FACULTY OF ENGINEERING

1967 HANDBOOK

THE UNIVERSITY OF NEW SOUTH WALES

FACULTY OF ENGINEERING

1967 HANDBOOK

FIFTY CENTS

THE UNIVERSITY OF NEW SOUTH WALES
P.O. Box 1, Kensington, N.S.W.
Phone: 663 0351

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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.

Tuesday 31 ..... Deferred examinations begin.

FEBRUARY—

Saturday 11 ..... Deferred examinations end.

Monday 20 ..... Enrolment Week begins for new First Year students.

Monday 27 ..... Enrolment Week begins for students re-enrolling.

MARCH—

Monday 6 ..... First term lectures begin.

Friday 17 ..... Last day for acceptance of enrolments of new students.

Friday 24 to Monday 27 ..... Easter.

Friday 31 ..... Last day for acceptance of enrolments of students re-enrolling.

APRIL—

Tuesday 25 ..... Anzac Day—Public Holiday.

MAY—

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.

NOVEMBER—

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

DECEMBER—

Saturday	2	Annual Examinations end—30-week courses.

1968

JANUARY—

Tuesday 30 to Sat., Feb. 10 .... Deferred examinations.

FEBRUARY—

Monday	19	Enrolment Week begins for new First Year students.
Monday	26	Enrolment Week begins for students re-enrolling.

MARCH—

Monday	4	First term lectures begin.

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THE FACULTY

SCHOOL OF CIVIL ENGINEERING

The School of Civil Engineering consists of three departments, the Department of Water Engineering, the Department of Structural Engineering and the Department of Surveying. The School conducts undergraduate courses in Civil Engineering and in Surveying, both part time and full time. In addition, the Departments conduct graduate courses in Structural Engineering, Water Engineering, Public Health Engineering and Engineering Construction. A vigorous graduate research programme is pursued in many fields.

The Department of Water Engineering encompasses the fields of Hydraulics, Hydrology, Public Health Engineering, Soil Mechanics and Engineering Construction. Public Health Engineering and Soil Mechanics Laboratories are located at Kensington. The Hydrology research centre is also at Kensington, but a substantial amount of investigation is carried out in the field. The Water Research Laboratory at Manly Vale is the centre for hydraulics laboratory instruction and investigations.

The Department of Structural Engineering covers the fields of Structural Engineering, Materials and Applied Mechanics, and Concrete Technology. The Materials and Concrete Technology laboratories, the Model Structures Laboratory, the Experimental Stress Analysis Laboratory and the Solid Mechanics Laboratory are at Kensington. The Structures Laboratory is at present at Ultimo in the Technical College grounds but during 1967 it will be transferred to King Street, Randwick in the vicinity of the Schools of Highway and Traffic Engineering.

The Department of Surveying has facilities for precise astronomical observation and for surveying computation, also a well-equipped Photogrammetrical Laboratory, all at Kensington. As well as the usual surveying equipment, it possesses modern electronic distance measuring equipment.

SCHOOL OF ELECTRICAL ENGINEERING

The School of Electrical Engineering comprises four departments — Communications, Control Engineering, Electric Power Engineering and Electronic Computation, and a research group, the Solid State Electronics Group.

Each department and group carries out research in its own field and offers lecture and laboratory courses at the undergraduate and post-graduate levels. Subjects of common interest are provided by the School as a whole.

Special laboratories are equipped for work in the areas of Microwaves, Plasmas, Computer Control, Machines and Acoustics. A Measurements Laboratory provides a calibrating service under certificate from the National Association of Testing Authorities, and an I.B.M. 360/50 computer is installed in the School.

SCHOOL OF HIGHWAY ENGINEERING

Postgraduate courses are offered, leading to the Degree of Master of Technology and to a Postgraduate Diploma, in which road location and geometrics, properties of road materials, construction techniques, bridge design and traffic engineering are studied.

The School has well-equipped laboratories for studying the properties of soils, road aggregates, bitumen and cement concrete, and active studies on these subjects are in progress. Members of the school have easy access to a 1620 IBM computer in the same building, and studies are being made of its utilization in all fields of highway engineering.

SCHOOL OF MECHANICAL ENGINEERING

Full-time undergraduate courses are offered in Mechanical and Industrial Engineering leading to the degree of Bachelor of Engineering. Part-time courses, or combined full-time/part-time courses, are offered in Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture, leading to the degree of Bachelor of Science (Technology).

Formal postgraduate courses of study are available, with a wide selection of subjects, leading to the degree of Master of Technology in Mechanical Engineering and there are special Master of Technology courses in Refrigeration and Air Conditioning, and in Industrial Engineering. The Department of Industrial Engineering within the School offers a course leading to a Graduate Diploma.

