. Some applied aspects of clay mineralogy. Laboratory work to illustrate the lecture course.

Stratigraphy—Selected stratigraphy topics with emphasis on basin analysis. Detailed treatment of sedimentary structures. Advanced study of stratigraphic maps. Specialized aspects of photogeology and map interpretation.

Palaeontology—Micropalaeontology—the morphology, taxonomy and stratigraphical distribution of the principal groups of microfossils. *Practical work*: Study and description of Foraminifera, Ostracoda, Conodonts and plant microfossils, also certain examples of megafossils from the invertebrate phyla. Micropalaeontological techniques.

TEXT BOOK *Oceanography*

Pickard. *Descriptive Physical Oceanography*. Pergamon, 1964.

REFERENCE BOOKS

King. *Introduction to Oceanography*. McGraw-Hill.

Kuenen. *Marine Geology*. Wiley.

TEXT BOOK *Palaeontology II*

Glaessner. *Principles of Micro-palaeontology*. Melbourne University Press, 1945. Hafner reprint ed., 1963.

REFERENCE BOOKS

Cushman. *Foraminifera*. Harvard University Press, 1950.

Beebower. *Search for the Past*. Prentice Hall, 1960.

Mayr, Linsley and Usinger. *Methods and Principles of Systematic Zoology*. McGraw-Hill.

Simpson. *Principles of Animal Taxonomy*. Columbia University Press, 1961.

REFERENCE BOOKS *Stratigraphy III*

See list for *Stratigraphy II* (25.513).

TEXT BOOK *Structural Geology II*

De Sitter. *Structural Geology*. 1956.

REFERENCE BOOK

As for *Structural Geology I*.

TEXT AND REFERENCE BOOKS *Geophysics II*

As for *Geophysics II* in *Geology IV*.

TEXT BOOK *Geochemistry*

Mason. *Principles of Geochemistry*. 2nd ed.

REFERENCE BOOK

Abelson. *Researches in Geochemistry*.

Rankama and Sahama. *Geochemistry*. 1950.

Goldschmidt. *Geochemistry*.

Smales and Wager. *Methods in Geochemistry*. 1960.

TEXT BOOKS *Mineragraphy*

Edwards. *Textures of the Ore Minerals*. 2nd ed., 1954.

Hallimond. *1953 Manual of the Polarizing Microscope*.

REFERENCE BOOKS

Cameron. *Ore Microscopy*. 1961.

Ramdohr. *Die Erzminerale und ihre Verwachsungen*. 3rd ed., 1960.

REFERENCE BOOKS *Clay Mineralogy*

Grim. *Clay Mineralogy*. 1953.

Grim. *Applied Clay Mineralogy*. 1962.

25.531S and 25.531 Geology for Engineers

An introduction to geology with emphasis on the mechanical properties of rock and soil. Rock-forming minerals, clay minerals and the classification of rocks. The properties of rock. An introduction to the processes of orogenesis, epeirogenesis, denudation and weathering of rocks, vulcanicity, intrusion of plutonic rocks, sedimentation and metamorphism. Ground-water, the formation of soils, landforms and the stability of slopes. Review of the application of geology and geophysics in engineering practice. Laboratory work consists of the examination and the identification of

common rock-forming minerals and rock types, and the preparation and interpretation of simple geological maps and sections. Two geological field tutorials of one day duration are a compulsory part of the course, and satisfactory field tutorial reports are to be submitted.

TEXT BOOK

Blyth. *Geology for Engineers*. 4th ed.

REFERENCE BOOKS

Dapples. *Basic Geology*. Wiley, 1959.

Krynine and Judd. *Principles of Engineering Geology and Geotechnics*. McGraw-Hill, 1957.

Schultz and Cleaves. *Geology in Engineering*. Wiley, 1952.

Application of Geology to Engineering Practice. Geol. Soc. of America, N.Y., 1950.

25.532 Geology for Mining Engineers

Mineralogy and Petrology—Crystalline state, crystal symmetry, crystal systems, physical and chemical properties of minerals, crystal optics, micropetrology. Occurrence and structures of igneous rocks, consolidation of magmas, igneous rock classification. Thermal and regional metamorphism. Composition and classification of sedimentary rocks, sedimentation and sedimentary environments, micropetrology. *Laboratory*: Hand specimen crystallography, mineralogy and petrology; thin section petrology.

Stratigraphy and Palaeontology—Principles and methods in stratigraphy; stratigraphy of selected geological provinces of Australia. Systematic Palaeontology—plants and invertebrates, stratigraphic palaeontology. Elementary structural geology. *Laboratory*: study of more common plant and animal fossils. Stratigraphic mapping.

Geophysics—An introduction to the basic principles of geophysics, and to the principles, methods and applications of geophysical exploration, viz. gravity, magnetic, electrical, seismic, radioactive and miscellaneous. Discussion of various physical properties of rocks.

Ore Deposits and Fuels—Nature and origin of ore deposits, ore magmas—synmagmatic, epimagmatic and post-magmatic processes. Submarine exhalative deposits. Sedimentary biogenetic deposits. Alluvial and residual deposits. Nonmetallic ores. Nature and origin of petroleum and coal. Coal seams, type and rank variation, coal petrology, coalfield geology. *Laboratory*: macroscopic study of ores and country rocks, ores in thin and polished sections.

Exploration and Mining Geology—As for 25.514, Part III, Exploration and Mining Geology.

25.532/1 Geology for Mining Engineers (B.Sc.(Tech.))

Occurrence and structures of igneous rocks, consolidation of magmas, igneous rock classification. Thermal and regional metamorphism. Composition and classification of sedimentary rocks—sedimentary environments. Ore genesis, synmagmatic, epimagmatic and post-magmatic processes, volcanic exhalative deposits, sedimentary biogenetic deposits. Structural control of ore deposits. Alluvial deposits, non-metallic ores. Nature, origin and occurrence of coal and petroleum. Type and rank variation, coal petrology, coalfield geology. Geological evolution of the Australian continent from Pre-Cambrian to Recent times. Introductory geophysics—methods and applications. *Laboratory*: macroscopic and microscopic study of rocks and minerals. Ore mineralogy and mineragraphy. Coal petrology. Study of more common plant and animal fossils. Stratigraphic and other forms of geological mapping.

TEXT BOOK

Lawrence (edited by). *Exploration and Mining Geology*. Melbourne, 1965.
Aust. Inst. Min. Met.

Parasnis. *Principles of Applied Geophysics*. Methuen, 1962.

REFERENCE BOOK

Dobrin. *Introduction to Geophysical Prospecting*. McGraw-Hill, 1960.

25.551 Mineralogy (Metallurgy Course)

The crystalline state of minerals; fundamental laws of crystallography, symmetry elements and symmetry operations; crystal systems and classes; Miller indices; stereographic projection of crystals. Examples of the more common crystal classes. Regular and irregular attachment of crystals, twinning, etc.; crystal growth and its anomalies. Fundamentals of the atomic structure of crystals; Bravais lattices; examples of the atomic structure of some common minerals. Physical properties of crystals; cleavage, gliding, secondary twinning, elasticity. Elements of crystal optics in polarized light. Mode of formation of minerals and ores in the igneous, sedimentary and metamorphic cycles; introduction to petrology. Principal types of economic mineral deposits. Elements of fuel geology; construction and refractory materials. Classification of minerals. Descriptive mineralogy of common minerals, especially economic minerals. *Laboratory: Crystallography*—Examination of crystals and crystal models for symmetry; perspective drawing of crystal models. *Optical Mineralogy*—Examination of minerals by means of the polarizing microscope in transmitted and incident, reflected light. Determination of the refractive indices of crystal fragments by means of the immersion method. *Descriptive and Determinative Mineralogy*—Macroscopic examination of common minerals, especially economic minerals; study of the paragenesis and mode of occurrence of common mineral groups. Study of principal rock types in which they occur.

TEXT BOOK

Read. *Rutley's Elements of Mineralogy*, or
Dana. *Manual of Mineralogy*.

25.591 Project (Applied Geology Course)

APPLIED GEOLOGY GRADUATE SUBJECTS

25.571G Geophysics

The physics, shape, structure and constitution of the earth. Extensive treatment of the theory, interpretation, instrumentation, practice and applications of geophysical methods in exploration: seismic, electric, electromagnetic, gravity, magnetic, radioactive and well logging. Laboratory requirements include projects in model experimentation, and field requirements include three weeks of field tutorials on the practice of geophysical methods.

TEXT BOOKS

Grant and West. *Interpretation Theory in Applied Geophysics*. McGraw-Hill, 1965.

Dobrin. *Introduction to Geophysical Prospecting*. McGraw-Hill, 1960.

Parasnis. *Principles of Applied Geophysics*. Methuen, 1962.

Howell. *Introduction to Geophysics*. McGraw-Hill, 1959.

REFERENCE BOOKS

Geophysics Well Logging. Vol. 60, No. 1, 1965. Colorado School of Mines.
Electrical Prospecting with Telluric Current Method. Vol. 57, No. 2, 1962.

Colorado School of Mines.

Malmstadt, Enke and Taren. *Electronics for Scientists*.

- Moon and Spencer. *Field Theory: Field Theory for Engineers*. Van Nostrand, N. J., 1961.
- Pirson. *Handbook of Well Log Analysis*.
- Wyllie. *The Fundamentals of Electric Log Interpretation*. Academic, 1957.
- Heiskanen and Vening Meinesz. *The Earth and its Gravity Field*. McGraw-Hill, 1958.
- Garland. *The Earth's Shape and Gravity*. Pergamon, 1965.
- Irving. *Palaeomagnetism*. Wiley, 1964.
- Chapman. *The Earth's Magnetism*. Methuen, 1951.
- Hill. *The Sea*, Vol. 3. Wiley, 1963.
- Ewing, Jardetsky and Press. *Elastic Waves in Layered Media*. McGraw-Hill, 1957.
- White. *Seismic Waves*. McGraw-Hill, 1965.
- Jakosky. *Exploration Geophysics*. Trija, 1956.
- Heiland. *Geophysical Exploration*. Hafner, 1963.
- Bullen. *Introduction to Theory of Seismology*. Cambridge, 1963.
- Dix. *Seismic Prospecting for Oil*. Harper, 1952.
- Tagg. *Earth Resistances*. George Newness, 1964.

25.572G Geology

A series of special courses in aspects of geology which have particular relevance to geophysics: structural geology, stratigraphy, petroleum geology, engineering geology, petrology, economic mineralogy, geochemistry, air-photo interpretation and field methods.

REFERENCE BOOKS

- Kerr. *Optical Mineralogy*. McGraw-Hill, 1959.
- Williams, Turner and Gilbert. *Petrography*. Freeman, 1954.
- Krumbein and Sloss. *Stratigraphy and Sedimentation*, 2nd ed.
- Hills. *Outlines of Structural Geology*, 3rd ed., 1953.
- Miller. *Photogeology*. McGraw-Hill, 1961.
- Blyth. *Geology for Engineers*, 4th ed., 1960.

SCHOOL OF CHEMICAL ENGINEERING

DEPARTMENT OF CHEMICAL ENGINEERING

3.111 Chemical Engineering I

Principles I: The principles of heat transfer and fluid statics and dynamics, together with a simple introduction to boundary layer theory and heat and momentum transfer analogies.

Calculations: Will be conducted mainly by tutorials supplemented by lectures where necessary. Students will attempt 30-40 problems throughout the year. In Third Term students will be required to solve a large integrated problem.

3.111/1 Chemical Engineering I (Principles)

Principles I as set out in 3.111 Chemical Engineering I.

TEXT BOOK *Principles*

- Perry. *Chemical Engineers' Handbook*. McGraw-Hill.
- Coulson and Richardson. *Chemical Engineering*. Vol. I. Pergamon, or Faust, Wenzel, Clump, Maus and Andersen. *Principles of Unit Operations*. Wiley.

REFERENCE BOOKS

McCabe and Smith. *Unit Operations of Chemical Engineering*. McGraw-Hill.

Eckert and Drake. *Heat and Mass Transfer*.

Knudson and Katz. *Fluid Dynamics and Heat Transfer*.

Badger and Banchero. *Introduction to Chemical Engineering*. McGraw-Hill.

TEXT BOOKS *Calculations*

Himmelblau. *Basic Principles and Calculations in Chemical Engineering*. Prentice Hall.

REFERENCE BOOKS

Hougen, Watson and Ragatz. *Chemical Process Principles*. Vol. 1. Wiley.

Langhaar. *Dimensional Analysis and the Theory of Models*.

Lewis Radasch and Lewis. *Industrial Stoichiometry*. McGraw-Hill.

Johnson. *Nomography and Empirical Equations*.

Allcock and Jones. *The Nomogram*. Pitman.

Mickley, Sherwood and Reed. *Applied Mathematics in Chemical Engineering*. McGraw-Hill.

Lipka. *Graphical and Mechanical Computations*.

Haslam and Russell. *Fuels and their Combustion*. McGraw-Hill.

Davies. *Statistical Methods in Research and Production*.

Worthing and Geffner. *Treatment of Experimental Data*.

Johnstone and Thring. *Pilot Plant Models and Scale-up Methods in Chemical Engineering*. McGraw-Hill.

Corcoran and Lacey. *Introduction to Chemical Engineering Problems*.

Schmidt and List. *Material and Energy Balances*. Prentice Hall.

3.121 Chemical Engineering IIA

Thermodynamics—Introduction to chemical engineering thermodynamics.

Kinetics—Order of reaction and methods of determination. Theory of rate

processes. Introduction to reactor design. *Management and Data Processing*

—Methods engineering, data processing, administration, development, marketing, and industrial and commercial law.

TEXT BOOKS *Thermodynamics and Kinetics*

Smith and Van Ness. *Introduction to Chemical Engineering Thermodynamics*. McGraw-Hill.

Hougen, Watson and Ragatz. *Chemical Engineering Principles*. Vol. 2. Wiley.

Smith. *Chemical Engineering Kinetics*. McGraw-Hill.

Levenspiel. *Chemical Reaction Engineering*. Wiley.

Walas. *Chemical Engineering Kinetics*. McGraw-Hill.

Weber and Meissner. *Thermodynamics for Chemical Engineers*.

Dodge. *Chemical Engineering Thermodynamics*. McGraw-Hill.

Guggenheim. *Thermodynamics*.

Hinshelwood. *Kinetics of Chemical Change*.

Frost and Pearson. *Kinetics and Mechanisms*. Wiley.

Denbigh. *Principles of Chemical Equilibrium*. Cambridge.

TEXT BOOKS *Management and Data Processing*

Edward Sykes. *The Employer, Employee and the Law*. Law Book Co.

Yorston and Fortescue. *Australian Mercantile Law*. 11th ed.

Colman, Smallwood and Brown. *Computer Language*.

3.122 Chemical Engineering IIB*Principles II*

Stage Operations: Mass transfer operations, descriptions of equipment for stage operations, phase equilibria.

Molecular and Turbulent Transport: Molecular diffusion, thermal diffusion, momentum transport, film, boundary layer and penetration theories, non-Newtonian fluids, transport properties of liquid gases and solids, steady state transfer between phases, turbulent transport, empirical correlations, analogies, applications to transfer between gases, liquids and solids, equipment for mass transfer use of the transfer unit, solution of isothermal and adiabatic problems in distillation absorption, extraction and adsorption, prediction of stage efficiencies.

Heat Transfer: Unsteady state, extended surfaces, condensing and boiling. More advanced treatment of conduction, convection and radiation. Network method, jacketed vessels, simultaneous heat and mass transfer, analogies and limitations.

Solids Handling: Particle size distribution functions, sieve analysis, energy size relationships in comminution, separation of particulate material by froth flotation and electrical methods (course provided by the School of Mining Engineering).

Solid-Fluid Systems (2-phase systems): Flow of particles through fluids, flow of fluids through beds of solids.

Design I

Process Vessels—Mechanical design and fabrication of pressure vessels. Code and legal requirements. Supports for tall vertical, or horizontal vessels and their design.

Heat Exchangers—Types of heat exchangers. Service fluids for heating and cooling at various temperature levels. Construction and design of shell and tube exchangers for liquids, gases, condensing vapours and boiling liquids.

Distillation and Absorption Equipment—Construction and design of sieve trays, bubble cap trays and plate towers. Selection of packing; design and construction of packed towers. Performance characteristics of packed and plate towers.

Plant Layout; Reticulation and Fluid Transfer Systems—Arrangement of equipment, fluid prime movers, valves and piping for process and service fluids. Overhead and underground piping. Commercial pipes and tubes; components, flanges and couplings. Construction; shop and field fabrication. Characteristics of common valve types, their sizing and selection. Sizing of pipes. Characteristics of fluid prime movers and associated piping systems. Brief outline of flexural considerations.

Process Engineering—Block diagrams, process flowsheets, presentation of material properties, mass and energy flows at various points. Engineering flowsheets. Process engineering (or performance) specifications for equipment items. Storage and safety considerations. The design report.

Chemical Engineering Economics—Estimation of capital and operating costs. Components of fixed and variable costs. Break-even charts. Methods of comparing alternatives: rate of return, minimum payback time, incremental return rate, capitalized cost, optimization. Depreciation and taxation and their effect on economic analyses. Economic design.

Industrial Measuring Instruments—Elementary treatment of transducers, transmitters and instruments for measuring temperature, pressure, flow, liquid level and pH. Speed of response.

Industrial Processes—A series of brief reviews of selected processing industries in which integration with other industries and present and foreseeable trends of the industry are emphasized.

Corrosion and Materials—An elementary course in corrosion theory. Cathodic and anodic protection. Surface coatings. Materials of construction for chemical plant.

TEXT BOOKS *Principles II*McAdam. *Heat Transmission*. McGraw-Hill.Coulson and Richardson. *Chemical Engineering*. Vol. 2, Pergamon.Faust, Wenzel, Clump, Maus and Andersen. *Principles of Unit Operations*. Wiley.Perry. *Chemical Engineers' Handbook*. McGraw-Hill.Badger and Banchero. *Introduction to Chemical Engineering*. McGraw-Hill.

REFERENCE BOOKS

Norman. *Absorption and Distillation*.Sherwood and Pigford. *Absorption and Extraction*. McGraw-Hill.Bird, Stewart and Lightfoot. *Transport Phenomena*. Wiley.Larian. *Fundamentals of Chemical Engineering Operations*. Constable.TEXT BOOKS *Design I*

A.S. No. CB.1, Part V—1951 S.A.A. Boiler Code, Part V—Welding. Standards Association of Australia.

S.A.A. Int. 351. *Structural Steel in Building*. Standard Association of Australia.Buchanan and Sinclair (edited by). *Costs and Economics of the Australian Process Industries*. West.Peters. *Plant Design and Economics for Chemical Engineers*. McGraw-Hill.A.S. No. A1—1956 *Structural Steel and Rolled Steel Sections*. Standards Association of Australia.

REFERENCE BOOKS

A.S.M.E. *Boilers and Pressure Vessel Code*. Section 8 (1962).B.S. 1500: 1958. *Fusion Welded Pressure Vessels*. British Standards Institution.A.S. No. CA.2—(1958) S.A.A. *Code for Concrete in Buildings*. Standards Association of Australia.A.S. No. CA.10—(1938) *Platforms, Gangways, etc.* Standards Association of Australia.S.A.A. Int. 350. *Minimum Design Loads in Buildings*. Standards Association of Australia.Vilbrandt and Dryden. *Chemical Engineering Plant Design*. 4th ed. McGraw-Hill.B.S. 1387. *Steel Tubes and Tubulars, British Platforms*. British Standards Institute.Rase and Barrow. *Project Engineering of Process Industries*. Wiley.Brownell and Young. *Process Equipment Design*. Wiley.Kern. *Process Heat Transfer*. McGraw-Hill.Tema. *Heat Exchangers Design Manual*. 3rd and 4th editions.B.H.P. *Catalogue of Rolled Steel Sections*.Tyler and Winter. *Chemical Engineering Economics*.Dept. of Trade. *Income Tax for the Manufacturer*.Rase. *Piping Design for Process Plants*. Wiley.Hirschhorn. *Materials and Structures*. UNSW Students' Union.Morris and Jackson. *Absorption and Stripping Towers*. Butterworths.Leva. *Packed Towers*. U.S. Stoneware.Kellog, M. W. *Design of Piping Systems*.Siemon. *Pressure Vessel Manual*. 6th ed. Edwards Bros.Ludwig, E. E. *Applied Process Design for Chemical and Petrochemical Plants*. Gulf Publishing. Vols. 1-2-3, 1963-1966.TEXT BOOKS *Corrosion and Materials*Evans. *Introduction to Metallic Corrosion*.Rollason. *Metallurgy for Engineers*. 4th ed.Hepner. *Materials of Construction for Chemical Plant*.

REFERENCE BOOKS

Rumford. *Chemical Engineering Materials*.

Uhlig. *Corrosion Handbook*.

Speller. *Corrosion, Causes and Prevention*.

Society of Chem. Ind., 1950. *Materials of Construction in the Chemical Industry*.

3.123 Combined Chemical Engineering Principles and Design Examination

Tests the knowledge gained by B.Sc.(Tech.) students during studies and industrial training and is taken at the end of the course.

3.131S Chemical Engineering IIIA

Principles III

Extension of selected topics treated in Chemical Engineering II. Solution of problems using digital and analogue computers, relaxation and boundary layer methods and analytical solutions.

TEXT BOOKS *Principles III*

Coulson and Richardson. *Chemical Engineering*. Vols. 1 and 2. Pergamon.

Bird, Stewart and Lightfoot. *Transport Phenomena*.

Foust, Clump, Wenzel, Maus and Andersen. *Principles of Unit Operations*. Wiley.

Holland. *Multicomponent Distillation*. Prentice Hall.

REFERENCE BOOKS

Treybal. *Mass Transfer Operations*.

Robinson and Gilliland. *Elements of Fractional Distillation*.

Eckert. *Introduction to the Transfer of Heat and Mass*.

Othmer. *Fluidization*.

Ipsen, D. C. *Units, Dimensions and Dimensionless Numbers*.

Johnstone, R. E. and Thring, M. W. *Pilot Plants, Models and Scale-up Methods*.

Langhaar. *Dimensional Analysis and Theory of Models*.

3.132S Chemical Engineering IIIB

Design II

Chemical Engineering Economics—Estimation of capital and operating costs. Components of fixed and variable costs. Break-even charts. Methods of comparing alternatives: rate of return, minimum payback time, incremental return rate, capitalized cost, optimization. Depreciation and taxation and their effect on economic analyses. Economic design.

Plant Location—Topography, climate, transport, effluent disposal, relative location of markets and raw material sources, political environment.

Plant Layout—Principles, economic factors, use of drawings, three dimensional models and methods engineering.

Project Engineering—Management and critical path scheduling of the design, fabrication, procurement and erection of plant.

Civil Engineering Aspects—Qualitative treatment of soils and foundations for structures, buildings, storage tanks, and all free-standing columns. Economics of single, multi-stage and open air structures. Factory acts and codes. Access roads.

Pressure Vessels—Design and construction of vessels to contain high pressures and high temperatures. Monobloc cylinders, auto-fretage, wire and tape wound vessels, multi-shell constructions, end closures, seals and joints for high pressure vessels, transition stresses, economic considerations, nozzles, glands, auxiliary components, piping, valves, pumps and com-

pressors for high pressure plant. Vessels for high temperature, stresses due to temperature gradients, creep, creep resistant materials, shell construction using two materials, wall temperatures.

Piping Design—Introduction to methods of flexural analysis for piping systems. Methods of reducing expansion and vibration reactions and stresses.

Process Engineering and Economic Design—The economic design of the major components of a projected chemical plant will be demonstrated in detail. The course will demonstrate, *inter alia*, the economic selection of the process, product effluent compositions, and optimum size and operating conditions of the various components of the battery.

Instrumentation and Automatic Control

Instrumentation—Important types of measuring instruments, principles governing their operation, selection and installation. Indicating and recording instruments. Pneumatic and electric controllers. Control valves and actuators and control valve sizing.

Process dynamics—Dynamics of flow processes, thermal processes, mass transfer processes and chemical processes. Use of block diagrams and signal flow diagrams. Mathematical techniques for handling the equations involved.

Automatically-controlled processes—Fundamental principles of automatic control, and of the mathematical techniques for solving automatic-control problems.

Laboratory—Problems associated with measuring instruments (calibration, errors, installation, etc.), and a study of the properties of some of the components in controlled systems (lags performance characteristics, valve characteristics, etc.). Other work will involve the use of electronic and analogue equipment for simulating controlled processes. The use of the digital computer in similar problems.

TEXT BOOKS *Design II*

Buchanan and Sinclair (edited by). *Costs and Economics of the Australian Process Industries*. West.

Comings. *High Pressure Technology*. McGraw-Hill.

REFERENCE BOOKS

Tongue. *Design of High Pressure Chemical Plant*. 2nd ed.

Kern. *Process Heat Transfer*. McGraw-Hill.

Brownell and Young. *Process Equipment Design*. Wiley.

Timoshenko. *Theory of Elastic Stability*. McGraw-Hill.

Kellog, M. W. *Design of Piping Systems*. Kellog.

Rase. *Piping Design for Process Plants*. Wiley.

Roark. *Formulas for Stress and Strain*. McGraw-Hill.

TEXT BOOKS *Instrumentation and Automatic Control*

Perlmutter. *Introduction to Chemical Process Control*. Wiley.

REFERENCE BOOKS

Shilling. *Process Dynamics and Control*. Holt, Rinehart and Winston.

Campbell. *Process Dynamics*.

D'Azzo, J. J. and Houpis, C. H. *Feedback Control System Analysis and Synthesis*. McGraw-Hill.

Eckman. *Automatic Process Control*. Wiley.

Smith and Wood. *Principles of Analog-Computation*. McGraw-Hill.

Clark. *Introduction to Automatic Control Systems*. Wiley.

3.140 Chemical Engineering Projects

The design of plant for the production of chemicals and the estimation of product costs.

3.150 Chemical Engineering Projects

An experimental investigation of some aspects of chemical engineering.

DEPARTMENT OF FOOD TECHNOLOGY

3.211 Food Technology IA

The technology of fruits and vegetables—Horticultural factors, maturity assessment, harvesting, precooling, packaging, transportation. Plant respiration, principles of gas and cold storage, induced physiological defects. Microbiology of plant foods. Principles of canning and freezing technology. Thermal processing and process evaluation. Dehydration and sun drying. Microbiology of canned, frozen and dehydrated plant foods, diagnosis of spoilage. Preservation by use of salt, sugar and chemical preservatives. Students will also take the subject 17.311 Botany from the School of Biological Sciences which covers the essential structure and function of higher plants.

Part I

TEXT BOOKS

Kent. *Technology of Cereals*. Pergamon.

REFERENCE BOOKS

Hersom and Holland. *Canned Foods*. Churchill, London.

Tressler and Evans. *The Freezing Preservation of Foods*. 2 Vols. A.V.I. Publ. Co., Westport.

Blanc. *Handbook of Food and Agriculture*. Reinhold.

Tressler and Joslyn. *Fruit and Vegetable Juice Production*. A.V.I. Publ. Co.

Van Arsdel and Copley. *Dehydration*. 2 Vols. A.V.I. Publ. Co.

Howard. *Canning Technology*. Churchill, London.

Cruess. *Commercial Fruit and Vegetable Products*. McGraw-Hill.

Morris. *Principles of Fruit Preservation*. Chapman & Hall, London.

Frazier. *Food Microbiology*. McGraw-Hill.

Stumbo. *Thermobacteriology in Food Processing*. Academic Press.

3.212 Food Technology IB

The science and technology of meat, fish, eggs, milk, fats and oils, cereals, sugars; their derived products, with particular reference to sources, structure and composition, microbiological and biochemical aspects, their reactions and modifications during processing and storage. Food additives, food package requirements. Food spoilage, its diagnosis and control.

Part II

TEXT BOOKS

Lawrie. *Meat Science*. Pergamon.

Earle. *Unit Operations in Food Processing*. Pergamon.

REFERENCE BOOKS

Honig. *Principles of Sugar Technology*. Elsevier, Amsterdam.

Jensen. *Meat and Meat Foods*. Garrard, Champaign, Ill.

Jensen. *Microbiology of Meats*. Garrard Press.

Swern. *Bailey's Industrial Oil and Fat Products*. Wiley.

Jacobs. *Food and Food Products*. 3 Vols. Wiley.

- Bate-Smith and Morris. *Food Science*. Cambridge, U.P.
 Mrak and Stewart. *Advances in Food Research*. Academic.
 Davis. *Dictionary of Dairying*. Hill, London.
 Tressler and Lemon. *Marine Products of Commerce*. A.V.I. Publ. Co.
 Frazier. *Food Microbiology*. McGraw-Hill.
 Romanoff and Romanoff. *The Avian Egg*. Wiley.
 Tanner. *Microbiology of Foods*. Garrard Press.
 Borgstrom. *Fish as Food*. Vols. 1-4. Academic Press.
 Hlynka. *Wheat Chemistry and Technology*. Am. Assn. of Cereal Chem.
 Bailey. *Melting and Solidification of Fats*. Academic.
 Andersen and Williams. *Margarine*. Pergamon.
 Jenness and Patton. *Principles of Dairy Chemistry*. Wiley.
 American Meat Institute Foundation. *Meat and Meat Products*. Freeman.

3.221 Food Technology II

The characteristics of food quality. Colour, its subjective and objective assessment, colour instrumentation. Flavour, physiology or flavour perception, taste evaluation, separation and identification of flavour constituents. Texture and consistency. Nutrition, the evaluation of diets. Food irradiation. Students will also take 17.511 Entomology offered by the School of Biological Sciences.

REFERENCE BOOKS

- U.S.A. Quartermaster Food and Container Institute: 1. Colour in Foods; 2. Food Acceptance Testing Methodology; 3. Chemistry of Natural Food Flavours.
 Crocker. *Flavour*. McGraw-Hill.
 Little. *Flavour Research and Food Acceptance*. Reinhold.
 Harris and Von Loesecke. *Nutritional Evaluation of Food Processing*. Wiley.
 Mackinney and Little. *Colour of Food*. A.V.I. Publ. Co.
 Karrer and Jucker. *Carotenoids*. Elsevier, Amsterdam.
 Goodwin. *The Comparative Biochemistry of the Carotenoids*. Chapman and Hall.
 Paech and Tracey. *Modern Methods of Plant Analysis*. 4 Vols. Springer, Berlin.
 Mrak and Stewart. *Advances in Food Research*. Academic.
 Meyer. *Food Chemistry*. Reinhold.
 Charm. *Fundamentals of Food Engineering*. A.V.I. Publ. Co.
 Webb. *Biochemical Engineering*. Van Nostrand, London.
 N.A.S.-N.R.C. Publication 1273. *Radiation Preservation of Foods*. Nat. Acad. of Science, Washington.
 NAS-NRC Publication 1273. *Radiation Preservation of Foods*. Nat. Acad. of Science, Washington.
 Burnham, Hanes and Bartleson. *Color: A Guide to Basic Facts and Concepts*. Wiley.
 Amerine, Pangborn and Roessler. *Principles of Sensory Evaluation of Food*. Academic Press.

3.222 Food Technology Project

The student will undertake an individual project involving a literature survey, an experimental investigation, and the final preparation of a detailed report on a selected topic in food science or technology.

3.231 Chemical Engineering

Fundamentals and application of the following topics: fluid flow, heat transfer, evaporation and drying, refrigeration, instrumentation and psychrometry, and materials of construction.

DEPARTMENT OF FUEL TECHNOLOGY

3.311 Fuel Science and Engineering I

Principles and processes of fuel technology.

Fuels: importance, costs, economics, availability, fields of application, relative advantages. Solid, liquid and gaseous fuels: origin, types, classification, storage occurrence in Australia; introduction to standard specifications; sampling, testing and evaluation—significance of tests.

Processing and utilization of fuels: combustion, gasification, carbonization and manufacture of chemicals. Atmospheric pollution and control. The future outlook for fuels.

TEXT BOOKS

Brame and King. *Fuel: Solid, Liquid and Gaseous*. Arnold, or H.M.S.O. (London), Ministry of Power. *The Efficient Use of Fuel*. Gilchrist. *Furnaces*. Pergamon.

REFERENCE BOOKS

Himus. *Elements of Fuel Technology*. Hill.

Himus. *Fuel Testing*. Hill.

Australian Standards Association. *The Coal Resources of Australia*. Power Survey Report No. 3.

Commonwealth of Australia. *Report of the Coal Utilization Research Advisory Committee*. Govt. Printer. CURAC Report.

Cambell (Ed. Gibb). *Methods of Analysis of Fuels and Oils*. Constable.

Gilchrist. *Fuels and Refractories*. Pergamon.

Lowry. *Chemistry of Coal Utilization*. Supplementary Vol. Wiley.

Francis. *Coal: Its Formation and Composition*. 2nd ed. Arnold.

Shell Internat. Pet. Co. Ltd. *The Petroleum Handbook*. 4th ed.

British Petroleum Co. Ltd. *Gasmaking*.

B.S. 1017. *Methods for the Sampling of Coal and Coke*. 1960.

B.S. 1016. *Methods for the Analysis and Testing of Coal and Coke*. 1957-1961.

B.S. 1756. *Code for the Sampling and Analysis of Fuel Gases*.

Inst. of Petroleum. *I.P. Standards for Petroleum and Its Products*.

Standardisation of Tar Products Tests Committee (S.T.P.T.C.). *Standard Methods for Testing Tar and Its Products*.

Huxtable. *Coal Tar Fuels*. Assoc. of Tar Distillers.

Spiers. *Technical Data on Fuel*. World Power Conference, London.

3.321 Fuel Engineering II

Fundamental principles of combustion. Gaseous reactions; theory of chain reactions—free radicals in the gas phase. Kinetics of heterogeneous combustion reactions. Flames, flame propagation. Inflammability limits, cool flames and knock. Combustion in model fuel beds; reactivity and combustion of coke.

Combustion in practice: blast furnaces and cupolas; mechanical stoking. The burning of coal in suspension. Characteristics of pulverized fuel, combustion mechanism, heat release and particle burning times. Combustion of liquid fuels; characteristics of importance; physical and chemical processes involved in the burning of "atomized" fuels. Mineral impurities in fuels and their significance. Ash fusibility, clinkering and slagging; deposits and corrosion: causes, measurement and control.

TEXT BOOKS

Smith and Stinson. *Fuels and Combustion*. McGraw-Hill.

*Thring. *The Science of Flames and Furnaces*. Chapman and Hall.

*Gaydon and Wolfhard. *Flames*. Chapman and Hall.

*Also needed in later courses.

REFERENCE BOOKS

Spiers. *Technical Data on Fuel*. W.P.C., London.

Dehnel. *Fundamentals of Boiler House Technique*.

Lewis and Von Elbe. *Combustion, Flames and Explosions of Gases*. Academic.

Lowry. *Chemistry of Coal Utilization*. Supplementary volume. Wiley, 1963.

A.S.M.E. Research Report. *Corrosion and Deposits in Coal—and Oil-fired Boilers and Gas Turbines*. Pergamon.

Inst. of Fuel (Australian Membership). *Symposium on the Inorganic Constituents of Fuel (Origin, Influence and Control)*. 1964.

3.331S Fuel Engineering IIIA

Part I—Instrumentation and Automatic Control: Principles of design and operation of instruments applicable to fuel-using plant. Temperature, pressure and flow measurements. Electric and pneumatic transmission systems. Electronic telemetering. Fundamentals of automatic control: proportional, integral, derivative and three-term controls. Applications of control systems to boilers and other fuel-using plant.

Part II—Fuel Plant Technology and Design: Refractories and insulating materials and their application in the construction of fuel-using plant. Properties of significance to fuel economy. Behaviour of refractories in industrial retorts, ovens, furnaces and kilns.

Fuel-using plant: boilers, furnaces, ovens, kilns and cupolas: principal types and methods of application of different fuels. Fundamental features of plant design, construction and operation; heat release and distribution; heat transmission and distribution to furnace charge and structure; sources of heat loss, flow patterns and draughting in furnace systems.

Heat recovery, recuperation and regeneration; relationship between load and efficiency. Auxiliary plant, process steam and water; feed water treatment and condensate recovery.

Appropriate laboratory experiments, and design assignments.

Part I

TEXT BOOKS

Eckman. *Automatic Process Control*. Wiley.

REFERENCE BOOKS

The Instrument Manual. United Trades Press.

McAdams. *Heat Transmission*. McGraw-Hill.

*Gaydon and Wolfhard. *Flames*. Chapman and Hall.

B.S. 1042. Part I, 1964. *Measurement of Fluid Flow in Pipes*.

B.S. 1043. *Temperature Measurement*.

*Spiers. *Technical Data on Fuel*. W.P.C., London.

*Also needed in later courses.

Part II

TEXT BOOKS

Kern. *Process Heat Transfer*. McGraw-Hill.

Spiers. *Technical Data on Fuel*. W.P.C., London.

REFERENCE BOOKS

Griswald. *Fuels, Combustion and Furnaces*. McGraw-Hill.

Etherington. *Modern Furnace Technology*. 3rd ed. Griffin.

Trinks. *Industrial Furnaces*. Vols. 1 and 2. Wiley.

Lyle. *The Efficient Use of Steam*. H.M.S.O., London.

Norton. *Refractories*.

Schack. *Industrial Heat Transfer*. Chapman and Hall.

3.332S Fuel Engineering IIIB

Part I—Thermal Engineering: Heat transfer related to flames, furnace enclosures and complex shapes; calculations of flame temperature. Analytical, numerical and analogue methods of computation. Dimensional analysis and models in the study of aerodynamics and flame behaviour in furnaces and related plant. Process control dynamics with particular reference to instrumentation and control of fuel plant; analysis of control system responses including the use of analogue computers. Thermodynamic cycles in power generation; recent research and development in the field of conversion of heat to electricity. Brief review of rocket fuels, explosives, and their uses.

Part II—Thermal Processing: A more detailed treatment of some of the topics from 3.311 Fuel Science and Engineering I, as follows:—

Coal carbonization science and its application to the production of metallurgical coke. Recovery and purification of liquid and gaseous products.

Petroleum processing; the properties of petroleum fractions and the theoretical basis of some of the unit operations involved. The production of liquid and gaseous fuels from synthesis gas; coal and oil hydrogenation.

Thermodynamics of gasification processes and the calculation of yields. Particle mechanics, and applications in beneficiation of fuels, collection and sampling of dusts and combustion effluents. Examination of dusts; size analysis and distribution. Fluidization and fluidized bed processes used in the fuel industries.

Part III—Fuel Science II: Constitution of mineral oils. Molecular type analysis. Relation of hydrogen content to molecular structure. Structural group analysis. Classification of mineral oils.

Coal petrology: macerals, minerals and microlithotypes. Influence of the petrographic composition on the technical uses of coal.

Coal constitution. Development of theories on the ultrafine physical and chemical structure of coal by the application of modern techniques. Statistical constitution analysis. Possible industrial applications. The action of heat on coal: pyrolysis of the various petrographic constituents. The mechanism of coking and of tar formation.

TEXT BOOKS

McAdams. *Heat Transmission*. McGraw-Hill.

*Spiers. *Technical Data on Fuel*. W.P.C., London.

*Thring. *The Science of Flames and Furnaces*. 2nd ed. Chapman and Hall.

Van Krevelen. *Coal. Typology, Chemistry, Physics and Constitution*. Elsevier.

*Gaydon and Wolfrard. *Flames*. 2nd ed. Chapman and Hall.

Institute of Petroleum. *Modern Petroleum Technology*.

*Texts from previous subject which should already be in the students' possession.

REFERENCE BOOKS

Karplus. *Analogue Simulation*. McGraw-Hill.

Spalding. *Some Fundamentals of Combustion*. Butterworth.

Griswald. *Fuels, Combustion and Furnaces*. McGraw-Hill.

Etherington. *Modern Furnace Technology*. 3rd ed. Griffin.

Trinks. *Industrial Furnaces*. Vol. 1 and 2. Wiley.

Kern. *Process Heat Transfer*. McGraw-Hill.

Sach (edited by). *Coal Tar Fuels*. Association of Tar Distillers, London.

Gumz. *Gas Producers and Blast Furnaces*. Wiley.

Francis. *Boiler House and Power Station Chemistry*. Arnold.

Drinker and Hatch. *Industrial Dusts*. McGraw-Hill.

Nelson. *Petroleum Refinery Engineering*. McGraw-Hill.

Lowry. *Chemistry of Coal Utilization*. Supplementary Vol. Wiley.

Francis. *Coal: Its Formation and Composition*. 2nd ed. Arnold.

B.C.U.R.A. *Proceedings of a Conference on the Ultrafine Structure of Coals and Cokes*. 1944.

Institute of Fuel. *Residential Conference on Science in the Use of Coal*. Sheffield, 1958.

The Central Fuel Research Institute, India. *Proceedings of the Symposium on the Nature of Coal*. Jealgora, 1959.

Van Nes and Van Westen. *Aspects of the Constitution of Mineral Oils*. Elsevier.

3.333 Fuel Engineering IIIM

For B.Sc.(Tech.) students. Covers the subject-matter of 3.331S Fuel Engineering IIIA and 3.332S Fuel Engineering IIIB, but with slightly reduced laboratory hours. The syllabus includes solids handling and coal density analysis.

The text and reference books for this subject are selected from those for 3.332S above.

3.340 Fuel Engineering Project

Projects will be selected involving the design of fuel plant or aspects of fuel science and/or fuel processing and utilization. This will usually involve some experimental work.

No books are recommended. Students are supplied with reading lists appropriate to individual requirements.

CHEMICAL ENGINEERING GRADUATE COURSE SUBJECTS

3.161G Corrosion Technology I

A technical survey of metals and non-metals from the viewpoint of types available and the corrosion properties, i.e., steels, irons, special ferrous alloys, non-ferrous metals and alloys, glass, plastics, ceramics, rubber, Cathodic and anodic protection. Inhibitors and passivizers.

3.162G Corrosion Technology II

Applications of Corrosion Theory

Environmental and intrinsic factors encountered in corrosion and the design of plant to prevent or minimize corrosion. Atmospheric and gaseous corrosion. Aqueous and liquid media corrosion. Underground corrosion.

Corrosion Prevention

Application of corrosion prevention to pipelines, structures, factory equipment in chemical, food, metallurgical and other industries. Corrosion prevention in sea water, steam generation, canning, industry, etc.

3.171G Corrosion Literature Assignment

Students will be expected to consult and read the wide literature on corrosion and to produce a comprehensive and detailed report on a selected topic, e.g., aspects of corrosion in the acid industry; marine corrosion; corrosion problems in the food industry; underground corrosion of pipelines.

3.172G Corrosion Assignment

This will involve students in a small project connected with corrosion problems, i.e., examination of coatings and the reason for failure, examination of corrosion products, reasons for failure by corrosion, etc.

3.181G Heat, Mass and Momentum Transfer

Revision of fluid dynamics, heat and mass transfer; boundary layer theory; applications to stagewise processes and two-phase flow, lift and drag coefficients, non-Newtonian flow. Unsteady state heat transfer by conduction, convection and radiation.

Heat and Momentum Transfer

TEXT BOOKS

Coulson and Richardson. Vol. 1. *Chemical Engineering*. Pergamon.

REFERENCE BOOKS

Faust, Wenzel, Clump, Maus and Andersen. *Principles of Unit Operations*. Wiley.

Perry. *Chemical Engineers Handbook*. McGraw-Hill.

3.182G Thermodynamics and Kinetics

Review of fundamental principles. First and Second Laws. Applications to biological systems, energy in important processes. Rates of reaction, activation, energy, free energy, and metabolism, activated complexes, redox potential and irreversible electrode potentials.

Thermodynamics Kinetics and Process Control

TEXT BOOKS

Lewis and Randall. 2nd Ed. *Thermodynamics*. McGraw-Hill.

Levenspiel. *Chemical Reaction Engineering*. Wiley.

Perlmutter. *Introduction to Chemical Process Control*. Wiley.

REFERENCE BOOKS

Bray and White. *Kinetics and Thermodynamics in Biochemistry*. Churchill.