Research is carried out by members of the staff and by higher degree students, the particular fields of interest being Fluid Mechanics, Heat Transfer and Human Engineering. An Agricultural Engineering section, which is part of the University's Institute of Rural Technology, carries out endowed research within the School.

SCHOOL OF NUCLEAR ENGINEERING

The School of Nuclear Engineering offers a formal graduate course (M. Tech.) and accepts candidates for the ME and PhD degrees. Nuclear Engineering covers neutron and gamma transport theory, the analysis of the nuclear aspects of reactor performance, heat and fluid flow, heat removal processes, thermal stress, steady state thermal performance and design, neutron kinetics, reactor and nuclear power system dynamics, and nuclear power system economics, selection and optimization. Digital computation is fundamental to the study of nuclear reactors, and particular attention is given to the efficiency of numerical techniques and the basic mathematical theory.

Research activities in the School include aspects of neutron transport theory, problems of heat flow and thermal stress associated with variable surface heat transfer, ball flow in a pebble bed reactor, reactor noise analysis and studies of nuclear and thermal random processes in nuclear power reactors.

SCHOOL OF TRAFFIC ENGINEERING

The School of Traffic Engineering is located at Randwick, and is associated with the School of Highway Engineering and the Institute of Highway and Traffic Research.

The establishment of the School followed the endowment of a Chair by the Australian Automobile Association, which had long been concerned with the need for a centre for training traffic engineers and specialists. The School is assisting this object by conducting courses in traffic and transport planning and control, and offering opportunities for research into the technical problems created by the tremendous growth in the use of the motor vehicle on the street and highway system, and also into its impact on other forms of transport and on land use activity.

The teaching philosophy is directed at the fundamental properties of Land Use and Transport, for it is only the joint interaction of the two that gives rise to traffic.

The research activities of the School cover a wide range of transport and traffic phenomena, viz.: traffic flow theory — queueing, traffic stream structure, saturation flow; transportation planning — land use and transport interaction, system parameters, synthetic models for growth, distribution and assignment of desire lines; public enterprise economics; and human factors and road safety. Research in these fields can be undertaken for the ME, MSc, and PhD degrees.

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 postgraduate 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, are also included in this 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 Examinations (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 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,

†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.

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 couse or *second* level short course.

Arts.

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

(b) Course Requirements

Industrial Arts (BSc), Wool Technology (BSc) (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

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 Office 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.

FEES*

COURSE FEES

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, irrespective of any variation from the prescribed hours which may be necessary in conducting the subject.

Fee determination for courses in the Faculty of Engineering 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 Fees (more than 15 hours' attendance per week) — $96 per term. (In those years of Engineering courses which include industrial training, students will complete their formal studies in the third week of third term. In these cases, and in courses where attendance in third term, either at lectures or survey camp, is less than five weeks (e.g., in Bachelor of Surveying degree course), 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 per week attendance) — $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.)

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.

***Fees quoted are current at time of publication. The Council reserves the right to alter them at any time.**

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.

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).†

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 — $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
Fees paid during the 1st and 2nd weeks of term	$10
Fees paid after the commencement of the 3rd week of term with the express approval of the Registrar and Head of the School concerned	$20

*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.

Re-Enrolments

First Term

Failure to attend enrolment centre during enrolment week $5

Fees paid after the commencement of the 3rd week of term to 31st March $10

Fees paid after 31st March where accepted with the express approval of the Registrar $20

Second and Third Terms

Fees paid in 3rd and 4th 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.

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 $2.

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.

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.

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*The enrolment periods for Sydney students are prescribed annually in the leaflets "Enrolment Procedure for New Students" and "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 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 twelve 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 dates 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 ten 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 Examination 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.

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 or 17.001 General Biology, 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 Regulations 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.

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

* 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.

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 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, Stage 5 part-time 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 inquiries 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. The headquarters of the Union is located in the new Union Building, which is adjacent to the circular building near Anzac Parade.

STUDENT ACCOMMODATION

Residential Colleges

Accommodation for students is provided within the complex of the Residential Colleges of the University which comprise 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, NSW, from whom further information is available.

Other Accommodation

Students requiring other than Residential College accommodation may make personal application to the Amenities Service for assistance in obtaining suitable lodgings at recognised boarding houses, private homes, and in serviced and unserviced apartments. To accommodate the needs of the individual student it is essential that a personal interview be arranged with an officer of the Amenities Service.