Webb. *Biochemical Engineering*. Van Nostrand.

Aida, Humphrey and Millis. *Biochemical Engineering*. Tokyo Univ. Press.

Pourbaix. *Atlas of Electrochemical Equilibrium Diagrams*. Pergamon.

Smith. *Chemical Engineering Kinetics*. McGraw-Hill.

Smith and Van Ness. *Introduction to Chem.Eng. Thermodynamics*. McGraw-Hill.

3.183G Process Design and Operation

Process dynamics and control: Principles of process dynamics and the mathematical technique employed. Dynamics of batch and flow processes with living organisms. Unstable systems.

Engineering design and operating characteristics of plant and processes normally used, e.g., sterilization and air purification; dehydration; drying at reduced pressure; reduced temperature preservation; radiation; product isolation; sedimentation, filtration, centrifugation; extraction; absorption, chromatography and ion exchange; absorption with reaction; electrophoresis and dialysis; aseptic design; materials of construction; effluent disposal.

TEXT BOOKS

Webb. *Biochemical Engineering*. Van Nostrand.

Coulson and Richardson. Vol. II. *Chemical Engineering*. Pergamon.

REFERENCE BOOKS

Faust, Wenzel, Clump, Maus and Andersen. *Principles of Unit Operations*. Wiley.

Aida, Humphrey and Millis. *Biochemical Engineering*. Tokyo Univ.
Larian. *Fundamentals of Chemical Engineering Operations*. Constable.
Steel. *Biochemical Engineering*. Heywood.

3.191G Chemical Reactor Engineering I

Transport Phenomena in Reactors—Residence time distribution. Flow models. Non-ideal flow. Heat exchange in reactors. Tracer techniques. Mixing, dispersion, and segregation in reactors. Heterogeneous flow system—catalytic and fluidized-bed reactors. Mass transfer. Temperature gradients and concentration profiles.

Reactor Dynamics—Analysis of basic linear systems. Open loop and closed loop systems. Introduction of synthesis techniques. Characterization of dynamic systems based on transport phenomena and reaction kinetics. Prediction of instability.

Reactor Engineering Economics—Economic analysis of Australian process industries. Objective functions. Preliminary evaluation of capital requirements and estimation of associated costs.

TEXT BOOKS

Levenspiel. *Chemical Reaction Engineering*. Wiley.

Perlmutter. *Introduction to Chemical Process Control*. Wiley.

REFERENCE BOOKS

Shilling. *Process Dynamics & Control*. Wiley.

Campbell. *Process Dynamics*. Wiley.

D'Azzo, J. J. and Houpis, C. H. *Feedback Control System Analysis and Synthesis*. McGraw-Hill.

Eckman. *Automatic Process Control*. Wiley.

Smith and Wood. *Principles of Analog Computation*. McGraw-Hill.

Clark. *Introduction to Automatic Control Systems*. Wiley.

Comings. *High Pressure Technology*. McGraw-Hill.

Buchanan and Sinclair. *Costs and Economics in the Australian Process Industries*.

3.192G Chemical Reactor Engineering II

Reactor Design and Control—Linearization of reactor systems. Analysis of non-linear systems. Synthesis techniques in reactor design. Design for control. Objective functions. Transient models. Scale-up in design. Transfer coefficients. Combined mechanisms. Industrial reactors.

Design Optimization—Selectivity. Reactor types and feed distribution. Temperature optimization. Dynamic models and design. Optimization of functional groups.

3.193G Industrial Process Kinetics

Kinetics and mechanisms particularly in the field of complex reactions.

TEXT BOOKS

Frost and Pearson. *Kinetics and Mechanisms*. Wiley.

Levenspiel. *Chemical Reaction Engineering*. Wiley.

3.194G Kinetic Models and Parametric Studies

Advanced kinetics course involving extensive use of analogue computers.

3.195G Reactor Design Project

Detailed design of a chemical reactor as an element of a functional group of process equipment. The project will be based on an engineering flowsheet of a process plant. Computer facilities will be employed as needed.

FOOD TECHNOLOGY GRADUATE COURSE SUBJECTS

3.241G Food Technology

World food supplies. Geographic considerations, sources and distribution. Structure and composition of foods, of plant and animal origin. Principles of food preservation. Food spoilage, chemical and microbiological, its nature and control. Foods in relation to disease. Food evaluation and acceptance, colour, flavour, texture and nutrition. Food regulations.

FUEL TECHNOLOGY GRADUATE COURSE SUBJECTS

3.381 Principles of Fuel Engineering

An expanded version of the course 3.311 Fuel Science and Engineering I, including appropriate laboratory work.

Text and reference books are as for 3.311 Fuel Science and Engineering I.

3.382 Combustion Engineering

Similar to 3.321 Fuel Engineering II offered in the post-graduate diploma.

Text and Reference Books as for 3.321 Fuel Engineering II.

3.383 Fuel Plant: Evaluation and Assignments

A non-examinable subject designed to meet the needs of individual students in the graduate diploma course, which stresses the practical aspects of combustion engineering and the efficiency of operation of fuel plant. Also included is a bridge course of lectures in heat transfer, fluid mechanics, and chemical and engineering thermodynamics, which is designed to bring students from the varied backgrounds of their first degrees to a common level to facilitate further study of these subjects in the graduate diploma course.

Students are supplied with reading lists appropriate to individual requirements.

3.390G Post-Graduate Seminar

This is intended to assist students in assessing technical problems, in the collection of information and presentation of data, including technical report writing and critical evaluation of available information.

3.391G Atmospheric Pollution and Control

Causes, measurement and control of atmospheric pollutants with special reference to fuel-using plant.

TEXT BOOKS

Magill, Holden and Ackley. *Air Pollution Handbook*. McGraw-Hill.

REFERENCE BOOKS

Meetham. *Atmospheric Pollution*. 2nd ed. Pergamon.

Faith. *Air Pollution Control*. Wiley.

McCabe (edited by). *Air Pollution*. McGraw-Hill.

Drinker and Hatch. *Industrial Dust*. 2nd ed. McGraw-Hill.

Thring (edited by). *Air Pollution*. Butterworth.

Orr and Dalla Valle. *Fine Particle Measurement*. MacMillan.

Davies. *Dust is Dangerous*. Faber and Faber.

Davies. *Breathing and Irrespirable Atmospheres*.

3.392G Fuel Science

The nature of solid and liquid fuels, their physical and chemical properties and fundamental structure. The constitution of the coal matrix and coal petrography. The influence of the physical and chemical constitution of fuels and petrographic composition of coal and technological utilization.

TEXT BOOKS

Van Krevelen. *Coal: Typology, Chemistry, Physics and Constitution*. Elsevier.

REFERENCE BOOKS

Lowry (edited by). *Chemistry of Coal Utilization*. Supplementary Vol. Wiley.

B.C.U.R.A. *Ultrafine Structure of Coals and Cokes*. Proceedings of a Conference in London, 1943.

The Institute of Fuel. *Residential Conference on Science in the Use of Coal*. Sheffield, 1958.

Francis. *Coal: Its Formation and Composition*. 2nd ed. Arnold.

The Central Fuel Research Institute, India. *Proceedings of the Symposium on the Nature of Coal*. Jealgora, 1959.

Raistrick and Marshall. *The Nature and Origin of Coal Seams*. English University Press.

Van Nes and Van Westen. *Aspects of the Constitution of Mineral Oils*. Elsevier.

Freund (edited by). *Handbuch der Mikroskopie in der Technik*. Band II, Teil I, Kohle und Koks.

Stach. *Lehrbuch der Kohlen Mikroskopie*.

Anon. *Atlas Fur Angewandete Steinkohlenpetrography*. Essen.

3.393G Fuel Engineering Plant Design

Extends some of the subject-matter of 3.331s/2 Fuel Plant Technology and Design.

TEXT BOOKS

Kern. *Process Heat Transfer*. McGraw-Hill.

Spiers. *Technical Data on Fuel*. W.P.C., London.

REFERENCE BOOKS

Griswald. *Fuels, Combustion and Furnaces*. McGraw-Hill.

Etherington. *Modern Furnace Technology*. 3rd ed. Griffin.

Trinks. *Industrial Furnaces*. Vols. 1 and 2. Wiley.

Lyle. *The Efficient Use of Steam*. H.M.S.O., London.

3.394G Thermal Engineering and Fuel Processing

Advanced heat transfer with applications to flames and fuel utilization. The aerodynamics of fuel and combustion plant and its study by various techniques including dimensional analysis and models. Process control dynamics and control system response analysis by analytical and analogue computation methods. Developments in power generation; thermodynamics of combined cycles, high temperature direct conversion, propulsion systems, etc.

Coal carbonization and by-product recovery. Petroleum processing and the production of liquid and gaseous fuels from synthesis gas and by coal and oil hydrogenation. Thermodynamic calculations of gasification yields. Particle mechanics and application to fuel beneficiation, sampling and size analysis of dusts, and fluidization. Industrial applications of fluidized bed processes.

Appropriate laboratory experiments.

TEXT BOOKS

Wilson and Wells. *Coal, Coke and Coal Chemicals*. McGraw-Hill.

Inst. of Petroleum. *Modern Petroleum Technology*.

McAdams. *Heat Transmission*. McGraw-Hill.

REFERENCE BOOKS

Gayden and Wolfhard. *Flames*. 2nd ed. Chapman and Hall.

Karplus. *Analogue Simulation*. McGraw-Hill.

Spalding. *Some Fundamentals of Combustion*. Butterworth.

Gumz. *Gas Producers and Blast Furnaces*. Wiley.

3.395G Research Techniques and Extension Methods

Designed to provide a critical approach to research activities. The topics are selected from the following:

(a) Advanced analytical techniques (e.g. spectroscopy, X-ray diffraction, chromatography, mass spectroscopy, N.M.R., other optical and instrumental methods. (b) Mathematical methods in the design and interpretation of experiments, e.g., formulation and solution of equations; statistical evaluation of results; empirical equations and nomographs; analogue simulation; an introduction to programming and use of digital computers.

Students to be supplied with reading lists appropriate to individual requirements.

SCHOOL OF CHEMICAL TECHNOLOGY

22.111 Industrial Chemistry I

(a) *Processes*—Review of services in the chemical industries; a study of the production of inorganic industrial chemicals from the standpoint of the application of the basic principles of inorganic and physical chemistry (acid industries, alkali industries, industrial gases, electric furnace products, superphosphates, aluminium and glass); a study of some sections of the organic industrial chemical industry—fermentation, cellulose, acetylene, polymers, methanol and formaldehyde, sugar. (b) *Chemical Process Equipment*—The principles of operation, construction and fields of application of equipment used in carrying out various processes and operations in the chemical industry. (c) *Management Science*—Application of the principles of the feed-back control loop to management in the chemical industry and dealing with production, quality control, work study, production planning, economics and project development. (d) *Operations Research*—A study of the use of operations research in the chemical industry including linear programming, the transportation problem, inventory control techniques, applications of the queueing theory, use of the digital computer, brief discussion of network flow problems and dynamic programming. (e) *Chemical Thermodynamics and Kinetics*—(i) *Thermodynamics*—Statistical thermodynamics; thermodynamic functions; first and second laws of thermodynamics; thermodynamics of fluids; power cycles; heterogeneous equilibrium; chemical reaction equilibrium; third law of thermodynamics; irreversible processes. (ii) *Kinetics*—Order of reaction and rate equations; theory of rate processes; diffusion; types of reactors; catalysis; mechanical arrangement of reactors for agitation and heat and mass transfer. (f) *Data Processing*—Use of graphical methods; fitting of empirical equations to experimental data; preparation of nomograms using constructional determinants; application of the principles of statistics to chemical problems (t test, F test and Chi-squared test), analysis of variance, correlation and regression, design of experiments. (g) *Laboratory*—Students will be

required to attend lectures in report writing, carry out laboratory assignments and attend factory inspections at local and country centres as required.

22.111/1 and 22.111/2 Industrial Chemistry I

Parts 1 and 2

22.111 Industrial Chemistry I for part-time students in two parts over two years. Part 1 consists of sections (a) and (b) plus (g) laboratory. Part 2 consists of (c) to (f) inclusive.

22.111/1 Processes

TEXT BOOKS

Shreve. *Chemical Process Industries*, or
Kent-Riegel. *Industrial Chemistry*.

REFERENCE BOOKS

Kobe. *Inorganic Process Industries*.
Groggins. *Unit Processes in Organic Syntheses*.
Rogers. *Industrial Chemistry*.

REFERENCE BOOKS Chemical Process Equipment

Riegel. *Chemical Machinery*.
Brown. *Unit Operations*.
Badger and Banchero. *Introduction to Chemical Engineering*.

22.111/2 Industrial Chemistry I

TEXT BOOKS Chemical Thermodynamics and Kinetics

Smith and Van Ness. *Introduction to Chemical Engineering Thermodynamics*.
Smith. *Chemical Engineering Kinetics*.

REFERENCE BOOKS

Darken and Gurry. *Physical Chemistry of Metals*. McGraw-Hill.
Dodge. *Chemical Engineering Thermodynamics*.
Hougen, Watson and Ragatz. *Chemical Process Principles*. Vol. 2.
Guggenheim. *Thermodynamics*.
Walas. *Reaction Kinetics for Chemical Engineers*.
Kirkwood and Oppenheim. *Chemical Thermodynamics*.

TEXT BOOK Data Processing

Crow, Davis and Maxfield. *Statistics Manual*. Dover.
Allcock and Jones. *The Nomogram*.

REFERENCE BOOKS

Johnson. *Nomography and Empirical Equations*.
Davies. *Statistical Methods in Research and Production*.
Worthing and Geffner. *Treatment of Experimental Data*.

22.112 Industrial Chemistry II

An advanced series of lectures dealing with some industries not covered in Industrial Chemistry I.

(a) Appropriate examples of industrial processes will be covered to illustrate the following: refractories; high-temperature chemistry; high-pressure processes (ammonia synthesis—thermodynamics and equipment); high-vacuum processes and molecular distillation; nuclear metals; industrial polymers; aromatic intermediates; fermentation industries. (b) *Instrumentation and Process Control*—Instrumentation—primary sensitive elements and final control elements concerned with the parameters normally encountered in the chemical industry; elementary principles of digital

computation; process dynamics; open-loop process system analysis; principles of analogue computation and simulation; automatic process control systems. (c) *Advanced Kinetics*—Theoretical kinetics (rate processes, statistical mechanics, diffusion); catalysis; solid-state reactions; polymerization kinetics; scale-up reactor design; applications of computers to kinetics and reactor design; nuclear reactions. (d) *Industrial Chemistry Seminar*—Students will be required to present papers on selected topics with the intention of developing their skill in oral expressions as well as their ability to evaluate critically and present logically information on selected topics. Opportunity will also be taken where appropriate to arrange for guest lecturers.

REFERENCE BOOKS *Processes*

- Rochow. *An Introduction to the Chemistry of the Silicones*.
 Salmang. *Ceramics: Physical and Chemical Fundamentals*.
 Norton. *Refractories*.
 Campbell. *High Temperature Technology*.
 Comings. *High Pressure Technology*.
 Dushman. *Scientific Foundations of Vacuum Technology*.
 Seaborg and Katz. *The Actinide Elements*.
 Glasstone. *Principles of Nuclear Reactor Engineering*.
 McQuillan and McQuillan. *Titanium*.
 Miller. *Zirconium*.
 Shirley. *The Preparation of Organic Intermediates*.
 Bawn. *The Chemistry of High Polymers*.
 Billmeyer. *Textbook of Polymer Science*.
 Schildknecht. *Polymer Processes*.
 Schildknecht. *Vinyl and Related Polymers*.
 Underkofler and Hickey. *Industrial Fermentations*.
 Grogins. *Unit Processes in Organic Synthesis*.
 Kortum-Bockris. *Electrochemistry*.
 Friend and Gutmann. *Proc. 1st Australian Conference on Electrochemistry*. Pergamon.
 Gerrard. *Proc. A.I.M.E. Symposia on Extraction of Aluminium*, Vol. 2. Interscience.
 Fordham. *Silicones*. Newnes, 1960.
 Kingery. *Introduction to Ceramics*. Wiley, 1960.
 Ryshkewitch. *Oxide Ceramics: Physical Chemistry and Technology*. Academic, 1960.
 Harrington and Ruehle. *Uranium Production Technology*. Van Nostrand, 1959.
 Cuthbert. *Thorium Production Technology*. Addison-Wesley, 1958.
 Chesters. *Steel Plant Refractories*. 2nd ed., 2nd impression. United Steel Companies, 1963.
 Foley and Clegg (edited by). *Uranium Ore Processing*. Addison-Wesley, 1958.

TEXT BOOK *Instrumentation and Process Control*

Shilling. *Process Dynamics and Control*. Holt, Rinehart and Winston.

REFERENCE BOOKS

- Eckman. *Automatic Process Control*.
 Del Toro and Parker. *Principles of Control Systems Engineering*. McGraw-Hill, 1960.
 Caldwell, Coon and Zoss. *Frequency Response in Process Control*.
 Johnson. *Analog Computer Techniques*.
 Huskey and Korn. *Computer Handbook*.
 Smith and Wood. *Principles of Analog Computation*.
 Considine. *Process Instruments Handbook*.

REFERENCE BOOKS *Advanced Kinetics*Hougen, Watson and Ragatz. *Chemical Process Principles*. Vol. III.Hinshelwood. *Kinetics of Chemical Change*.Frank-Kamenetskii. *Diffusion and Heat Exchange in Chemical Kinetics*.Rietema. *Chemical Reaction Engineering*.Trotman-Dickinson. *Gas Kinetics*.Lapidus. *Digital Computation for Chemical Engineers*.Garner (edited by). *Chemistry of the Solid State*.Rees. *Chemistry of the Defect Solid State — Advances in Catalysis*. Academic.Griffith. *Contact Catalysis*.Laidler. *Introduction to the Chemistry of Enzymes*.**22.131 Industrial Chemistry (Processes)**

For the description of this subject see section (a) Processes, of 22.111 Industrial Chemistry I. Students are also required to take part in a series of factory visits and prepare reports on them.

22.211 Ceramics I

Ceramics Ia—Introduction; basic principles of firing procedures (thermodynamics, phase equilibria, reaction rates, nucleation and growth of phases), fired properties and the quality control of finished products; stoichiometry; calculation of the physical properties of ceramic materials. *Ceramics Ib*—Chemical Ceramics—Structural principles; crystal chemistry; kinetics of solid-state reactions; chemistry of ceramics in relation to the periodic table. A systematic treatment of a range of ceramic products in the light of the above principles. *Ceramic Equipment*—The principles of operation, construction and fields of application of equipment used in the mining, preparation, and fabrication of raw materials, and the drying and firing of ceramic products.

22.211/1 and 22.211/2 Ceramics I—Parts 1 and 2

22.211 Ceramics I for part-time students in two parts over two years.

22.211/1 Ceramics Ia

REFERENCE BOOKS

Findlay, Campbell and Smith. *Phase Rules*.American Ceramic Society. *Phase Diagrams for Ceramists*.Andrews. *Ceramic Tests and Calculations*.Norton. *Elements of Ceramics*.Heath and Green. *A Handbook of Ceramic Calculations*.Salmang. *Ceramics—Physical and Chemical Fundamentals*.**22.211/2 Ceramics Ib**

REFERENCE BOOKS

Green and Stewart. *Ceramics: A Symposium*.Norton. *Refractories*.Chesters. *Steelplant Refractories*.Goldman. *Science of Engineering Materials*.Campbell. *High Temperature Technology*.Searle and Grimshaw. *The Chemistry and Physics of Clays and Other Ceramic Materials*.Eitl. *Physical Chemistry of Silicates*.Kingery. *Introduction to Ceramics*. Wiley, 1960.Klug and Alexander. *X-ray Diffraction Procedures*. Wiley.

Andrews. *Porcelain Enamels*. Garrard Press, 1961.

Ryshkewitch, E. *Oxide Ceramics: Physical Chemistry and Technology*, 1960.

Parmelee. *Ceramic Glazes*.

22.212 Ceramics II

Physical Ceramics—Application of the principles of physical chemistry and solid-state physics to a study of the preparation and properties of ceramic materials. *Clay Mineralogy*—Structures and properties of the various clay minerals; techniques employed in the identification of clay minerals; composition and properties of the ceramic clays of New South Wales. *Fuel Technology*—The nature of solid, liquid and gaseous fuels; principles of combustion. *Laboratory*.

REFERENCE BOOKS

McKenzie. *Modern Aspects of the Vitreous State*.

Sinnott. *Solid State for Engineers*.

Gray. *The Defect Solid State*.

Smoluchowski. *Phase Transformations in Solids*.

Kingery. *Ceramic Fabrication Processes*.

Darken and Gurry. *Physical Chemistry of Metals*.

Kern. *Process Heat Transfer*.

Green. *Industrial Rheology and Rheological Structure*.

Evans. *Crystal Chemistry, Introduction to*.

Stanworth. *Physical Properties of Glass*.

22.221 Chemical Thermodynamics and Kinetics

For the description of this subject, see section (e), Chemical Thermodynamics and Kinetics, of 22.111 Industrial Chemistry.

22.231 Ceramic Engineering

A detailed study of the mechanical properties of ceramic materials and a comparison of these with those of metals and plastics. A detailed fundamental treatment of the unit operations concerned with the handling of ceramic materials; production of high temperatures; unsteady-state heat transfer and firing. Ceramic engineering design.

22.241 Instrumentation and Process Control

For the description of this subject, see section (b), Instrumentation and Process Control, of 22.112 Industrial Chemistry II.

22.251 Operations Research and Seminars

For the description of this subject, see section (d), Operations Research, of 22.111 Industrial Chemistry I.

22.311 Polymer Science I

Industrial Polymerization Processes—Classification of polymers, processes and methods used in the conversion of monomers to polymers. Naturally occurring polymeric materials. *Polymerization Mechanisms I*—Mechanisms and kinetics of condensation and free radical polymerization reactions. Molecular weights. Fractionation of high polymers. *Polymer Physics I*—A study of the stress-strain behaviour of polymeric materials at ordinary and elevated temperatures. Rheological considerations of polymer processing operations. Physical testing of polymers. Design of high polymer formulations.