STUDENT AMENITIES SERVICE

The Student Amenities Service was established to promote the physical, social and educational development of students through their leisure time activities.

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 in the Chancellery, 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, interstate and intrastate 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 ('Phone: 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. This Service is located in the Chancellery on the ground floor.

CHAPLAINCY SERVICE

The 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. Napthali, 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. Monday to Friday, and during term from 6 p.m. to 8 p.m. Tuesdays and Thursday.

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.

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.

LOCATION OF SCHOOLS, LABORATORIES AND ADMINISTRATIVE DIVISION

The Schools and Laboratories of the Faculty of Engineering, the servicing schools and the administrative division are located as follows:

(i) Kensington

The Schools of Civil, Electrical and Mechanical Engineering and the Department of Industrial Engineering: the School of Nuclear Engineering; the servicing Schools of Physics, Architecture, Mathematics, Mining Engineering, Applied Geology, Metallurgy, Chemistry and Biological Sciences; the Department of General Studies, which provides the Humanities and Social Science subjects for engineering students.

In addition to the teaching schools, there are at Kensington the Library, the Examinations Branch, the Admissions Office, the Union, the Students' Union, the Student Amenities Office and the Student Counselling Service.

(ii) Broadway

The Structures Laboratory of the School of Civil Engineering.

(iii) Randwick

The Schools of Highway and Traffic Engineering occupy new buildings on the site of the old Tramway Depot at King Street, Randwick.

(iv) Manly Vale

The Water Research Laboratory of the School of Civil Engineering.

UNDERGRADUATE SCHOLARSHIPS

Students undertaking courses in the Faculty of Engineering 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 publication of the results of the N.S.W. Leaving Certificate Examination. A separate application must be lodged for each category of scholarship.

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 twenty-five 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 twenty-five 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.

University Scholarships

The University annually awards up to fifteen scholarships tenable in degree courses to students who have matriculated at the Leaving Certificate Examination; ten scholarships to students who have completed certificate courses (Department of Technical Education); ten scholarships to students who have completed Trade Courses (Depart-

ment of Technical Education); and ten 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.

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.

Joint Coal Board and Australian Coal Industry Research Laboratories Limited Scholarships

The Joint Coal Board and the Australian Coal Industry Research Laboratories Limited each offer scholarships in full-time courses in Mechanical Engineering, Electrical Engineering, Mining Engineering, Fuel 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 are awarded on the understanding that students 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.

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/- the Metal Trades Employers' Association, 101 Walker Street, North Sydney.

The A. E. Goodwin Memorial Scholarship

The Directors of A. E. Goodwin Ltd. provide a scholarship each year to students who are eligible to enrol in the second year of the Mechanical Engineering degree course. The total value of the scholar-

ship is $360, payable in three equal amounts of $120 each at the beginning of the second, third and fourth years of the course. Applications should be lodged with the Registrar by 31st January each year.

The Tyree Electrical Company Scholarship in Electrical Engineering

The Tyree Electrical Company Pty. Ltd., has undertaken to provide two scholarships for students enrolling in the full-time courses in Electrical Engineering. The value of the scholarships is $500 per annum, payable in fortnightly instalments as a living allowance to students. They will normally be tenable for four years but may be extended to a fifth year when the holder intends to qualify for the two degrees, Bachelor of Science and Bachelor of Engineering. They may be held concurrently with any other scholarship.

Mining and Metallurgical Bursaries Fund

Mining and Metallurgical Bursaries at the University of New South Wales, valued at $100 per annum, will be awarded by the Trustees of the Mining and Metallurgical Bursaries Fund, Melbourne. Candidates must be British subjects and have completed the first year of the course for the degree of Bachelor of Engineering in Mining Engineering, Bachelor of Science in Applied Geology, or Bachelor of Science in Metallurgy, or have been awarded corresponding status in consideration of work done elsewhere.

ENGINEERING COURSES

The Faculty of Engineering consists of the Schools of Civil Engineering, including the Department of Surveying, of Electrical Engineering, and Mechanical Engineering with its associated Department of Industrial Engineering, and the Schools of Highway Engineering, Nuclear Engineering, and Traffic Engineering, the three last named Schools offering graduate courses only. The Schools of Civil, Electrical and Mechanical Engineering offer full-time courses leading to the degrees of Bachelor of Engineering or Bachelor of Surveying, and part-time courses leading to the degrees of Bachelor of Science (Technology) or Bachelor of Surveying.

All the post-graduate activities of the Faculty are co-ordinated under the Graduate School of Engineering. For full details of such activities please see the Graduate School of Engineering Handbook.