TEXT BOOKS

Burnett. *Mechanisms of Polymer Reactions; or*
 Flory. *Principles of Polymer Chemistry, and*
 Allen. *Characterisation of High Polymers.*
 Schmidt and Marlies. *Principles of High Polymers—Theory and Practice.*

REFERENCE BOOKS

Payne. *Organic Coating Technology.* Vol. I.
 Schildknecht. *Vinyl and Related Polymers.*
 Ott, E. *Cellulose.*
 Houwink, R. *Elastomers and Plastomers.* Vols. I and II.
 Treloar. *The Physics of Rubber Elasticity.*
 Billmeyer. *Textbook of Polymer Science.*
 Tompa. *Polymer Solutions.*
 A.S.T.M. Standards. Part IX.
 British Standards.
 Frith and Tuckett. *Linear Polymers.*
 Eirich. *Rheology Theory and Application.* Vols. I, II and III.
 Reiner. *Deformation and Flow.*

22.312 Polymer Science II

Polymerization Mechanisms II—Advanced study of the mechanisms of polymerization processes; degradation; polymer solutions. *Polymer Analysis*—The use of modern instrumental methods for establishing the composition and structure of high polymers. *Polymer Physics II*—Properties of polymer solutions, advanced rheological considerations of polymer processing operations.

TEXT BOOKS

Grassie. *The Chemistry of High Polymer Degradation Processes.*
 Butterworth.
 Pinner. *A Practical Course in Polymer Chemistry.* Pergamon.
 Tompa. *Polymer Solutions.*
 Schmidt and Marlies. *Principles of High Polymers—Theory and Practice.*

REFERENCE BOOKS

Kappelmeyer. *Chemical Analysis of Resin-based Coating Materials.*
 Interscience.
 Kline. *Analytical Chemistry of Polymers Part I.* Interscience.
 Houwink, R. *Elastomers and Plastomers.* Vols. I and II.
 Schildknecht. *Vinyl and Related Polymers.*
 Eirich. *Rheology Theory and Application.* Vols. I, II and III.
 A.S.T.M. Standard. Part IX.

22.321G Polymer Engineering I

(a) *Polymer Compound Design*—Formulation principles of: Elastomers, thermosets, thermoplastics, adhesives and bonding, cellular polymers (open and closed cell, rigid and flexible), surface coatings, films, sheeting and pipes. Formulation cost data. Milling, mixing and curing of polymer formulations.

Natural rubber gum stock; carbon black reinforced tyre tread stock; neoprene compound design; acrylonitrile compound design; flexible PVC compound design; plasticizer ratios in PVC; polyester castings; glass reinforced—polyester laminates; polyurethane foams (rigid); epoxy chemical resistant coatings; surface coating formulation and testing.

(b) *Polymer Processing*—Mixing and dispersion: extrusion fundamentals (screw type)—isothermal operation, adiabatic operation, die design; ram extrusion fundamentals; screwless extrusion fundamentals; injection mould-

ing (plastic and elastomers); press and transfer moulding; calendering; sheet forming; hollow articles; sealing and welding.

Mixing processes (2 and 3-roll mills and Banbury mixer) dispersion processes (Sigma arm mixer); press moulding of thermosets; injection moulding of polyethylene and nylon: screw extrusion of thermoplastics (1½" extruder); screw extrusion of elastomers (1½" extruder); screwless extrusion of thermoplastics; vacuum forming from sheet material; hot gas welding of thermoplastics; hot sealing of plastic films.

(c) *Physical Testing I*—Density of solid and cellular polymers; hardness; stress-strain fundamentals (ultimate tensile strength, modulus) for thermosets, thermoplastics and elastomers; elastic modulus; work of deformation; compressive strength and modulus; shear; torsion; flexural strength and modulus; impact, resilience; flex cracking; tear.

22.322G Polymer Engineering II

(a) *Polymer Physical Properties*—Physical properties in relation to—linear structure, branch structure, cross-linked structure; molecular weight and distribution functions; molecular orientation for reinforcement; theory of rubber elasticity; molecular chain tension; force-extension fundamentals; large strain region in elastomers; rheological phenomena (flow); extrusion plastometry; reinforcement of polymer physical properties.

(b) *Engineering Applications of Polymers*—Thermosets; thermoplastics; elastomers; cellular polymers; adhesives and bonding; surface coatings; thermal and acoustic insulation; vibration isolation; chemical resistance; artificial ageing.

(c) *Physical Testing II*—Creep; relaxation; first and second order transition; thermal conductivity through polymers; refractive index extrusion plastometry; cone and plate viscometry (solid polymers).

Stress-strain; creep; relaxation; second order transition; thermal conductivity (K factor); cell size and per cent closed cells (cellular polymers); refractive index; extrusion plastometer; cone and plate viscometer; Mooney viscometer.

22.331G Polymer Chemistry I

(a) *Processes*—Classification of polymers; methods of polymerization—bulk, suspension, emulsion, high pressure; processes—addition, condensation; the chemistry and applications of polymer systems including—polyesters, vinyl polymers, phenolic condensation resins, synthetic rubbers and elastomers, fluorinated polymers. Introduction to natural polymers.

(b) *Mechanisms*—Polycondensation—kinetics, structure effects: free radical polymerization—chemistry and properties of free radicals, initiators, kinetics, transfer reactions; copolymerization; ionic polymerization including stereoregular polymers; introduction to molecular weight determinations and fractionation.

(c) *Analysis*—Instrumental methods; ultraviolet spectroscopy, infra-red spectroscopy, end group analysis, vapour phase chromatography, degradation, X-rays, radio-isotopes, stereoisomers. Chemical methods.

Molecular weights by: viscosity, end group analysis, osmometry, ebulliometry, cryoscopy. Fractionation by precipitation, turbidimetry, elution, Instrumental analytical methods.

22.332G Polymer Chemistry II

(a) *Structure and Characterisation*—Thermodynamics of polymer solutions; properties in solution as basis of molecular weight determination; polymer crystals; optical rotatory dispersion; fluorescence; differential

thermal analysis; use of films; ultra centrifugation microtacticity fractionation; advanced kinetics—radical reactivity and structure; stereo-regular catalysis; relation of structure to mechanical properties; degradation of polymers; surface properties.

Advanced kinetics; free radical polymerization in bulk; free radical polymerization in emulsion; free radical polymerization in suspension; ionic polymerization; use of osmosis or viscosity to determine fundamental parameters; degradation—thermal (use of G.P.C.), ionising radiation. Characterization—Electron microscope, optical rotatory dispersion, films differential thermal analysis, optical methods, fluorescence methods, X-rays.

(b) *Natural Polymers*—Proteins and synthetic polypeptides—molecular structure, effect of structure on physical properties and behaviour in biological systems; synthetic methods, collagen. Carbohydrates—cellulose and related polymers.

(c) *Inorganic Polymers*—Silicones; arsenic polymers; phosphorus polymers; nitrogen polymers (not proteins); miscellaneous.

22.351G Organic Surface Coatings (Corrosion Technology Course)

Chemistry and function of major components in various surface coatings. Mechanical and chemical test procedures.

SCHOOL OF GEOGRAPHY

27.001 Geography I (Applied Science Course)

Introduces the physical basis of geography. Solar energy and the heat balance, atmospheric circulation, precipitation. Storms, air masses and weather types. World climatic patterns. Hydrologic cycle and the water balance. Bases of first-order relief. Rocks and rock-weathering in relation to climate. Mass movement and the work of running water. Coastal processes and forms. Concepts of landscape evolution. Soil properties and classes. Distribution of soil types. Soils in the landscape. Soil conservation. Bases of plant growth. Vegetation structure and types. Vegetation dynamics. Patterns of natural vegetation. Man as a physical geographic agent. Examples of major ecosystems illustrating the interaction of physical and biological factors. Use and construction of maps. Analysis and depiction of geographic data. Elementary air-photo analysis.

TEXT BOOKS

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

Holmes, A. *Principles of Physical Geology*. Nelson.

Dury, G. H. *The Face of the Earth*. Penguin.

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

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

Gregory, S. *Statistical Methods for the Geographer*. Longmans.

All students should possess a modern atlas such as:

Lewis, C. et al. *The Oxford Atlas*. O.U.P., 1963.

Fullard, H. and Darby, H. C. *The University Atlas*. Philip.

Students will be required to purchase geologic and topographic maps of the Sydney area.

REFERENCE BOOKS

Ashton, H. T. and Maher, J. V. *Australian Forecasting and Climate*.

Bunting, B. T. *The Geography of Soil*. Hutchinson.

Haurwitz, B. and Austen, J. M. *Climatology*. McGraw-Hill.

Met. Office. *Observer's Handbook*. H.M.S.O.

- U.S. Dept. of Agriculture. *Water*. U.S. Govt. Printer.
 Leopold, L. B., Wolman, M. G. and Miller, J. P. *Fluvial Processes in Geomorphology*. Freeman.
 Flint, R. F. *Glacial and Pleistocene Geology*. Wiley.
 Leeper, G. W. *Introduction to Soil Science*. Melbourne U.P.
 Stephens, C. G. *Manual of Australian Soils*. CSIRO.
 Billings, W. D. *Plants and the Ecosystem*. Macmillan.
 Thomas, W. L. (ed.). *Man's Role in Changing the Face of the Earth*. Chicago, U.P.
 CSIRO. *The Australian Environment*. Melbourne U.P.

SCHOOL OF METALLURGY

4.011 Metallurgy I

(a) *General Introduction to Metallurgy*.

(b) *Physical Metallurgy*—The crystalline structure and physical properties of solids. Structure sensitive and structure insensitive properties. Free electron theory. Phase equilibrium in alloy systems. Thermodynamical and physical aspects of binary systems. Mechanism of phase transformations. Departures from equilibrium and principles of heat treatment. Generation of microstructure. Metallography of ion-carbon alloys.

(c) *Chemical and Extraction Metallurgy*—Principles underlying the unit processes by which metals are extracted from ores and raw materials. The extraction metallurgy of iron and steel, copper, aluminium, lead, and zinc, together with the less common metals. An introduction to the principles of fluid flow, metallurgical stoichiometry, energy and mass balances, refractories, fuels and combustion.

(d) *Mechanical Metallurgy*—Principles, aims and methods of mechanical testing. The mechanical behaviour of solids—elastic and inelastic behaviour. The effects of stress state, temperature and strain rate. Creep, fatigue and brittle fracture. Metal shaping processes.

TEXT BOOKS

- Bailey, A. R. *A Textbook of Metallurgy*. 2nd Edition. Macmillan.
 Bennett and Myers. *Momentum, Heat and Mass Transfer*. McGraw-Hill.
 Cottrell, A. H. *Theoretical Structural Metallurgy*. 2nd Edition. Arnold.
 Hume-Rothery, W. and Raynor, G. V. *The Structure of Metals and Alloys*. The Institute of Metals, London.
 Guy, A. C. *Elements of Physical Metallurgy*, Addison-Wesley.

REFERENCE BOOKS

- Browne, G. and Orford, A. L. *The Iron and Steel Industry*. Pitman.
 Farwell, G. *Down Argent Street*. Johnson, Sydney.
 Blainey, G. *The Peaks of Lyell*. Melbourne University Press.
 Norton, F. H. *Elements of Ceramics*. Addison-Wesley.
 Kubasohewski, O. and Evans, E. L. *Metallurgical Thermochemistry*. Pergamon.
 Darken, L. S. and Gurry, R. W. *Physical Chemistry of Metals*. McGraw-Hill.
 Boas, W. *Introduction to the Physics of Metals and Alloys*. Melbourne University Press.
 Kehl, G. L. *Principles of Metallographic Laboratory Practice*. 3rd Edition. McGraw-Hill.
 Rhines, F. N. *Phase Diagrams in Metallurgy*. McGraw-Hill.
 Hollomon, J. and Jaffe, L. *Ferrous Metallurgical Design*. Wiley.
 Van Vlack, L. H. *Elements of Materials Science*. Addison-Wesley.

Gensamer, M. *Strength of Metals under Combined Stress*. American Society for Metals.

Dieter, G. E. *Mechanical Metallurgy*. McGraw-Hill.

Dennis, W. H. *Metallurgy in the Service of Man*. Macdonald, London.

United States Steel. *The Making, Shaping and Treating of Steel*. United States Steel.

Perry. *Chemical Engineers Handbook*. McGraw-Hill.

Publications Vol. 3 of the Eighth Commonwealth Mining and Metallurgical Congress. Aust. Inst. of Mining and Metallurgy, 1965. *The Australian Mining, Metallurgical and Mineral Industry*.

4.012 Metallurgy II

(a) *Metallurgical Thermodynamics*—An introduction to the thermodynamics of metallurgical systems including a study of equilibria involving liquid metals, slags, gases and the solid state.

(b) *Chemical and Extraction Metallurgy*—The application of physico-chemical principles to the study of metallurgical processes. Electrochemistry and the related topics of corrosion and hydrometallurgy. The engineering basis of extraction metallurgy; heat and mass transfer, high temperature technology.

(c) *Physical Metallurgy*—Theories of diffusion, phase equilibrium and transformation, and their application to alloying, heat treatment, and other metallurgical processes.

(d) *Mechanical Metallurgy*—Analysis and effects of complex stress states in relation to flow and fracture. Stress concentration. Residual stresses. Creep, fatigue and brittle fracture—metallurgical and engineering aspects.

(e) *Mineral Dressing*—The principles and practice associated with liberation, beneficiation, froth flotation, hydrometallurgy, materials handling and process engineering.

(f) *Theory of Plastic Deformation*—Geometry of slip in metal crystals. Polycrystalline materials; preferred orientation. Introduction to dislocation theory; application of this theory to yielding, strain ageing, work- and solution-hardening.

(g) *X-ray Diffraction and Theory of the Metallic State*—X-ray diffraction and its application to metallurgy. Development of the modern theory of solids based on the zone theory.

(h) *Special Topics*—Further development of topics from the above sections.

4.012/1 Metallurgy IIA

Comprises sections (a), (b) (part only), (c) and (e) of 4.012 Metallurgy II, together with appropriate laboratory work.

4.012/2 Metallurgy IIB

Comprises section (b) (part only), (d), (f) and (g) of 4.012 Metallurgy II, together with:

(i) *Industrial Metallurgy*—A course of lectures on the application of metallurgical principles to industrial practice.

(j) *Metallurgy Seminar*—As specified in 4.013 Metallurgy III.

4.012/3 Metallurgy IIC

Principally industrial metallurgy, and substantially as for section (i) in 4.012/2.

4.012/4 Report

A literature survey of approximately 10,000 words on a topic of relevance to the student's employment. The proposed topic must be submitted to the Head of School for approval before the end of the third week of First Term, and the report submitted not later than the end of the fifth week of Third Term.

For Text and Reference Books for "Mineral Dressing" section of this subject, see under 7.311 Mineral Dressing (School of Mining Engineering).

TEXT BOOKS

As for 4.011 Metallurgy I, together with—

Darken, L. S. and Gurry, R. W. *Physical Chemistry of Metals*. McGraw-Hill.

Barrett, C. S. *Structure of Metals*. 2nd Edition. McGraw-Hill.

Cottrell, A. H. *Dislocations and Plastic Flow in Crystals*. Oxford University Press.

Bain, E. C. and Paxton, H. W. *Alloying Elements in Steel*. 2nd Edition, 1961. American Society for Metals.

Dieter, G. E. *Mechanical Metallurgy*. McGraw-Hill.

Shewmon, P. C. *Diffusion in Solids*. McGraw-Hill, 1963.

West, J. M. *Electrodeposition and Corrosion Processes*. Van Nostrand.

REFERENCE BOOKS

As for 4.011 Metallurgy I, together with—

Hume-Rothery, W. *Atomic Theory for Students of Metallurgy*. The Institute of Metals, London.

Wagner, C. *Thermodynamics of Alloys*. Addison-Wesley.

Campbell, I. E. *High Temperature Technology*. Wiley.

Bockris, J. O'M., White, J. L. and Mackenzie, J. D. *Physicochemical Measurements at High Temperatures*. Butterworth.

Read, W. T. *Dislocations in Crystals*. McGraw-Hill.

Crossman, M. A. *Elements of Hardenability*. American Society for Metals.

Birchall, C. E. *Physical Metallurgy*. McGraw-Hill.

Cullity, B. D. *Elements of X-ray Diffraction*. Addison-Wesley.

Seminar. *Thermodynamics in Physical Metallurgy*. American Soc. for Metals.

Dekker, A. J. *Solid State Physics*. Macmillan.

Jevons, J. D. *The Metallurgy of Deep Drawing and Pressing*. Chapman and Hall.

Heine, R. W. and Rosenthal, P. C. *Principles of Metal Castings*. McGraw-Hill.

Goetzl, G. C. *Treatise on Powder Metallurgy*. Interscience Publishers.

Underwood, L. R. *The Rolling of Metals*. Chapman and Hall.

Hinsley, J. F. *Non Destructive Testing*. Macdonald and Evans.

Udin, Funk and Wulff. *Welding for Engineers*. Wiley.

Smallman, R. E. *Modern Physical Metallurgy*. Butterworth.

Shreivi, L. L. *Corrosion, Vols. I and II*. Newnes.

4.013 Metallurgy III

(a) Development and application of metallurgical principles relating to the thermodynamics and kinetics of metallurgical processes; structural chemistry; the extraction and refining of the rarer metals; crystal imperfections, with reference to deformation, work hardening, annealing and radiation damage; X-ray and neutron diffraction; phase transformations; fracture mechanisms; and the design of engineering materials.

(b) The application of metallurgical principles to industrial practice, with particular reference to welding, foundry practice, metal shaping, metal finishing, materials selection and non-destructive testing.

(c) Seminar.

4.013/1 Metallurgy Seminar

As specified in 4.013 Metallurgy III.
TEXT AND REFERENCE BOOKS
 As for 4.012 Metallurgy II

4.111G Corrosion Metallurgy I

Electrochemical mechanisms, electrode potentials, polarization and corrosion rate, passivity. Effect of aqueous environment on corrosion rate, i.e., dissolved oxygen, anaerobic bacteria, temperature, pH, galvanic coupling, dissolved salts. Stress corrosion and corrosion fatigue. Theory of inhibition.

4.112G Corrosion Metallurgy II

The behaviour of metals in specific environment, stress, corrosion, corrosion fatigue, high temperature gas and liquid corrosion. Alloy selection, metal coatings.

Metallographic procedures, X-ray and electron diffraction, X-ray fluorescent analysis and electron microprobe identification of corrosion products.

SCHOOL OF MINING ENGINEERING**7.111S Mining Engineering I**

Part 1—Mining as a major primary industry. Introduction to mining engineering; mining law; explosives; drilling; blasting.

Part 2—Mine development: shaft sinking and tunnelling; materials used for mine support. Introduction to the organization and programming of mining techniques. Surface methods of mining.

Part 3—Underground methods of mining; coal mining; metalliferous mining; non-entry methods of mining; petroleum production engineering. Conservation of reserves. Seminar on methods of mining.

7.111/1; 7.111/2; 7.111/3 Mining Engineering**Parts 1, 2 and 3**

For students in the B.Sc.(Tech.) course; based on the syllabus of 7.111 and taken in three parts over three years.

PRELIMINARY BACKGROUND READING

(Selected reading from this book list for First and Second Year Students.)

Hoover, H. C. *The Memoirs of Herbert Hoover, 1874-1920 Years of Adventure*. Macmillan.

Lovering, T. S. *Minerals in World Affairs*. Prentice-Hall.

Morrell, W. P. *The Gold Rushes*. A. and C. Black.

Farwell, G. M. *Down Argent Street*. Johnson, Sydney.

Woodward, O. H. *A Review of the Broken Hill Lead, Silver and Zinc Industry*. A.I.M.M. Melbourne.

Blainey, G. *The Peaks of Lyell*. A. and R.

TEXT BOOKS

Lewis, R. S. and Clark, G. B. *Elements of Mining*. Wiley, or

Young, G. T. *Elements of Mining*. McGraw-Hill, or

Higham, S. *An Introduction to Metalliferous Mining*. Griffin.

Statham, I. C. F. *Coal Mining*. English U.P.

Fox, A. F. *The World of Oil*. Pergamon.

REFERENCE BOOKS

(i) *Statistics*

Brooks, B. C. and Dick, W. F. L. *Introduction to Statistical Method*. Heinemann.

Deming. *Some Theory of Sampling*. Wiley.

(ii) *Drilling*

Cumming, J. D. *Diamond Drill Handbook*. Smith.

Brantly, J. E. *Rotary Drilling Handbook*. Palmer Publications.

(iii) *Geophysics*

Howell, B. F. *Introduction to Geophysics*. McGraw-Hill.

Dobrin, M. R. *Introduction to Geophysical Prospecting*. McGraw-Hill.

(iv) *Economics*

Truscott, S. J. *Mine Economics*. Mining Publications.

(v) *Explosives and Blasting*

Dupont de Nemours, E. I. and Co. Inc. *Blasters Handbook*.

McAdam and Westwater. *Mining Explosives*. Oliver and Boyd.

Atlas Copco Ltd. *Manual of Rock Blasting*. Stockholm.

Gregory, C. E. *Explosives for Engineers*. Queensland University Press.

Langefors and Kihlstrom. *Rock Blasting*. Wiley, N.Y.

(vi) *Mine Equipment*

Bryson, T. *Mining Machinery*. Pitman.

Compressed Air & Gas Institute, N.Y. *Compressed Air Handbook*.

(vii) *Mining Practice*

Fifth Empire Mining & Metallurgical Congress, 1953. *Coal in Australia*. A.I.M.M. Melbourne.

Eighth Commonwealth Mining and Metallurgical Congress, 1965. *The Australian Mining, Metallurgical and Mineral Industry*. A.I.M.M. Melbourne.

Jackson, C. F. and Hedges, J. H. *Metal Mining Practice*. U.S. Bureau of Mines Bulletin, No. 419.

Beringer, B. *Underground Practice in Mining*. Mining Publications.

Stoces, B. *Introduction to Mining*. 2 vols. Pergamon.

Eaton, L. *Practical Mine Development and Equipment*. McGraw-Hill.

Whitaker, J. W. and Willett, H. L. *Colliery Explosion and Recovery Work*. Pitman.

Fifth Empire Mining & Metallurgical Congress, 1953. *Mining Methods in Australia and Adjacent Territories*. A.I.M.M. Melbourne.

Sinclair, J. *Winning Coal*. Pitman.

Stoces, B. *Atlas of Mining Methods*.

Shevyakov, L. *Mining of Mineral Deposits*. Peace Publishers.

(viii) *Tunnelling*

Sandstrom, G. E. *The History of Tunnelling*. Barrie & Rockliff.

Proctor and White. *Rock Tunnelling with Steel Supports*. Commercial Shearing & Stamping Co.

Howett, B. H. M. and Johannesson, S. *Shield and Compressed Air Tunneling*. McGraw-Hill.

Atlas Copco Ltd., Stockholm. *Manual of Rock Blasting*.

Inst. of Mining, London. *Symposium on Shaft Sinking and Tunnelling*, 1959.

(ix) *Alluvial Mining*

Harrison, H. L. M. *Examination, Boring and Valuation of Alluvial Deposits*. Mining Publications.

Griffith, S. V. *Alluvial Prospecting and Mining*. Mining Publications.

Proceedings of The Symposium of Open Cast Mining Quarrying and Alluvial Mining, London 1964.

(x) *Oil*

Uren, L. C. *Petroleum Production Engineering*. Vol. I, *Oil Field Exploitation*; Vol. II, *Development*; Vol. III, *Economics*. McGraw-Hill.

Pirson, S. J. *Elements of Oil Reservoir Engineering*. McGraw-Hill.

Amyx, J. W., Bass, D. M. and Whiting, R. L. *Petroleum Reservoir Engineering*. Vols. I and II. McGraw-Hill.

Frick, T. C. *Petroleum Production Handbook*. Vols. I and II. McGraw-Hill.

7.112 Mining Engineering II

Mine atmospheres; gas, dust, spontaneous combustion. Explosions; fires; safety; rescue and recovery. Mine ventilation; control of pressure, quantity and quality. Materials handling; loading, transport and elevation of solids, transport of fluids, transport of men. Power supply and distribution. Drainage of mines; mine pump technology. Sampling and valuation of mineral properties. Estimation of mineable limits; influence of impurities; recoveries; grades, markets. Management of mineral industry operations; company law. Rock mechanics; support of mine openings; strata control. Mine planning and design.

7.112/1 Mining Engineering II and Project

For students in the B.Sc.(Tech.) course; based on topics selected from the syllabus of 7.112. The course is supplemented by a compulsory excursion of five days.

7.113 Mining Engineering Elective and Project

Elective may include mineral process engineering; statistics; sampling and valuation; strata control; mine design; petroleum production engineering.

PRELIMINARY BACKGROUND READING

Jenkin, A. K. H. *The Cornish Miner*. Allen and Unwin.

Rickard, T. A. *Man and Metals*. Vol. 1 and II. McGraw-Hill.

Rickard, T. A. *Technical Writing*. Wiley or A.I.M.E. Series.

Spalding, J. *Deep Mining*. Mining Publications Ltd.

Hoover, H. C. *Principles of Mining*. McGraw-Hill.

Blainey, G. *Mines in The Spinifex*. Angus and Robertson.

TEXT BOOKS

Baxter, C. H. and Parks, R. D. *Examination and Valuation of a Mineral Property*. Addison-Wesley.

Peele, R. *Mining Engineer's Handbook*. 3rd edition. Vols. I and II. Wiley.

Staley, W. *Mine Plant Design*. McGraw-Hill.

Standards Association of Australia. *Steel Wire Rope for Winding and Haulage Purposes in Mines*. As No. M/4—1955.

Fritzsch and Potts. *Horizon Mining*. Allen and Unwin.

REFERENCE BOOKS

(i) *Statistics*

Arkin, H. and Colton, R. R. *Statistical Methods*. Barnes & Noble.

Walker, M. W. and Lev, J. *Statistical Inference*. Constable or Holt.

Schafer, R. *Probability and Statistics for Business Decisions*. McGraw-Hill.

(ii) *Hoisting*

Inst. of Mining and Metallurgy. *Wire Ropes in Mines*.

Broughton, H. H. *Electric Winders*. Spon.

Price, A. G. *Winding Calculations for the Mining Engineer*. The General Electric Co.

(iii) Mine Ventilation

- Roberts, A. *Mine Ventilation*. Cleaver-Hume.
 Buffalo Forge Co. *Fan Engineering*.
 Penman, D. and J. S. *Principles and Practice of Mine Ventilation*, Griffin.
 Weeks, W. S. *Ventilation of Mines*. McGraw-Hill.
 Rayner, H. E. R. *A Guide to Mine Ventilation Calculations*. Mine Ventilation Society of South Africa.
 Transvaal Chamber of Mines. *Quality of Mine Air*.
 Barenburg, A. W. *Psychometry and Psychometric Charts*. South African Inst. of Mining and Metallurgy.
 BSS 848. *Testing of Fans*.
 Bulletin 385, U.S. Bureau of Mines. *Engineering Factors in the Ventilation of Metal Mines*.
 Hartman, H. L. *Mine Ventilation and Air Conditioning*. Ronald Press, New York.

(iv) Economics

- Hoover, T. J. *The Economics of Mining*. Standford, J.P. and O.U.P.
 Chambers, R. J. *Financial Management*. Law Book Co.
 Myers, *Financial Statement Analysis*. Prentice-Hall.
 Wilcox, F. *Mine Accounting and Financial Administration*. Pitman.
 Court, H. P. *Budgetary Control*. Sweet & Maxwell.
 Dobb, M. *Wages*. Nisbet and C.U.P.
 Brech, E. F. L. *Management, its Nature and Significance*. 3rd Edition. Pitman, 1953.

(v) Mining Law

- Mining Acts*. N.S.W., W.A., Tas., Qld., Vic. and S.A.

(vi) Safety Health

- Drinker, P. and Hatch, T. *Industrial Dust*. McGraw-Hill.
 Gill, G. H. *Dust, its effects on the Respiratory System*. Lewis.
 Inst. of Mining Engineers and Institution of Mining and Metallurgy, 1947. *Silicosis, Pneumoconiosis and Dust Suppression in Mines*.
 Jenkins and Waltham. *Coal Mines Rescue and Fire Fighting*. C. Griffin, London.
 Transvaal Chamber of Mines. *Safety Code*.
 McAdam, R. and Davidson, D. *Mine Rescue Work*. Oliver and Boyd.
 Davies, C. N. *Dust is Dangerous*. Faber and Faber.
 Davies, R. N. *Breathing and Irrespirable Atmospheres*. St. Catherine Press.

(vii) Mining Practice

- Jeppe, C. B. *Gold Mining on the Witwatersrand*. Transvaal Chamber of Mines.
 Mitke, C. A. *Mining Methods*. McGraw-Hill.
 Tillson, B. F. *Mine Plant*. A.I.M.E.
 Caxton Publishing Co. *Coal Mining Practice*. 4 vols. Edited by Statham.
 Spruth Fritz. *Face Supports in Steel and Light Metal*. Colliery Guardian.
 Isaacson, E. *Rock Pressure in Mines*. Mining Publications.

(viii) General

- Nelson, J. R. *Writing the Technical Report*. McGraw-Hill.

7.121 Mine Surveying

General and special methods associated with the application of surveying techniques in the development and exploitation of mineral resources and the assessment of mineral properties. Tunnel surveys; transfer of azimuth; bore hole surveying; stope surveys; special mine surveys; mine survey office organization.

7.121/1 Mine Surveying

For students in the B.Sc.(Tech.) course; based on the syllabus of 7.121.

TEXT BOOKS

Students should provide themselves with seven-figure logarithmic tables, such as Chambers' Mathematical Tables.

REFERENCE BOOKS

Metcalfe, J. R. *Mining Engineers' Survey Manual*. Electrical Press.
Winiberg, F. *Metalliferous Mine Surveying*. Mining Publications.
Winiberg, F. *Surveying Calculations*. Mining Publications.
Staley, W. *Introduction to Mine Surveying*. Stanford U.P.
Haddock, M. *Deep Borehole Surveys and Problems*. McGraw-Hill.
Haddock, M. *The Basis of Mine Surveying*. Chapman and Hall.

7.151 Mining Engineering

An introduction to mining engineering. Principles of mine and quarry development. Mining extraction methods: selection of processes; application to coal, non-metallic and metalliferous deposits; petroleum production engineering. Mine sampling; grade calculations; valuation; ore reserves. Economics of the mineral industries. Mining and company law: management.

TEXT BOOK

Lewis, R. S. and Clark, G. B. *Elements of Mining*. Wiley.

REFERENCE BOOKS

Bryson, T. *Mining Machinery*. Pitman.
Jackson, C. F. and Hedges, J. N. *Metal Mining Practice*. U.S. Bureau Mines Bulletin, No. 419.
Sinclair, J. *Winning Coal*. Pitman.
Griffith, S. V. *Alluvial Prospecting and Mining*. Mining Publications.

7.311 Mineral Processing I

Objects of mineral processing operations and their integration with mining and metallurgical operations; marketing of mineral products. Liberation; particle size distribution and analysis; theory and technology of comminution. Sedimentation; classification; screening. Principles of concentration of minerals: gravity, electrostatic, magnetic, chemical separation process, froth flotation. Materials handling: sampling, dewatering, product disposal. Process engineering: flowsheet and plant design; automatic control. Laboratory; work on unit and integrated processes.

7.311/1 Mineral Processing

For students in the B.Sc.(Tech.) course; based on the syllabus of 7.311.

TEXT BOOKS

Gaudin, A. M. *Principles of Mineral Dressing*. McGraw-Hill.
Taggart, A. F. *Elements of Ore Dressing*. Wiley.

REFERENCE BOOKS

Taggart, A. F. *Handbook of Mineral Dressing*. Wiley.
Gaudin, A. M. *Flotation*. 2nd ed. McGraw-Hill.
Sutherland, K. and Wark, W. *Principles of Flotation*. Aust.I.M.M.
Brown, G. G. *Unit Operations*. Wiley.
Pryor, E. J. *An Introduction to Mineral Dressing*. Mining Publications.
Herdan, G. *Small Particle Statistics*. Butterworths.

7.551 Mining and Mineral Process Engineering

Mining Engineering—An introduction to mining engineering. Principles of mine and quarry development. Mining extraction methods; selection of processes; application to coal, non-metallic and metalliferous deposits; petroleum production engineering. Mine sampling; grade calculations; valuation; ore reserves. Economics of the mineral industries. Mining and company law; management.

Mineral Process Engineering—Comminution: liberation, size analysis, crushing and grinding. Concentrating processes: gravity, magnetic, electrostatic, froth flotation, chemical extraction. Process engineering; flowsheet and plant design. Materials handling; dewatering. Marketing of mineral products; evaluation of separation processes, smelter schedules.

TEXT BOOKS

Lewis, R. S. and Clark, G. B. *Elements of Mining*. Wiley.

Gaudin, A. M. *Principles of Mineral Dressing*. McGraw-Hill.

REFERENCE BOOKS

Baxter, C. H. and Parks, R. D. *Examination and Valuation of Mineral Property*. Addison-Wesley, 1957.

Taggart, A. F. *Handbook of Mineral Dressing*. Wiley.

Gaudin, A. M. *Flotation*. McGraw-Hill.

MINERAL TECHNOLOGY GRADUATE COURSE

SUBJECTS

7.391G Mineral Processing II

Microscope techniques: application to circuit design and operation. Mineral particle statistics: size distribution functions and size analysis. Breakage theories; comminution theory and technology. Fluid mechanics of particle fluid systems; sedimentation, thickening, classification and dewatering. Rheology: pumping and mixing of mineral pulps. Gravity separation processes. Electrostatic and magnetic separation. Surface chemistry of mineral particles; application of interfacial theory to froth flotation; flotation kinetics. Electrical double layer theory; flocculation. Marketing of mineral products; the position of mineral processing in the mineral industry. Plant design and flowsheet development. Automatic control; and management of mineral processing operations.

TEXT BOOKS

Gaudin, A. M. *Flotation*. 2nd ed. McGraw-Hill.

Taggart, A. F. *Handbook of Mineral Dressing*. Wiley.

Rose, H. E. and Sullivan, R. M. *Ball Tube and Rod Mills*. Constable.

Mitchell, D. R. *Coal Preparation*. A.I.M.E.

Cameron, E. N. *Ore Microscopy*. Wiley.

REFERENCE BOOKS

Sutherland, K. and Wark, W. *Principles of Flotation*. Aust.I.M.M.

Herdan, G. *Small Particle Statistics*. Butterworths.

Feurstenau, D. W. *Froth Flotation*. A.I.M.E.

Robie, E. *Economics of the Mineral Industries*. A.I.M.E.

Brown, G. G. *Unit Operations*. Wiley.

International Mineral Processing Congress. 1960. I.M.M.

Alexander, A. and Johnson, P. *Colloid Science*. Oxford.

Dorr, J. V. N. and Bosqui, F. L. *Cyanidation and Concentration of Gold and Silver Ores*. McGraw-Hill.

Sinclair, J. *Coal Preparation and Power Supply at Collieries*. Pitman.

- Baxter, C. H. and Parks, R. D. *Examination and Valuation of a Mineral Property*. Addison-Wesley.
- Pryor, E. J. *Economics for the Mineral Engineer*. Pergamon.
- Short, M. W. *Microscopic Determination of the Ore Minerals*. U.S. Govt. Printing Office.
- Uytenbogaardt, W. *Tables for Microscopy Identification of Ore Minerals*. U.S. Govt. Printing Office.
- Schonten, C. *Determination Tables for Ore Microscopy*. Elsevier.

7.392G Mineral Engineering Laboratory

Laboratory investigations may be selected from the following classifications according to availability and specialization: metalliferous ore concentration; coal preparation; beneficiation of non-metallics; processing of mineral bearing fluids.

TEXT BOOKS

Taggart, A. F. *Handbook of Mineral Dressing*. Wiley.

REFERENCE BOOKS

- Rabone, P. *Flotation Plant Practice*. Mining Publications
- Michell, F. B. *The Practice of Mineral Dressing*. Elect. Press.
- Modern Mineral Processing Flowsheets*. Denver Equipment Co.
- Handbook on Belt Conveyor Design*. G.E.C.

MINING ENGINEERING GRADUATE COURSE SUBJECTS

7.191G Mining Engineering

Mine ventilation: quality and properties of mine air; contaminants; thermodynamics; network analysis; application of analogues; materials handling—solid and liquid; analysis of control; application of programming techniques. Power supply and distribution: legal and statutory requirements; protection of personnel and equipment. Rock mechanics: behaviour and control of extraction openings in metalliferous, coal and non-entry mining; techniques in deep mining. Non-entry methods of mineral production: sub-surface horizons; orientation of drilling patterns; conditioning of extraction horizon; fluid, thermal and chemical factors in extraction. Mine design; separation of functions for maximum efficiency; application of analogue and digital computers. Application of high energy (chemical and nuclear) mediums to the mining industry. Economics: the mineral-metal type complex; inter-industry economics of mineral production; resource allocation in mineral development programmes. Practical use of programming methods.

TEXT BOOKS

- Baxter, C. H. and Parks, R. D. *Examination and Valuation of a Mineral Property*. Addison-Wesley.
- Peele, R. *Mining Engineers Handbook*. 3rd edition. Vols. I and II. Wiley.
- Lewis, R. S. and Clark, G. B. *Elements of Mining*. Wiley.
- Fox, A. F. *The World of Oil*. Pergamon.

REFERENCE BOOKS

- Sinclair, J. *Winning Coal*. Pitman.
- Roberts, A. *Mine Ventilation*. Cleaver Hume.
- Isaacson, E. *Rock Pressures in Mines*. Mining Publications.
- Sanders, R. *Project Plowshare*. Public Affairs Press., Washington.

7.192G Mining Engineering Laboratory

May include advanced work in: sampling and mine valuation: mine support (temporary or long terms): ventilation: mine design and plant (extraction areas and servicing functions): rock properties: programming of mining methods and transport: non-entry mining; petroleum engineering; gasification; solvent processes.

TEXT BOOKS

As for 7.191G. Mining Engineering.

SCHOOL OF TEXTILE TECHNOLOGY

13.111 Textile Technology I

Raw Materials: An outline of the history, sources, growth, grading, sorting, marketing, statistics, properties and uses of the natural textile fibres. A brief description of the production of the man-made fibres, their statistics, properties and uses. Principles and practice of sampling textile materials. Statistical techniques. Physical testing of fibres and yarns. *Yarn Manufacture:* Introduction, historical development. Principles and practices of manufacture of yarns on the cotton, worsted and woollen systems. *Fabric Manufacture:* Principles and practice of winding, warping, sizing and healding. Primary motions of weaving related to simple looms, shedding by tappet and overmotions. Secondary motions, warp release, warp slip motions. Loom timing and tuning. Cloth defects.

13.112 Textile Technology II

Fabric Manufacture: Principles of knitting. Historical development of knitting techniques. The basic knitting stitches and their application in fabric production. Standard mechanisms of knitting machines. Dobby, shutterless and circular looms. Factory organization and layout. Quality control and costing in weaving. Weaving and knitting developments and research. A study of the general principles of the design of single cloth structures. Drafting simple and complex. Colour theories and application of colour. *Dyeing and Finishing:* General descriptions of properties of dyes, dyeing assistants, solvents used in dyeing, water supplies and water treatment, machinery used in dyeing, classification and methods of application of dyes, textile printing methods. Objects of finishing and typical flow diagrams, the principles underlying and the technology of processes concerned with: the removal of impurities and discoloration; the improvement and elimination of deficiencies in properties of textile fibres. *Textile Testing:* Physical testing of fabrics. Evaluation of the serviceability of textile fabrics. Qualitative and quantitative assessment of damage in textile materials. *Yarn Manufacture:* Principles and practice of yarn manufacture for other natural fibres such as silk, flax, jute, etc. Fancy yarns, paper yarns, twistless yarns. Manufacture of yarns from man-made fibres and blends with natural fibres.

13.113 Textile Technology III

Yarn Manufacture: Recent research and development in yarn manufacture. *Textile Testing:* Functions of quality control. The organization and integration of a quality control department in a textile factory. Fault investigation. Recent developments and trends in industrial textile testing methods. *Dyeing and Finishing:* Physical-chemical concepts of dyeing. Methods of control of dyeing. Colour changes subsequent to dyeing. The production of specified dimensions in textile fabrics. The development of

specific properties: mechanical, surface finishes, protective finishes. *Fabric Manufacture*: Compound cloth structures. Pile fabrics, tapestries, gauzes and carpets. Cloth setting theories. Felts and non-woven fabrics. Review of standard fabrics in natural and man-made fibres. Analysis of finished fabrics. Fabric development and research. Advanced knitting techniques. Design in fabrics by needle selection. Knitted fabric geometry; quality control in fabric production. Basic garment assembly.

REFERENCE BOOKS

(1) Textile Testing

- Koch, P. *Microscopic and Chemical Testing of Textiles*.
 Booth, J. E. *Principles of Textile Testing*.
 Skinkle, J. H. *Textile Testing*.
 Lomax, J. *Textile Testing*.
 Grover, E. B. and Hamby, D. S. *Handbook of Textile Testing and Quality Control*.
 Meredith, R. and Hearle, J. W. S. *Physical Methods of Investigating Textiles*.
 Morton, W. E. and Hearle, J. W. S. *Physical Properties of Textile Fibres*.
 Kaswell, E. R. *Textile Fibres, Yarns and Fabrics*.
 Preston, J. M. *Fibre Science*.
 Howell, H. G., Mieszkig, K. W. and Taber, D. *Friction in Textiles*.
 Hearle, J. W. S. and Peters, R. H. *Moisture in Textiles*.
 Garner, J. W. *A Textile Laboratory Manual*.
 Wool Industries Research Association. *Wool Research*. Vol. 2. *Physical Properties of Wool Fibres and Fabrics*. Vol. 3. *Testing and Control in the Wool Industry*.
 British Standards Handbook. *Methods of Test for Textiles*.
 American Society for Testing Materials. Vols. 24 and 25. *Standards*.
 American Association of Textile Chemists and Colourists. *Test Methods*.
 Australian Standards Association. *Textile Standards*.
 Brearley and Cox. *An Outline of Statistical Methods for Use in the Textile Industry*.
 The Textile Institute, *Manual of Cotton Spinning. The Characteristics of Raw Cotton*. Vol. 2, Part 1.

(2) Fibre Identification

- The Textile Institute. *Identification of Textile Materials*.
 Luniak. *Identification of Textile Fibres*.

(3) Raw Materials

- Mathews. *Textile Fibres*.
 Moncrieff. *Man-made Fibres*.
 The Textile Institute. *Manual of Cotton Spinning*. Vol. 1. *Raw Cotton Production and Marketing*.

(4) Dyeing and Finishing

- Giles. *Laboratory Course in Dyeing*.
 Bird. *The Theory and Practice of Wool Dyeing*.
 Marsh. *Introduction to Textile Bleaching*.
 Marsh. *Introduction to Textile Finishing*.
 Marsh. *Mercerising*.
 Marsh. *Self Smoothing Fabrics*.
 Schmidlin. *Preparation and Dyeing of Synthetic Fibres*.
 Society of Dyers and Colourists. *Colour Index*.
 Vickerstaff. *The Physical Chemistry of Dyeing*.
 Schwarz and Perry. *Surface-Active Agents*.
 Moilliet, Collie and Black. *Surface Activity*.

(5) Knitting

- Shinn. *Principles of Knitting*. Vols. I and II. Clark Publishing Co.
 Chamberlain. *Principles of Machine Knitting*. The Textile Institute.
 Wignall. *Knitting*. Pitman.
 Reichman (editor). *Principles of Knitting Outerwear Fabrics and Garments*.
 National Knitted Outerwear Assoc.
 Reichman (editor). *Advanced Knitting Principles*. N.K.O.A.
 Paling. *Warp Knitting Technology*. 2nd Ed. Columbine Press.
 Mills. *Fully Fashioned Garment Manufacture*.

(6) Weaving

- Bennett. *Introduction to Automatic Weaving*.
 Bradbury. *Modern Looms*.
 Thompson. *Narrow Fabric Weaving*.
 Robinson. *Rayon Fabric Construction*.
 Watson. *Textile Design and Colour*.
 Watson. *Advanced Textile Design*.
 Seydel. *Warp Sizing*.
 Middlebrook. *Primary Aspects of the Power Loom*.
 Middlebrook. *Secondary Aspects of the Power Loom*.
 Crossland. *Modern Carpet Manufacture*.

(7) Yarn Manufacture

- Morton. *Introduction to the Study of Spinning*.
 Radcliffe. *Woollen and Worsted Yarn Manufacture*.
 Nissan. *Textile Engineering Processes*.
 Walker. *Worsted Drawing and Spinning*. Part 1, *Drawing*.
 Wray. *Modern Yarn Production from Man-Made Fibres*.
 Wool Industries Research Association. *Wool Research*. Vol. 4. *Carding*.
 Vol. 6. *Drawing and Spinning*.
 Caldwell. *Rayon Staple Fibre Spinning*.
 Griffin. *Practical Worsted Carding*.
 Griffin. *Practical Worsted Combing*.
 The Textile Institute. *Manual of Cotton Spinning*. Vol. II, Part 2. *Opening and Cleaning*. Vol. III. *Carding*. Vol. IV, Part 1. *The Principle of Roller Drafting*. Vol. IV, Part 2. *Drawframes, Combers and Speedframes*. Vol. V. *The Principles and Theory of Ring Spinning*.

13.211 Textile Science I

Fibres, rubbers and plastics. Polymerization. Chemical constitution and reactivity of the natural and man-made fibres. Morphological structure of fibres; optical and electron microscopy, X-ray diffraction and infra-red spectroscopy.

13.212 Textile Science II

Mechanical properties and rheological behaviour of fibres and fibre assemblies including a thermodynamic and kinetic treatment of fibre deformation. Physical properties of textile materials including water adsorption, electrical properties, heat and moisture transfer. Geometry of yarn and fabric structures. Aspects of colour, colour mixing and colour vision. Introduction to adsorptiometry, spectrophotometry and tristimulus colorimetry. Measurement and specification of colour. Applications of colour measurement in textile dyeing.

REFERENCE BOOKS**(1) Textile Chemistry**

- Peters. *Textile Chemistry*.
 Hill. *Fibres from Synthetic Polymers*.

Moore. *An Introduction to Polymer Chemistry*.
 Ward. *Chemistry and Chemical Technology of Cotton*.
 Ott and Spurlin. *Cellulose*.
 Hearle and Peters. *Fibre Structure*.
 Hermans. *Physics and Chemistry of Cellulose Fibres*.
 Alexander, Hudson and Earland. *Wool. Its Chemistry and Physics*.
 Wright. *Measurement of Colour*.
 Judd and Wyszecki. *Colour in Business, Science and Industry*.
 Optical Society of America. *The Science of Colour*.
 The Textile Institute and the Society of Dyers and Colourists. *Review of Textile Progress*. Annual.

(2) Textile Physics

Stones. *Fibre Microscopy*.
 Woods. *Physics of Fibres*.
 Hearle and Peters. *Moisture in Textiles*.
 Meredith and Hearle. *Physical Methods of Investigating Textiles*.
 Eirich. *Rheology*. Vols. I and II.
 Morton and Hearle. *Physical Properties of Textile Fibres*.
 Howell, Mieszkis and Tabor. *Friction in Textiles*.
 Meredith. *Mechanical Properties of Textile Fibres*.
 Zemansky. *Heat and Thermodynamics*.

13.311 Textile Engineering I

Textile mill location, design and layout. Application of electricity and mill illumination. Mechanical power transmission. Properties of steam and heat transfer. Introduction to methods engineering.

13.312 Textile Engineering II

Air conditioning, industrial instrumentation, process steam, lubrication, introduction to automatic control.

REFERENCE BOOKS

Kent. *Mechanical Engineers Handbook, Power*. Edited by J. K. Salisbury.
 Cook and Carr. *Elements of Electrical Engineering*.
 Swale. *Electricity in the Textile Industry*.
 Greenhut. *Plant Location in Theory and Practice*.
 Clifford. *Textile Organisation and Production*.
 Illumination Engineering Society *Lighting Handbook*.
 Staniar, Editor. *Plant Engineers Handbook*.
 Wrangham. *Theory and Practice of Heat Engines*.
 Lyle. *The Efficient Use of Steam*.
 Enrich. *Engineering Manual for the Textile Industry*.
 Kent. *Mechanical Engineers Handbook, Design and Production*.
 Michell. *Lubrication, Its Principles and Practice*.
 Eckman. *Industrial Instrumentation*.
 Young. *An Introduction to Process Control System Design*.
 Kern. *Process Heat Transfer*.
 Her Majesty's Stationery Office. *The Efficient Use of Fuel*.

13.511 General Textiles I

REFERENCE BOOKS

Mathews. *Textile Fibres*.
 Moncrieff. *Man-made Fibres*.
 Morton. *Introduction to the Study of Spinning*.
 Radcliffe. *Woollen and Worsted Yarn Manufacture*.
 Bradbury. *Calculation in Yarns and Fabrics*.
 Textile Institute. *Identification of Textile Materials*.

Luniak. *Identification of Textile Fibres*.
B.S. Handbook. *Methods of Test for Textiles*.

13.512 General Textiles II

REFERENCE BOOKS

Bennett. *Introduction to Automatic Weaving*.
Bradbury. *Modern Looms*.
Bird. *The Theory and Practice of Wool Dyeing*.
Marsh. *Introduction to Textile Finishing*.

SCHOOL OF WOOL TECHNOLOGY

9.101 Livestock Production I

Anatomy, histology and introduction to the physiology of the domestic animals. Mammalian evolution and embryology.

The livestock industry and its place in the economic life of Australia. Production of livestock products and trends. The inter-relationships of the various classes of stock and the natural, economic and artificial conditions determining the stratification of types. Breeds of livestock of importance to the pastoral industry and aids to judging. Breeds of sheep, their uses and economic relationships. Sheep management and calendar of operations. Flock composition; principal sources of loss and their control.

9.122 Livestock Production II

The more important breeds of beef cattle, dairy cattle, pigs, working dogs, and their management. Production of beef, veal, pigmeats, milk and milk products, and quality concepts. Handling hides and skins. Stud breeding—record keeping.

Livestock husbandry in relation to diseases. The Stock Diseases Act. Types of disease, immunity. Bacteriology and pathology. Parasitology—external and internal parasites. Diseases of the fleece, deficiency diseases. Poison plants. Specific diseases. Commoner diseases of cattle, horses, pigs and dogs. Veterinary first-aid. Common drugs.

9.123 Livestock Production III

Principles of livestock production and their application in animal industry; reproduction and fertility; milk secretion; growth and development; nutrition and breeding. Crossbreeding. Prime lamb production. Factors affecting livestock production, e.g., pasture improvement.

TEXT BOOKS

Ashton. *Dairy Farming in Australia*. N.S.W. ed. Dept. Commerce and Industry.
Belschner. *Sheep Management and Diseases*. 7th ed. A & R. 1965.
Cole. *Sheep Management for Wool Production*. Grazcos, Sydney, 1963.
Hammond, edited by. *Progress in the Physiology of Farm Animals*. 3 vols. Butterworth.

REFERENCE BOOKS

Allee et al. *Principles of Animal Ecology*. Saunders.
American Meat Inst. Foundation. *Science of Meat and Meat Products*. Freeman, 1960.
American Society of Animal Production. *Techniques and Procedures in Animal Production Research*. ASAP.
Beattie. *Beef Cattle Breeding and Management*. Past. Rev.
Beattie. *Beef Cattle Industry of Australia*. CSIRO Bull. No. 278.

- Bostock. *Pig Husbandry in Australia*.
 Briggs. *Modern Breeds of Livestock*.
 Brody. *Bioenergetics and Growth*.
 Butterfield and May. *Muscles of the Ox*. U.Q.P.
 Charleton and Leach. *Schafer's Essentials of Histology*.
 Cole and Cupps. *Reproduction in the Domestic Animals*. 2 vols. Academic.
 Downey. *Pig Raising*. 2nd ed. A. & R.
 Drabble. *Textbook of Meat Inspection*. A. & R.
 Dukes. *Physiology of Domestic Animals*. Comstock.
 Folley. *Physiology and Biochemistry of Lactation*. Oliver and Boyd.
 Foust and Getty. *Anatomy of Domestic Animals*. Iowa University Press, 1960.
 Fraser. *Beef Cattle Husbandry*. Crosby Lockwood.
 Fraser. *Sheepfarming*. Crosby Lockwood.
 Fraser and Stamp. *Sheep Husbandry and Disease*. Crosby Lockwood.
 Hafez, edited by. *Reproduction in Farm Animals*. Lea and Febiger, 1962.
 Hammond. *Farm Animals*. Edited by Arnold, 1960.
 Hammond. *Growth and Development of Mutton Qualities of Sheep*.
 Hungerford. *Diseases of Livestock*. Grahame.
 Kammlade and Kammlade. *Sheep Science*. Lippincott.
 Kelley. *Sheep Dogs (Breeding Care and Management)*. A. & R.
 Kent. *Comparative Anatomy of the Vertebrates*. McGraw-Hill.
 McGregor. *Structure of Meat Animals*.
 McMeekan et al. *Principles of Animal Production*. Whitcombe and Tombs.
 Miller and Robertson. *Practical Animal Husbandry*.
 Miller and West. *Encyclopaedia of Animal Care*. Williams & Wilkins.
 Nicholls. *Livestock Improvement in Relation to Heredity and Environment*. Oliver & Boyd.
 O'Loughlin, edited by. *Beef Cattle in Australia*. Country Life Newspaper.
 Parkes. *Marshall's Physiology of Reproduction, Parts I and II*. Longmans.
 Patten. *Foundations of Embryology*.
 Pearce. *Sheep Farm and Station Management*. Past. Rev.
 Phillips. *Breeding Animals Suited to Unfavourable Environments*. FAO.
 Roberts. *Insects Affecting Livestock*.
 Sisson. *Anatomy of Domestic Animals*.
 Smith. *Practical Poultry Husbandry in Australia*.
 Snapp. *Beef Cattle*.
 Taylor. *Regional and Applied Anatomy of Domestic Animals*.
 Thomas et al. *Sheep*.
 Trautmann and Fiebiger. *Fundamentals of the Histology of Domestic Animals*.
 Trow-Smith. *History of the British Livestock Industry*. 2 vols. Standish.
 Turner. *Anatomy of the Udder*. Columbia.
 Waddington. *Principles of Embryology*. Allen & Unwin.

9.221 Agronomy

Agricultural climatology, soil science, and soil conservation. Pastures in land use and land development. Principles of tillage, crop rotation, irrigation and fertilizer use. Weeds and weed control. Practical work in the systematics of plant families.

9.231 Pastoral Agronomy

Pasture ecology. Establishment, management and utilization of pastures. Fodder and field crops associated with the sheep industry. Fodder conservation. Insect pests of pastures.

TEXT BOOKS

Black. *Flora of South Australia*. (Parts I-IV.) S. Aust. Govt. Printer.

CSIRO. *The Australian Environment*. Angus & Robertson.
 Leeper. *Introduction to Soil Science*. Melb. Univ. Press.
 Molnar Edited by. *Manual of Australian Agriculture*. Heineman.
 Whittet. *Weeds*. N.S.W. Dept. of Agriculture.
 Whittet. *Pastures*. N.S.W. Dept. of Agriculture.
 Barnard. *Grasses and Grassland*. Macmillan.

9.311 Economics

Economic Theory—Factors of production and division of labour. The concepts of the firm and costs of production. The firm and the market, supply and demand, competition and monopoly. National income, expenditure and product. Government activity in the economy. Foreign transactions. Trade cycles. The economics of growth and development. Marketing theory, problems, organization and margins.

Wool in Australian Economy—Australian economic growth 1788-1860; 1860-1900 and after 1900. Economic organization of the pastoral industry. The wool market at home and overseas and future prospects.

Introduction to Farm Management—Its meaning, objectives and scope in different environments.

9.312 Farm Management

Land utilization in relation to farm management; climatic influences; patterns of enterprise distribution, land valuation and improvements; farm size and layout; labour and rural credit. Yield and intensity in production. Financial and production records and accounts; inventory theory; tests of economic efficiency. Farm planning and organization. Budgeting and programming. Production relationships and cost of production concepts. Linear programming. Economics of pasture improvement, fertilizer use, drought and fodder conservation and irrigation.

TEXT BOOKS

Black. *Introduction to Economics for Agriculture*. Macmillan.
 Castle and Becker. *Farm Business Management*. Macmillan.

REFERENCE BOOKS

Agriculture, Fish and Food Ministry. *The Farm as a Business*. H.M.S.O.
 Barnard. *Growth of the Australian Wool Market, 1840-1900*. Melbourne University Press.
 Blagburn. *Farm Planning and Management*. Longmans.
 Emery and Oeser. *Information, Decision and Action*. Melbourne University Press.
 Heady. *Economics of Agricultural Production and Resource Use*. Prentice-Hall.
 Heady and Candler. *Linear Programming Methods*. Iowa State College Press.
 Heady and Dillon. *Agricultural Production Functions*. Iowa State College Press.
 Heady and Jensen. *Farm Management Economics*. Prentice Hall.
 Hopkins and Heady. *Farm Records and Accounting*. Iowa State College Press.
 King. *Outline of Closer Settlement in N.S.W.* Govt. Printer.
 Mallyon. *Principles and Practice of Farm Management Accounting*. Law Book Co.
 Shannon. *Rural Industries in the Australian Economy*.
 Wadham and Wood. *Land Utilisation in Australia*. Melbourne University Press.
 Yang. *Methods of Farm Management Investigations*. FAO Agricultural Development Paper No. 64.

9.411 Agricultural Chemistry

The chemistry of feeding stuffs. Proximate analysis. Growth changes. Isolation, examination and estimation of constituents. Vitamins and assessment of nutritional value. Chemistry of silage. Correlations of structure and properties. Animal milks, factors affecting composition.

Poisonous plants. Agricultural chemicals. Water supplies (stability, activities of enzymes, substrate requirements).

General principles of analytical methods. Trace metal analysis. Colorimetry and instrumental techniques.

Concurrent extensions in chemistry as necessary.

9.421 Animal Nutrition

Composition and classification of foodstuffs and pastures. Physiology of ruminant digestion. Digestion, absorption and metabolism of carbohydrates, proteins, fats, minerals and vitamins. Digestibility of foodstuffs. Nutrient and energy balances and requirements of livestock. Feeding standards and the quantitative application of nutritional data with particular reference to Australian conditions. Utilization of forage by grazing ruminants. Supplementary and drought feeding. Consideration of disorders due to nutrition.

While particular emphasis will be given to nutritional requirements of sheep, those of other farm livestock will be dealt with in this section.

TEXT BOOKS

Lewis. *Digestive Physiology and Nutrition of the Ruminant*.

Maynard and Loosli. *Animal Nutrition*.

REFERENCE BOOKS

Annisson and Lewis. *Metabolism in the Ruminant*. Methuen.

Blaxter. *Energy Metabolism of the Ruminant*. Cambridge.

British Ministry of Agriculture. *Rations for Livestock*. H.M.S.O. Bull. No. 48.

Crampton. *Applied Animal Nutrition*.

Dougherty et al. *Physiology of Digestion in the Ruminant*. Butterworth, 1965.

Halnan and Garner. *Principles and Practice of Feeding Farm Animals*. Longmans.

Ivins. *Measurement of Grassland Productivity*.

Morrison. *Feeds and Feeding*. Henry Morrison.

National Research Council (U.S.A.). *Recommended Nutrient Allowances for Domestic Animals*.

Proc. 7th International Congress Animal Husbandry, Madrid, 1956.

Proc. 16th International Vet. Congress, Madrid, 1959.

Sheehy. *Animal Nutrition*.

Underwood. *Trace Elements in Human and Animal Nutrition*. Academic.

9.531 Wool Technology I

Wool Biology—Structure and function of skin. Aspects of fibril formation. Structure of follicles. The hair growth cycle. Development of fibre population in sheep. Comparative fleece biology.

Wool Metrology—All common measurement techniques, yield, length, diameter, damage, fleece components, their estimation and analysis of results.

Raw Materials—This subject, taught by the School of Textile Technology, constitutes part (a) of 13.511 General Textiles. A course on origin, chemical composition, structure and properties of natural and synthetic fibres, with particular emphasis on comparative properties.

Wool—Fleece characteristics—fibre fineness, crimp and quality number,

staple length, soundness, colour and yield. Component parts of the fleece. The wool product of Merino, British and Australasian breeds. Wool defects and discolorations. Vegetable fault in relation to district, price and processing. Theory of wool classing, shearing shed procedure, practical wool sorting, classing and typing.

9.532 Wool Technology II

Wool Textile Manufacture—Taught by the School of Textile Technology; constitutes part (a) of 13.512 General Textiles.

Detailed instruction on function of machines involved in woollen and worsted processing from scouring to (and including) finishing. The function and general mechanism of each stage of processing are studied and comparisons are made with other types of manufacture where possible.

Wool—Carbonizing and fellmongering. Central classing and repacking. Preparation of the wool selling brokers' catalogue. Wool buying techniques, wool shipment and finance. Composition and functions of the Australian Wool Board and International Wool Secretariat. A.W.B. Table of Types and Descriptions, history and application. Carpet wool. Wool top appraisal. Wool production and marketing in overseas countries. Wool futures. Practical wool sorting, classing and typing.

The following trade visits will be undertaken during Wool Technology I and II at times coincident with relevant theory and practice: worsted manufacture, woollen manufacture, scouring and carbonizing, fellmongering, carpet manufacture, repacking houses, wool brokers' stores, wool saleroom.

9.533 Wool Technology III

Wool types, appraisal of wool samples in terms of Australian Wool Board type, quality and yield.

9.534 Wool Technology IV

Wool Fibre Science—Histology of the fibre; molecular structure; chemical composition; mechanical properties; chemical reactivity; technology.

TEXT BOOKS

Barnard. *The Simple Fleece*. A.N.U.

Onions. *Wool*. Benn & Co., 1961. 9.532 only.

REFERENCE BOOKS

American Wool Handbooks

Austen. *The Merino. Past, Present and Probable*. A & R.

Barnard. *Growth of the Australian Wool Market, 1840-1900*. Melbourne University Press.

Bowen. *Wool Away*.

British Wool Manual.

Burgess et al. *Mechanical Properties of Textile Fibres*. North Holland Publishing Co.

C.I.B.A. *The Wool Fibre*. Review No. 113. C.I.B.A.-Basle.

Fegan. *Merino Wool*. Grahame.

Guthrie. *A World History of Sheep and Wool*. Pastoral Review.

Henderson. *Wool and Wool Classing*. Halstead.

International Wool Secretariat. *Wool Science Reviews*. I.W.S.

Luniak. *Identification of Textile Fibres*. Pitman.

Meredith. *The Mechanical Properties of Textile Fibres*.

Preston. *Fibre Science*. Textile Inst.

Proceedings of the International Wool Textile Res. Conf. Austl., 1955.

Ryan. *Sheep Shearing Experting*. A & R.

Stoves. *Fibre Microscopy*. Heywood & Co.

Reviews of Textile Progress. Textile Institute and Society of Dyers & Colourists.

Truter. *Wool Wax.* Cleaver-Hume.

Urquhart and Howitt. *Structure of Textile Fibres.* Textile Inst.

Wildman. *Microscopy of Animal Textile Fibres.* W.I.R.A.

Woods. *Physics of Fibres.* Inst. Physics.

9.601 Animal Physiology I

Physiological systems of mammalia are treated with special attention to homeostatis and to ruminants. Cell membranes; blood and body fluids; the immune reaction. Cardiac control, functions and haemodynamics. Respiration. The endocrine system with particular emphasis upon growth, reproduction, lactation and stress. The nerve impulse, its excitation and transmission. Physiology of digestion, the gastro-intestinal tract and of the kidney. Heat tolerance and climatic adaptation.

9.602 Animal Physiology II

Mammalian physiology directed towards domestic livestock production and homeostatic mechanics. Emphasis will be placed upon technique.

Active transport and allied membrane phenomena. Co-ordinator systems (neural, humoral), reproduction and lactation. Development physiology. General metabolism and its regulation—the physiology and metabolism of specific organs—heart, muscle, liver, kidney. The physiology of the mammalian digestive tract. Environmental physiology—adaptive mechanisms—especially in the newborn, and in heat tolerance; the immune reaction. Electrolyte physiology—acid-base equilibrium of the organism; use of clearance values in measuring renal and liver activity—respiration—techniques of gas analysis and respirometry. Circulation, cardiac output and distribution (experimental techniques), special vascular circuits (pulmonary, cerebral, hepatic, splenic, renal, testicular). Physiology of the skin.

TEXT BOOK

Sampson Wright. *Applied Physiology.* 10th ed. Oxford University Press.

REFERENCE BOOKS

Best and Taylor. *Physiological Basis of Medical Practice.*

Benzie and Phillipson. *The Alimentary Tract of the Ruminant.*

Brachet. *Biochemical Cytology.*

Dukes. *Physiology of Domestic Animals.*

Fulton. *Textbook of Physiology.*

Hall. *The Functions of the Endocrine Glands.*

Hammond, edited by. *Progress in the Physiology of Farm Animals.* 3 vols. Butterworth.

Hawker. *Synopsis of Endocrinology.*

Maximow and Bloom. *A Textbook of Histology.*

Prosser and Brown. *Comparative Animal Physiology.* Saunders, 1962.

Scheer. *Comparative Animal Physiology.*

Short. *The Bio-synthesis and Secretion of Adrenal Steroids.*

Spector. *Handbook of Biological Data.* Saunders.

Tepperman. *Metabolic and Endocrine Physiology.* Year Book. Medical Publishers.

Trautman and Fiebiger. *Fundamentals of the Histology of Domestic Animals.*

Turner. *General Endocrinology.* 3rd ed. Saunders.

West and Todd. *Textbook of Biochemistry.* Macmillan.

Hafez, edited by. *Reproduction in Farm Animals.* Lea & Fiebiger, 1962.

9.801 Genetics I

Applied genetics in relation to sheep and other farm livestock. Mendelian inheritance. Chromosomes, linkage and the physical basis of heredity. Gene action in physiology, development and sex determination. Mutation. Principles of statistical genetics, strength of inheritance, selection, inter-relationships, genetics and sheep improvement.

9.802 Genetics II

Genetic structure of populations. Forces causing genetic change. Partition of genetic and phenotypic variation. Resemblance between relatives and estimation of genetic parameters. Direct and correlates selection responses. Aids to selection and selection indexes. Inbreeding and genetic drift. Genetic homeostasis. Genotype—environment interaction. Heterosis and its utilization. Interaction of natural and artificial selection. Limits to selective progress.

TEXT BOOKS

Falconer. *Introduction to Quantitative Genetics*. Oliver and Boyd, 1960.
Lerner. *Genetic Basis of Selection*. Wiley, 1958.
Sinnott, Dunn and Dobzhansky. *Principles of Genetics*. 5th Ed. McGraw-Hill, 1957.

REFERENCE BOOKS

Allaid. *Principles of Plant Breeding*. Wiley, 1960.
Bogart. *Improvement of Livestock*. Macmillan, 1959.
Dunn. *Genetics in the 20th Century*. Macmillan, 1961.
Fisher. *Theory of Inbreeding*. Oliver and Boyd, 1949.
Hagedoorn. *Animal Breeding*. 6th Ed. Crosby Lockwood, 1962.
Johansson. *Genetic Aspects of Dairy Cattle Breeding*. Oliver and Boyd, 1962.
Kempthorne. *Introduction to Genetic Statistics*. Wiley, 1957.
Lerner. *Population Genetics and Animal Improvement*. Cambridge, 1950.
Lerner. *Genetic Homeostasis*. Oliver and Boyd, 1954.
Li. *Population Genetics*. Chicago, 1955.
Lush. *Animal Breeding Plans*. 3rd Ed. Iowa, 1945.
Smith. *Theory of Evolution*. 2nd Ed. Penguin, 1966.
Snedecor. *Statistical Methods*. 5th Ed. Iowa, 1956.
Snyder and David. *Principles of Heredity*. 5th Ed. Heath, 1957.
Spiess. Ed. *Papers on Animal Population Genetics*. Methuen, 1964.
Srb. Owen and Edgar. *General Genetics*. 2nd Ed. Freeman, 1965.
Waddington. *Strategy of the Genes*. Allen and Unwin, 1957.

9.811 Biostatistics

Random sampling. Estimation and tests of significance. Comparison of means. Regression and correlation. Analysis of variance and covariance. Factorial experiments. Multiple and curvilinear regression. Treatment of non-orthogonal data. Analysis of enumeration data. Distribution-free methods. Planning of experiments and surveys.

TEXT BOOK

Steel and Torrie. *Principles and Procedures of Statistics*. McGraw-Hill, 1960.

REFERENCE BOOKS

Anderson and Bancroft. *Statistical Theory in Research*. McGraw-Hill, 1952.
Cochran and Cox. *Experimental Designs*. 2nd Ed. Wiley, 1956.
Cox. *Planning of Experiments*. Wiley, 1958.
Fisher. *Statistical Methods for Research Workers*. 13th Ed. Oliver and Boyd, 1958.

Fisher. *Design of Experiments*. 7th Ed. Oliver and Boyd, 1960.
Goulden. *Methods of Statistical Analysis*. 2nd Ed. Wiley, 1952.
Pearce. *Biological Statistics*. McGraw-Hill, 1965.
Snedecor. *Statistical Methods*. 5th Ed. Iowa, 1956.
Williams. *Regression Analysis*. Wiley, 1959.

9.821 Genetics

Applied genetics in relation to sheep improvement. Mendelian theory. Chromosomes and the physical basis of heredity. Crossing over, sex differentiation, multifactor inheritance in selection. Inbreeding and line breeding. Introduction to population genetics.

9.901 Rural Extension

Objective and agencies. Research-extension relationships. Educational, psychological and sociological aspects and principles. Programme planning involving analysis of the situation, determination of objectives, establishment of priorities and assessment of rural-socio-economic factors. Presentation of programmes including aims, educational procedures in presentation, channels and techniques. Evaluation of extension.

WOOL TECHNOLOGY GRADUATE SUBJECTS (GRADUATE DIPLOMA)

9.105G Advanced Livestock Production

Advanced aspects of the principles of animal production with particular emphasis on physiology and endocrinology. Biostatistics and population genetics. Parasites. Management to maximize economic return.

9.503G Wool Study

Place of wool in world trade and the economic life of Australia. Wool quality, fleece defects. Principles of wool processing in relation to the preparation of the clip. Wool areas of the Commonwealth.

Wool terms. Types, yield. Wool classing. Wool scouring and carbonizing. Vegetable fault. Methodology of wool commerce. Australian Wool Board types and valuation.

9.711G Advanced Wool Technology

Biology of fibre growth—histology, fibre arrangement, morphology and fleece genetics. Modern concepts of fibre growth and structure. Advances in fibre physics and fibre chemistry. Wool metrology and conditioning house procedures. Principles of conversion of raw wool to finished goods. Impact of recent developments.

9.902G Techniques of Laboratory and Field Investigation

Experimental method. Design of experiments. The survey approach. Co-operative farm trials. Experiment station investigations. Controlled environmental work in the laboratory. Agronomic studies; plant ecology, plant improvement, field plots, fertilizer trials. Animal studies. Genetic investigations. Fertilization, growth and development. Conversion efficiency for wool, meat and milk. Quality concepts. Special techniques and instrumentation. Small animal techniques. Plant-animal relationships. Grazing management. Economic investigations. Statistical interpretations.

GENERAL STUDIES SUBJECTS

11.011H History of Fine Arts

This course, comprising 30 one-hour lectures, extends over three terms. Twenty hours will be devoted to an outline of the development of 19th and 20th century painting and sculpture. The course aims to outline the movements concerned in the development of modern art from the stylistic background of the European tradition to contemporary works. It is hoped to develop in the student a critical insight which will lead to greater enjoyment of works of art. Ten hours will be devoted to a brief historical review of the development of some phases of painting and sculpture during the ancient, Medieval and Renaissance epochs. The influence of religious, economic and social factors on the more important works of the periods concerned will be discussed.

TEXT BOOKS

Lake, C. and Maillard, R. *A Dictionary of Modern Painting*. Methuen, 1964, London.

Newton, E. *European Painting and Sculpture*. Penguin, U.K.

Read, H. *The Meaning of Art*. Penguin, 1951, U.K.

REFERENCE BOOKS

Seuphor, M. *A Dictionary of Abstract Painting*. Methuen, 1963, London.

Seuphor, M. *The Sculpture of this Century*. Zwemmer, 1959, London.

Brion, M. *Art Since 1945*. Thomas and Hudson. Ed. 1959, London.

Ragnar, M. *Modern Painting*. Skira, 1960.

Mathey, F. *The World of the Impressionists*. Thomas and Hudson, 1961, London.

Vasari, G. *Lives of the Painters, Sculptors and Architects*. Dent and Sons, 1949, London. Everymans.

Berenson, B. *Italian Painters of the Renaissance*. Phaidon, 1952, London.

De Wald, E. T. *Italian Painting 1200-1600*. Holt, Rinehart and Winston, 1962, New York.

Burchhardt, J. *The Civilisation of the Renaissance in Italy*. Phaidon, 1944, London.

Goldscheider, L. *The Painting and Sculpture of Michelangelo*. Phaidon, ca. 1960, London.

Gardner, Helen. *Art Through the Ages*. G. Bell, 1953, London.

Vivas, E. and Krieger, M. *The Problems of Aesthetics*. Holt, Rinehart and Winston, 1960, New York.

Reading lists are issued progressively during the course.

11.021H History of Architecture

This course, extends over three terms. The treatment of this historical review of architecture will be different from that as normally given to students of architecture. The early lectures aim to guide the student towards an understanding of the role of the Architect, and an appreciation of architecture as an art, a science, and a practical profession. Subsequently, the course will deal with the origins of architectural form in ancient civilisations, and the development of these forms throughout the Middle Ages and the Renaissance. The effects of the Industrial Revolution and its aftermath, and the growth of modern architecture, will be studied. The course will conclude with studies in the development of an Australian idiom in architecture and building. Only the most important or most typical examples of each historical phase will be discussed, and then primarily from the point of view of what they reveal of the social, economic, and physical conditions which produced them.

TEXT BOOKS

- Pevsner, Nikolaus. *An Outline of European Architecture*. Pelican Books, 1963, London.
 Richards, J. M. *An Introduction to Modern Architecture*. Pelican Books, 1963, London.
 Boyd, Robin. *The Walls Around Us*. F. W. Cheshire, 1962, Melbourne.

REFERENCE BOOKS

A list will be issued early in the lecture series.

26.113 History of Fine Arts and Architecture

Broadly these lectures will provide an introduction to the history of aesthetics of the visual arts of the Western world, i.e., architecture, painting, sculpture, design and craftsmanship.

The course is divided into two parts: Section I is mainly concerned with painting and sculpture, and Section II with architecture and theories of design in man's visual environment. Lectures will be illustrated by slides and films where possible.

Section I—History of Fine Arts: Twenty hours will be devoted to this section providing an outline of the development of 19th and 20th Century painting and sculpture. This course aims to outline the movements concerned in the development of modern art from the stylistic background of the European tradition to contemporary works. It is hoped to develop in the student a critical insight which will lead to greater enjoyment of works of art. Ten hours will be devoted to a brief historical review of the development of some phases of painting and sculpture during the Ancient, Medieval and Renaissance epochs. The influence of religious, economic and social factors on the more important works of the periods concerned will be discussed.

Section II—History of Architecture: The treatment of this historical review of architecture will be different from that as normally given to students of architecture. The early lectures aim to guide the student towards an understanding of the role of the architect, and an appreciation of architecture as an art, a science and a practical profession. Subsequently the course will deal with the origins of architectural form in ancient civilisations, and the development of these forms throughout the Middle Ages and the Renaissance. The effects of the Industrial Revolution and its aftermath, and the growth of modern architecture, will be studied. The course will conclude with studies in the development of an Australian idiom in architecture and building. Only the most important or the most typical examples of each historical phase will be discussed, and then primarily from the point of view of what they reveal of the social, economic, and physical conditions which produced them.

TEXT BOOKS AND REFERENCE BOOKS

Section I

- Lake, C. and Maillard, R. *A Dictionary of Modern Painting*. Methuen, 1964, London.
 Newton, E. *European Painting and Sculpture*. Penguin, U.K. (Pelican Books, A82.)
 Read, H. *The Meaning of Art*. Penguin, 1951, U.K. (Pelican Books, A213.)
 Seuphor, M. *A Dictionary of Abstract Painting*. Methuen, 1963, London.
 Seuphor, M. *The Sculpture of this Century*. Zwemmer, 1959, London.
 Brion, M. *Art Since 1945*, Thomas and Hudson. Ed. 1959, London.
 Ragnar, M. *Modern Painting*. Skira, 1960.
 Mathey, F. *The World of the Impressionists*. Thomas and Hudson, 1961, London.
 Vasari, G. *Lives of the Painters, Sculptors and Architects*. Dent, 1949, London. Everymans.

Berenson, B. *Italian Painters of the Renaissance*. Phaidon, 1952, London.
De Wald, E. T. *Italian Painting 1200-1600*. Holt, Rinehart and Winston, 1962, New York.

Burchhardt, J. *The Civilisation of the Renaissance in Italy*. Phaidon, 1944, London.

Goldscheider, L. *The Painting and Sculpture of Michelangelo*. Phaidon, ca. 1960, London.

Gardner, Helen. *Art Through the Ages*. G. Bell, 1953, London.

Vivas, E. and Krieger, M. *The Problems of Aesthetics*. Holt, Rinehart and Winston, 1960, New York.

Section II

Pevsner, Nikolaus. *An Outline of European Architecture*. Pelican, 1963.

Richards, J. M. *An Introduction to Modern Architecture*. Pelican, 1963, London.

Boyd, Robin. *The Walls Around Us*. Cheshire, 1962, Melbourne.

26.121 Psychology

An introduction to general Psychology by way of a course centred upon issues related to the study of personality-motivation, perception, learning, the nature of personality development and of social behaviour.

TEXT BOOK

Lindgren, H. C., Byrne, D. and Petrinovich, L. *Psychology: An Introduction to a Behavioural Science, or*

Morgan, C. T. *An Introduction to Psychology*. 2nd Edition. McGraw-Hill, 1961.

REFERENCE BOOK

Gabriel, J. *Children Growing Up. The Development of Children's Personalities*. University of London Press. 2nd Edition, 1965.

26.122 Psychology

The theme of this elective is man in society, his strivings, satisfactions and values. The course examines what psychology has to say about personality, the roles which people adopt, the groups people form and the nature of group relations, the effect of group interaction, the importance of attitudes, the influence of propaganda and the function of conformity, conventions and customs.

TEXT BOOKS

Krech, D. and Crutchfield. *The Individual and Society*. McGraw-Hill, 1962.

Baughman, E. E. and Welsh, G. *Personality, a Behavioural Science*. Prentice-Hall, 1962.

26.151 Economics

This subject is an introductory examination of the working of a modern economic system, with some reference to Australian economic institutions.

TEXT BOOKS

Grant, J. McB., and Hagger, A. F. *Economics—An Australian Introduction*. Cheshire, Melbourne, Canberra, Sydney, 1964 or 1965.

Carter, C. F. *The Science of Wealth*. Arnold, Oxford, 1963.

26.152 Economics

This subject follows 15.011H Economics. Includes more penetrating study of central fields of economic theory and includes such topics as the history of economic thought and different economic systems. Particular attention will be paid to relating economic theory to such subjects as the

population explosion, economic growth, and the role of international trade and economic integration. The subject will also comprise further studies of the economic structure and economic policy of Australia.

TEXT BOOKS

Karmel, P. H. and Brunt, M. *The Structure of the Australian Economy*. Cheshire, 1962.

Homan, Hartz and Sametz. *The Economic Order*. Harcourt, Brace and Co.

Sametz, A. W. *Students' Guide to the Economic Order*. Harcourt, Brace and Co. New York, 1958.

26.301 and 26.301S Music

A brief survey of music from the earliest times of documented history to the present day in the context of particular societies and periods. Many of the recorded examples used will be European music of a kind normally heard in the concert hall, but wherever possible European art music will be presented in juxtaposition with the practice of traditional or folk music of all continents (including the music of the Australian Aborigines) and with the high art music of Asian countries. Including continuity of improvisational methods from early periods to the development of jazz, and samples of the latest developments in contemporary music (including electronic music). Musical training is not a prerequisite.

TEXT BOOKS

Harman, A. and Mellers, W. *Man and His Music: The Story of Musical Experience in the West*. Barrie and Rockliff, London, 1962.

Hartog, H. (ed.). *European Music in the Twentieth Century*. Penguin, London, 1961.

Covell, R. *Music in Australia*. Sun Books, Melbourne, 1966.

REFERENCE BOOKS

Allen, W. D. *Philosophies of Music History*. Dover, New York, 1962.

Dart, T. *The Interpretation of Music*. Hutchinson, London, 1960.

Kerman, J. *Opera as Drama*. Vintage, New York, 1956.

Lang, P. H. *Music in Western Civilization*. Dent, London, 1942.

Mellers, W. *Music in a New Found Land*. Barrie and Rockliff, London, 1964.

Morgenstern, S. (ed.). *Composers on Music*. Faber, London, 1956.

Nettl, B. *Folk and Traditional Music of the Western Continents*. Prentice-Hall, New Jersey, 1965.

Stevens, D. and Robertson, A. (eds.). *The Pelican History of Music*. Vol. 1. Penguin, London, 1960.

Stravinsky, Ivor. *The Poetics of Music*. Vintage, New York, 1959.

26.501 English

Basically, the course will aim at stimulating an interest in literature through a study of twentieth century texts. The tutorials will be used, in the main, for an examination of the development and uses of the English language.

TEXT BOOKS

Forster, E. M. *Where Angels Fear to Tread*.

Lawrence, H. D. *Sons and Lovers*.

Hemingway, Ernest. *A Farewell to Arms*.

Camus, Albert. *The Outsider*.

Golding, William. *Lord of the Flies*.

McCullers, Carson. *The Ballard of the Sad Café*.

Shaw, Bernard. *Major Barbara*.

Williams, Tennessee. *A Streetcar Named Desire*.

Williams, Tennessee. *The Glass Menagerie*.

Miller, Arthur. *Death of a Salesman*.

Three Australian Plays.

All the texts are available in Penguin paperback editions, but any complete edition will do.

26.501/2 English—Part II

The second part of a course aimed at stimulating an interest in literature through a study of selected twentieth century texts.

TEXTS

Shaw, Bernard. *Major Barbara*. Penguin.

O'Casey, Sean. *Juno and the Paycock*. St. Martin's Library.

Williams, Tennessee. *A Streetcar Named Desire*. Penguin.

Williams, Tennessee. *The Glass Menagerie*. Penguin.

Miller, Arthur. *Death of a Salesman*. Penguin.

Three Australian Plays. Penguin.

Drew, Elizabeth. *Poetry*. Dell.

All the texts are available in paperbacks, but any complete edition will do.

26.502 English Literature (Advanced Elective)

A course on selected works from the literature of the eighteenth, nineteenth and twentieth centuries.

TEXT BOOKS

Pope, Alexander. *Collected Poems*. Everyman.

Keats, John. *Selected Poems*. Penguin.

Eliot, T. S. *Selected Poems*. Faber.

The following in any complete edition—

Defoe, Daniel. *Moll Flanders*.

Austen, Jane. *Persuasion*.

James, Henry. *Washington Square*.

Forster, E. M. *A Passage to India*.

White, Patrick. *The Tree of Man*.

26.503 English Language (Advanced Elective)

A course covering the history, development, structure and uses of English.

No special text.

Reference books will be prescribed during the course.

26.511 and 26.511S History

An introduction to modern Western civilization through the study of six special periods of stress and political, intellectual, economic and social change. These are the Renaissance and Reformation, the English revolution of the seventeenth century, the American and French revolutions of the eighteenth century, the industrial revolution of the eighteenth and nineteenth centuries and the Russian revolution of 1917.

TEXT BOOKS

Renaissance and Reformation

Hale, J. R. *Machiavelli and the Renaissance*. Teach Yourself History.

Bainton, R. H. *The Age of the Reformation*. Anvil.

The English Revolution

Ashley, M. *England in the Seventeenth Century*. Pelican.

Trevelyan, G. M. *The English Revolution*. Home Univ. Library.

The American Revolution.

Nye and Morpurgo. *History of the United States*. Vol. I. Pelican.

Morris, R. B. *The American Revolution*. Anvil.

*The French Revolution*Cobban, R. *History of Modern France*. Vol. I. Pelican.Goodwin, A. *The French Revolution*. Grey Arrow.*The Industrial Revolution*Ashton, T. S. *The Industrial Revolution*. Home Univ. Library.Cole and Postgate. *The Common People*. Methuen.*The Russian Revolution*Curtiss, J. S. *The Russian Revolution of 1917*. Anvil.Hill, C. *Lenin and the Russian Revolution*. Teach Yourself History.**26.512 and 26.512S History**

A survey of events since 1919 to give an historical understanding of the world today. Its main topics are: the Peace Settlement after World War I; the growth of communist Russia; dictatorship in Europe; U.S.A. between the wars and the abandonment of isolation; an outline of World War II, its causes and effects; the cold war; the role of UNO; the changing British Commonwealth; the decline of colonialism; African nationalism; communism in China; the crisis in S.E. Asia.

REFERENCE BOOKS

Hughes, H. Stuart. *Contemporary Europe*. (1914-60). Prentice-Hall, 1964.Connell-Smith, G. *The Pattern of the Post-World*. Pelican, 1957.Connell-Smith, G. *England in the Twentieth Century*. Pelican, 1965.Crozier, Brian. *South-East Asia in Turmoil*. Pelican, 1966.Fitzgerald, C. P. *The Birth of Communist China*. Pelican, 1964.Sampson, Anthony. *Common Sense about Africa*. Gollanz, 1960.Agar, Herbert. *The Unquiet Years*. (U.S.A. 1945-55). Chatto and Windus, 1956.**26.521 and 26.521S Philosophy**

A general introduction to philosophy. The course deals with differences between philosophical and other questions; the distinction between necessarily true or necessarily false and contingent statements; the broad differences between empiricism and rationalism; the relation of knowledge of beliefs to the evidence for them. An introductory account is given of some important philosophical issues such as: causality and scientific laws; determinism and free will; the relation of mental and physical; the existence of God.

TEXT BOOKS

Hamblin, C. L. *Elementary Formal Logic*. Hicks Smith.Hospers, J. *Introduction to Philosophical Analysis*. Routledge and Kegan Paul.

REFERENCE BOOKS

Popkin, R. H. and Stroll, A. *Philosophy Made Simple*. Made Simple Books.Ayer, A. *Foundations of Empirical Knowledge*. Macmillan.Pap, A. *Introduction to the Philosophy of Science*. Free Press of Glencoe.Passmore, J. A. *Philosophical Reasoning*. Duckworth.Russell, B. *Problems of Philosophy*. Oxford, H.U.D.Hook, S. *Determinism and Freedom in the Age of Modern Science*. Collier.Wollheim, R. *Hume on Religion*. Fontana.Keene, G. B. *Language and Reasoning*. van Nostrand.Morgenbesser, S. and Walsh, J. *Language and Reasoning*. van Nostrand.Morgenbesser, S. and Walsh, J. *Free Will*. Prentice-Hall.

26.522 and 26.522S Philosophy

Prerequisite 26.521. Alternative versions may be given. Syllabus A — Survey of recent philosophy with particular attention to "logical positivism". Syllabus B — Introduction to symbolic logic.

TEXT BOOKS

Ayer, A. J. *Language, Truth and Logic*. Gollanz.

Ayer, A. J. ed. *Logical Positivism*. Free Press of Glencoe.

Wisdom, J. *Philosophy and Psycho-Analysis*. Blackwell.

Passmore, J. A. *A 100 Years of Philosophy*. Duckworth.

TEXT BOOK

Copi, I. M. *Symbolic Logic*. Collier-Macaulan. 2nd ed., 1965.

26.531 Sociology

A study of the nature of human society. The main topics which will be covered in the course will be chosen from: Sociology and the social sciences; the group structures of society; basic trends in Western social organization; culture and cultural forms of behaviour; culture, personality and human nature; the primary group and its importance; social classes and social mobility; associations; collective behaviour, crowds, mobs, fads, fashions; public opinion; propaganda; population studies; the family from a sociological point of view; minorities; the city from a sociological point of view, industrial sociology; political sociology; criminal and delinquent behaviour.

TEXT BOOK

Koenig, Samuel. *Sociology: An Introduction to the Science of Society*. Barnes and Noble.

26.532 Sociology

This course will consist of an advanced treatment of one or more areas of sociological investigation. The elements of sociological analysis which will have been introduced in the first course will be applied to special areas of sociological interest and detailed consideration will be given to the methods of sociological research and analysis in these areas. There will be lectures and discussion periods together with practical field work.

Recommended reading will be prescribed during the course.

26.541 and 26.541S Political Science

An introduction to the advanced elective, 26.542, and a unit in its own right for students not proceeding further in Political Science.

About ten lectures will be on general questions on politics — what politics is about, the meaning of a political system, concepts such as state, law, government, rights, etc. The remaining twenty lectures will deal with three major political systems — Great Britain, U.S.A., and Australia. Both the common and distinct characteristics of each will be discussed, and these examples will be used to illustrate some general questions about political institutions and ideas.

TEXT BOOKS

Birch, A. H. *Representative and Responsible Government—An Essay on the British Constitution*. Allen & Unwin, 1964, London.

Griffith, E. S. *The American System of Government*. Methuen, 1964, London.

Miller, J. D. B. *The Nature of Politics*. Penguin, 1964.

Sawer, G. *Australian Government Today*. Melbourne University Press, 1964.

Moodie, G. S. *The Government of Britain*. Methuen, 1964, London.

REFERENCE BOOKS

- Miller, J. D. B. *Australian Government and Politics*. Duckworth, 1963, London.
- Andrews, W. G., ed. *Constitutions and Constitutionalism*. 2nd edition, 1963. van Nostrand, New Jersey.
- Jupp, James. *Australian Party Politics*. Melbourne University Press, 1964.
- Dean, Howard E. *Judicial Review and Democracy*. Random House, 1966. New York.
- Harrison, Wilfrid. *The Government of Britain*. Hutchinson University Library. London, 1963.
- Potter, Allen M. *American Government and Politics*. Faber. London, 1961.
- Most of these books are available in paperbacks.

26.542 and 26.542S Political Science

Will be conducted in first and second terms and by following on from 26.541 will extend the student's acquaintance with modern political systems. Three sections, of about twenty lectures each, dealing with (a) established communist regimes (U.S.S.R., the East European Peoples' Democracies, and China); (b) two Asian political systems; and (c) the international political systems.

TEXT BOOKS

- Armstrong, J. A. *Ideology, Politics and Government in the Soviet Union*. Praeger, 1963.
- Schapiro, L. B. *The Government and Politics of the Soviet Union*. Hutchinson University Library, 1965.
- Grant, Bruce. *Indonesia*. Melbourne University Press, 1964.
- Frankel, J. *International Relations*. Oxford, 1964.
- Barnett, A. D. *Communist China in Perspective*. Praeger, 1962.
- Von der Mehden, F. *Politics of the Developing Nations*. Prentice-Hall, 1964.

REFERENCE BOOKS

- Crankshaw, E. *The New Cold War*. Pelican, 1963.
- Deutscher, I. *Stalin*. Oxford Paperback, 1961.
- Fitzgerald, C. P. *The Birth of Communist China*. Pelican, 1964.
- Kochan, L. *The Making of Modern Russia*. Pelican, 1964.
- Meyer, A. G. *Communism*. Random House. 2nd Edition, 1963.
- Mills, C. W. *The Marxists*. Pelican, 1964.
- Tinker, H. *Ballot Box and Bayonet*. O.U.P., 1964.

26.571 An Introduction to Modern Drama

An introduction to modern drama through the study of plays by Ibsen, Chekhov and other writers, covering the range of dramatic activity from Naturalism to the Absurd.

Students, through a critical examination of plays in performance at the Old Tote Theatre (situated in the grounds of the University), also have an opportunity to enjoy the direct experience of theatre. Directors of current Old Tote productions take part in the course.

TEXT BOOKS

- Ibsen. *Pillars of the Community*. Penguin.
- Ibsen. *Ghosts*. Penguin.
- Ibsen. *Hedda Gabler*. Penguin.
- Ibsen. *The Wild Duck*. Penguin.
- Chekhov. *The Sea Gull*. Penguin.
- Chekhov. *The Cherry Orchard*. Penguin.
- Chekhov. *Uncle Vanya*. Penguin.
- Synge. *Plays in Genius of the Irish Theatre*. Eds., Barnet, Berman and Burto. Mentor.

O'Neill. *The Emperor Jones*.

O'Neill. *Mourning Becomes Electra*.

Miller. *Death of a Salesman*.

Shaw. *Plays Pleasant*. Penguin.

Brecht. *The Good Woman of Setzuan*. Ed., Bentley. Evergreen.

Brecht. *The Caucasian Chalk Circle*. Ed., Bentley. Evergreen.

Ionesco. *Complete Plays*. Vols. I and II. Calderback.

With additional assignments to be prescribed. Plays in performance at the Old Tote Theatre are also prescribed for study, and students of the course are required to attend one performance of each play presented during the academic year.

26.601 History of Technology

The course is designed to show that the development of the human race is closely linked with technological change. Every major development is to be seen against the historical background of the times and the changing socio-economic pattern. The subject will be dealt with in the following historical periods: (1) Prehistoric Times; (2) The early civilizations of Mesopotamia, Egypt, India and China; (3) Classical Antiquity; (4) Islamic Times and the Middle Ages; (5) Renaissance and the Age of Enlightenment; (6) The beginning of the Industrial Revolution.

TEXT BOOK

Forbes, R. J. and Dijksterhuis, E. J. *History of Science and Technology*.
2 vols. Penguin.

REFERENCE BOOK

Singer, C. and Holmyard, J. *History of Technology*. O.U.P., 1957.

NOTES

NOTES



THE UNIVERSITY OF NEW SOUTH WALES

REVISED FEES

EFFECTIVE FROM 1st JANUARY, 1967

Introductory Note

At the end of 1966, the schedule of fees payable for both undergraduate and post-graduate courses was revised. The new schedule is set out in the following pages. It should be noted that details of fees listed in this booklet supersede the fees listed in the 1967 University Calendar, all Faculty Handbooks, etc.

*G. L. Macauley,
REGISTRAR.*

REVISED STUDENT FEES FOR 1967

UNDERGRADUATE FEES

(a) Courses in the Faculties of Applied Science, Architecture, Engineering, Medicine (Bachelor of Science (Medicine) Course only) and Science, and degree courses in Industrial Arts and Sheep and Wool Technology.

For the purpose of fee determination assessment is on a term basis.

A full-time course fee will be charged for any term where more than 15 hours' per week instruction, etc., is involved.

- (i) Full-time Course Fee (more than 15 hours' attendance per week)—\$110 per term.

In courses in which the Third Term is limited to five weeks of formal studies the fee for this term is \$55.

- (ii) Part-time Course Fee—over 6 hours' and up to 15 hours' attendance per week—\$55 per term.
- (iii) Part-time Course Fee—6 hours' or less attendance per week—\$28 per term.
- (iv) Course Continuation Fee—A fee per annum of \$23 (no term payment) is payable by:
 - (a) students who have once been enrolled for a thesis and have only that requirement outstanding, or
 - (b) students given special permission to take annual examinations without attendance at the University. (Students in this category are not required to pay the subscriptions to the University Union, the Students' Union, the Sports Association and the Library fee.)

(b) Commerce Courses.

For the purpose of fee determination assessment is on a term basis.

A full-time course fee will be charged for any term where more than 11 hours' per week instruction, etc., is involved.

- (i) Full-time Course Fee (more than 11 hours' attendance per week)—\$92 per term.
- (ii) Part-time Course Fee—over 4 hours' and up to 11 hours' attendance per week—\$55 per term.
- (iii) Part-time Course Fee—4 hours' or less attendance per week—\$28 per term.
- (iv) Course Continuation Fee—A fee per annum of \$23 (no term payment) is payable by:
 - (a) students who have once been enrolled for a thesis and have only that requirement outstanding, or
 - (b) students given special permission to take annual examinations without attendance at the University. (Students in this category are not required to pay the subscriptions to the University Union, the Students' Union, the Sports Association and the Library fee.)

Diploma in Hospital Administration.

The fees for this course are assessed under this schedule according to the hours shown for the subject irrespective of whether the course is taken as an internal or external student. An external student in this course is exempt from the Student Activities Fees.

(c) Arts Courses* and the Degree Course in Social Work.

- (i) Pass—\$84 per annum per subject.
or \$28 per term per subject.
- (ii) Distinction Subjects or Honours—an additional \$26 per annum per subject in which distinction or honours are taken in student's second and third years and \$110 per subject per annum in the fourth year.

(d) Medical Course leading to degree of M.B.B.S.

Year 1	per term \$110
Year 2	per term \$110
Year 3	per term \$107
Year 4	per term \$110
Year 5	per term \$101
Year 6	per term \$65
1967 only	
Year 6	per term \$83

Note: In the case of students in the clinical years of the Medical Course, the proposed new rates are the same as for a full-time course with more than 15 hours' attendance per week, namely, \$110 per term, from which has been deducted amounts to be collected by the University on behalf of the teaching hospitals for cost of residence.

(e) Miscellaneous Subjects.

- (i) Undergraduate subjects taken as "miscellaneous subjects" (i.e., not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed where they appear only in an Arts course (except where approved as the humanities component in another course) according to paragraph (c) "Arts courses" above. Where the distinction section only of an Arts subject is taken the fee payable is the subject fee for a pass Arts subject. All other subjects taken as miscellaneous subjects are assessed according to paragraph (a) "Courses in the Faculties of Applied Science, etc." above.

In cases where a student takes a programme of miscellaneous subjects from more than one of the categories referred to above, the fees are assessed in accordance with paragraph (a) "Courses in the Faculties of Applied Science, etc." above.

* Students transferring from the Arts course to a course other than Arts and claiming credit for subjects taken in the Arts course will have their fees for these subjects re-assessed retrospectively to conform with those payable for the course to which they transfer.

- (ii) Students given approval to enrol in a miscellaneous subject or subjects in addition to being enrolled in a course are assessed according to the total hours of attendance as if the additional subject formed part of the course.

OTHER FEES

In addition to the course fees set out above, all registered undergraduates will be required to pay:—

Matriculation Fee—payable at the beginning of first year	\$7
Library Fee—annual fee	\$12

Student Activities Fees.

University Union*—annual subscription	\$12
Sports Association*—annual subscription	\$2
Students' Union—annual subscription	\$4
Miscellaneous—annual fee	\$10
Total	\$28

Graduation or Diploma Fee—\$7 payable at the completion of the course.

Depending on the course being taken, students may also be required to pay:—

Applied Psychology Kit Hiring Charge—\$2 per kit. Additional payment for breakages and losses in excess of \$1 may be required.

Biochemistry Kit Hiring Charge—\$4 per kit. Additional payment for breakages and losses in excess of \$1 may be required.

Chemistry Kit Hiring Charge—\$4 per kit. Additional payment for breakages and losses in excess of \$1 may be required.

Excursion Fee—\$2 per subject (Biology, Botany, Zoology, Entomology).†

Anatomy Dissection Manual and Histology Slides deposit—\$10. (Refundable on return in satisfactory condition.)

Pathology Instrument Kit—\$10. (Refundable on return in satisfactory condition.)

SPECIAL EXAMINATION FEES

Deferred examination—\$5 for each subject.

Examinations conducted under special circumstances—\$7 for each subject.

Review of examination result—\$7 for each subject.

* Life members of these bodies are exempt from the appropriate fee or fees.

† Students in the original Applied Biology degree course pay an excursion fee of \$1 per subject for Botany, Zoology and Entomology.

LATE FEES

First Enrolments.

Fees paid on the late enrolment session and before commencement of term	\$6
Fees paid during the 1st and 2nd weeks of term	\$12
Fees paid after the commencement of the 3rd week of term with the express approval of the Registrar and Head of the School concerned	\$23

Re-Enrolments.

First Term:

Failure to attend enrolment centre during enrolment week	\$6
Fees paid after the commencement of the 3rd week of term to 31st March	\$12
Fees paid after 31st March where accepted with the express approval of the Registrar	\$23

Second and Third Terms:

Fees paid in 3rd and 4th weeks of term	\$12
Fees paid thereafter	\$23
Late lodgement of Application for Admission to Examinations (late applications will be accepted for three weeks only after the prescribed dates)	\$5

WITHDRAWAL FROM COURSE

Students withdrawing from a course are required to notify the Registrar in writing. Fees for the course accrue until a written notification is received.

Where notice of withdrawal from a course is received by the Registrar before the first day of First Term, a refund of all fees paid other than the matriculation fee will be made.

Where a student terminates for acceptable reasons a course of study before half a term has elapsed, one half of the term's fee may be refunded. Where a student terminates a course of study after half a term has elapsed, no refund may be made in respect of that term's fees.

The Library fee is an annual fee and is not refundable where notice of withdrawal is given after the commencement of First Term.

On notice of withdrawal, a partial refund of the Student Activities Fees is made on the following basis:—

University Union—\$2 in respect of each half term.

University of New South Wales Students' Union—where notice is given prior to the end of the fifth week of first term, \$2; thereafter no refund.

University of New South Wales Sports Association—where notice is given prior to 30th April, a full refund is made; thereafter no refund.

Miscellaneous—where notice is given prior to 30th April, \$5; thereafter no refund.

POST-GRADUATE FEES

Basis of Fee Assessment.

Where course fees are assessed on the basis of term hours of attendance, the hours for each subject for purposes of fee assessment shall be those prescribed in the Calendar. The granting of an exemption from portion of the requirements of a subject in which a student is enrolled does not carry with it any exemption from the payment of fees.

(a) Courses for the degrees of Master of Technology, Master of Business Administration, and Master of Hospital Administration.

- (i) Registration Fee \$5
- (ii) Graduation Fee \$7
- (iii) Course Fee—calculated on the basis of a term's attendance at the rate of \$6 per hour per week. Thus the fee for a programme requiring an attendance of 24 hours per week for the term is \$144.
For the Master of Hospital Administration a special course fee per term of \$46 applies in Term 3 of first year and Term 1 of second year when attendance at the University is limited.
- (iv) Thesis or Project Fee—\$35.
(An additional fee of \$23† is payable by students who have completed their final examinations for the degree but have not completed the thesis or project for which they have been previously enrolled.)

(b) Master of Education.

Fees are payable from the commencement date of a candidate's registration and remain payable until the candidate's thesis is presented to the Examinations Branch.

Thesis plus Formal Courses in Two Subjects.

- (i) Registration Fee \$5
- (ii) Course Fee—per subject \$36
- (iii) Internal Full-time Student Annual Thesis Fee* \$69
- (iv) Internal Part-time Student Annual Thesis Fee* \$36
- (v) External Student Annual Thesis Fee*† \$23
- (vi) Final Examination (including Graduation Fee) \$35

Project plus Formal Courses in Four Subjects.

- (i) Registration Fee \$5
- (ii) Course Fee—per subject \$36
- (iii) Project Fee—Internal Student (at the time of first enrolment in the project) \$23
- (iv) Project Fee—Internal Student (for each† subsequent enrolment in the project) \$23
- (v) Project Fee—External Student—per annum \$23
- (vi) Graduation Fee \$7

* The Annual Thesis Fee is payable in any year in which a candidate is formally enrolled in the thesis.

† Students paying this fee who are not in attendance at the University are not required to pay the Student Activities Fees or the Library Fee.

(c) Graduate Diploma Courses

- (i) Registration Fee \$5
- (ii) Award of Diploma Fee \$7
- (iii) Course Fee—calculated on the basis of a term's attendance at the rate of \$6 per hour per week. Thus the fee for a programme requiring an attendance of 24 hours per week for the term is \$144.
- (iv) Thesis or Project Fee—\$35.
(An additional fee of \$23† is payable by students who have completed their final examinations for the diploma but have not completed the thesis or project for which they have been previously enrolled. This fee of \$23 also applies to students taking the course for the Graduate Diploma in Librarianship who have not completed assignments.)

† Students paying this fee who are not in attendance at the University are not required to pay the Student Activities Fees or the Library Fee.

(d) Diploma in Education.

- (i) Registration Fee \$5
- (ii) Award of Diploma Fee \$7
- (iii) Course Fee—per annum \$330, or \$110 per term.

(e) Miscellaneous Subjects.

Post-graduate subjects taken as "Miscellaneous Subjects" (i.e., not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on the basis of a term's attendance at the rate of \$6 per hour per week. Thus the fee for a subject requiring an attendance of 2 hours per week for the term is \$12 per term.

OTHER FEES

In addition to the course fees set out above, students in categories (a), (b), (c) and (d) are required to pay:—

*Library Fee**—Annual Fee \$12

*Student Activities Fees**—

University Union† — annual subscription	\$12
Sports Association† — annual subscription	\$2
Students' Union† — annual subscription	\$4
Miscellaneous—annual fee	\$10

Total	\$28
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Examinations conducted under special circumstances—\$7 for each subject.

Review of examination result—\$7 for each subject.

* External students are not required to pay these fees.

† Life members of these bodies are exempt from the appropriate fee or fees.

LATE FEES

First Term:

Fees paid from commencement of 3rd week of term to 31st March	\$12
Fees paid after 31st March where accepted with the express approval of the Registrar (see above)	\$23

Second and Third Terms:

Fees paid in 3rd and 4th weeks of term	\$12
Fees paid thereafter	\$23
Late lodgement of application for admission to examinations. (Late applications will be accepted for three weeks only after the prescribed dates)	\$5

Withdrawal:

Students withdrawing from a course are required to notify the Registrar in writing. Fees for the course accrue until a written notification is received.

Where notice of withdrawal from a course is received by the Registrar before the first day of First Term, a refund of all fees paid other than registration fee will be made.

Where a student terminates for acceptable reasons a course of study before half a term has elapsed, one-half of the term's fee may be refunded. Where a student terminates a course of study after half a term has elapsed, no refund may be made in respect of that term's fees.

The Library fee is an annual fee and is not refundable where notice of withdrawal is given after the commencement of First Term. On notice of withdrawal, a partial refund of the Student Activities fees is made on the following basis:—

University Union—\$2 in respect of each half-term.

University of New South Wales Students' Union—\$2 where notice is given prior to the end of the fifth week of First Term.

University of New South Wales Sports Association—where notice is given prior to 30th April, a full refund is made; thereafter no refund.

Miscellaneous—where notice is given prior to 30th April, \$5; thereafter no refund.

RESEARCH DEGREES — FEES

(a) Master of Architecture, Arts, Building, Commerce, Engineering*, Librarianship, Science* or Surveying.

Fees are payable from the commencement date of a candidate's registration and remain payable until the candidate's thesis is presented to the Examinations Branch.

(i) Qualifying Examination	\$12
(ii) Registration Fee	\$5

* Candidates registered under the conditions governing the award of this degree without supervision will pay the following fees:—

Registration fee \$5.

Examination of thesis \$69.

They are not required to pay the Student Activities Fees or the Library Fee.

(iii) Internal Full-time Student Annual Fee	\$69
Internal Full-time Student Term Fee	\$23
(iv) Internal Part-time Student Annual Fee	\$36
Internal Part-time Student Term Fee	\$12
(v) External Student Annual Fee*	\$23
(vi) Final Examination (including Graduation fee)	\$35
(b) Master of Surgery.	
(i) Qualifying Examination	\$12
(ii) Registration Fee	\$12
(iii) Annual Fee	\$69
(iv) Final Examination (including Graduation fee)	\$69
(c) Doctor of Medicine.	
(i) Qualifying Examination	\$12
(ii) Registration Fee	\$12
(iii) Annual Fee	\$69
(iv) Final Examination (including Graduation fee)	\$69
(d) Doctor of Philosophy.	
(i) Qualifying Examination	\$12
(ii) Registration Fee:	\$5
(iii) Annual Fee	\$69
(iv) Final Examination (including Graduation fee)	\$48
(e) Doctor of Science, Doctor of Letters.	
(i) Registration Fee	\$73
(f) Miscellaneous Subjects.	

Post-graduate subjects taken as "Miscellaneous Subjects" (i.e., not for a degree or diploma) or to qualify for registration as a candidate for a higher degree are assessed on the basis of a term's attendance at the rate of \$6 per hour per week. Thus the fee for a subject requiring an attendance of 2 hours per week for the term is \$12 per term.

Research.

(i) One day per week—per annum	\$23
(ii) Two or three days per week—per annum	\$46
(iii) Four or five days per week—per annum	\$69

Other Fees

In addition to the fees set out above, all students in the categories (a) to (d) are required to pay:—

<i>Library Fee</i> — Annual Fee	\$12
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Student Activities Fees—

University Union† — annual subscription	\$12
Sports Association† — annual subscription	\$2
Students' Union† — annual subscription	\$4
Miscellaneous — annual fee	\$10

Total	\$28
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* Students in this category are not required to pay the Student Activities Fees or the Library Fee.

† Life members of these bodies are exempt from the appropriate fee or fees.

Late Fees

Initial Registration—

Fees paid from commencement of sixth week after date
of offer of registration to end of eighth week \$12

Renewal at Commencement of each Academic Year—

Fees paid from commencement of third week of term
to 31st March \$12

Fees paid after 31st March where accepted with the
express approval of the Registrar \$23