Common First Year

There is a common first year syllabus in Physics, Mathematics, Chemistry and Engineering for all courses in the Faculty, except Surveying, where Surveying I is substituted for Chemistry. This arrangement allows for a high degree of transferability. 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 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 on page 34.

FULL-TIME COURSES

Full-time courses of four-years' duration are offered in Civil, Electrical, Mechanical and Industrial Engineering leading to the degree of Bachelor of Engineering. A four-year full-time course in Surveying is offered by the School of Civil Engineering leading to the degree of Bachelor of Surveying.

The award of the degree of Bachelor of Engineering is recognized by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Associate Member. Exemptions given by other Engineering Institutions are shown under the headings of the various Schools.

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 in 26.501 English or 26.571 An Introduction to Modern Drama, two 30-hour electives and an advanced elective, to be chosen 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.

Conditions for award of degrees of B.Sc. and B.E.

Subject to their being recommended by the Dean of the Faculty of Engineering and accepted by the Dean of the Faculty of Science, students in the Electrical Engineering full-time courses may qualify for the two degrees of B.Sc. and B.E. by completing a course of five years of full-time study in accordance with the following provisions:

A student shall have attended the prescribed course of study and satisfied the examiners in

(i) the first year of the course of the Faculty of Engineering;

(ii) the second year of the courses for the degree of Bachelor of Engineering in Electrical Engineering.

(iii) two Group III Science subjects, together with the appropriate General Studies programme (see Science Course Regulations set out in the University Calendar).

(iv) the third and fourth years of the courses for the degree of Bachelor of Engineering in Electrical Engineering.

The degree of B.Sc. may be awarded on the completion of the requirements of (i), (ii) and (iii) above.

Industrial Training Requirements

All full-time engineering courses incorporate periods of compulsory industrial training. In all of these courses, except Electrical Engineering, the periods occupy the long vacations between second and third and third and fourth years. In Electrical Engineering students must complete up to twenty weeks of industrial training during the long vacations, preferably by completing ten weeks at the end of second year and ten weeks at the end of third year. Surveying students attend survey camp for two weeks in their second and third years. Students are strongly recommended to gain further industrial experience in those long vacations where such training is not already prescribed.

The staff of the University will, where possible, assist students to obtain this employment, but it is emphasized that the primary responsibility for obtaining suitable industrial experience rests with

each student. Progression to succeding years of the course and the award of the degree are dependent on the completion of the requisite periods of industrial employment of a standard approved by the University.

PART-TIME COURSES

Since 1961 the Schools of the Faculty have offered six-year part-time courses in a variety of engineering fields leading to the degree of Bachelor of Science (Technology). Courses for this degree are offered in Civil, Electrical, Industrial and Mechanical Engineering and in Naval Architecture and Aeronautical Engineering (these last two being offered by the School of Mechanical Engineering).

The General Studies programme is the same for part-time as for full-time students, except that part-time students do not do an Advanced Elective.

The award of the degree of B.Sc. (Tech.) is recognised by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Associate Member.

Recognition by other Engineering Institutions is shown under the headings of the various Schools.

These courses replace the courses which the University offered from 1951 to 1965 on behalf of the Department of Technical Education leading to its A.S.T.C. diploma award. They also replace the associated part-time degree courses in Engineering which have led to the degree of Bachelor of Engineering.

A student completing the B.Sc. (Tech.) degree course and wishing to qualify for the corresponding B.E. degree may, on the recommendation of the Head of the School, transfer to the corresponding full-time B.E. course provided he does not take out the B.Sc. (Tech.) degree. Further, provided he continues as a registered student on transfer from one course to the other, he may retain any concession granted in the B.Sc. (Tech.) degree course.

Holders of the B.Sc. (Tech.) degree are eligible to proceed to the degree of Master of Engineering or Master of Technology subject to the conditions for the award of these degrees set out in Section C of the University Calendar.

Courses leading to the B.Sc. (Tech.) award are basically part-time and require the prescribed industrial experience to be gained concurrently with the course of study (a minimum of three years of

suitable engineering experience is required). Students transferring from full-time courses must, therefore, also satisfy these industrial experience requirements before being admitted to the degree of B.Sc. (Tech.).

For students who are able to combine some full-time attendance with part-time attendance, the B.Sc. (Tech.) courses are offered over five years, requiring full-time attendance in the third and fourth years.

The School of Civil Engineering offers a part-time course in Surveying of seven years' duration for the degree of Bachelor of Surveying.

FACULTY OF APPLIED SCIENCE

The Faculty of Applied Science offers courses to students desiring a career in a specialised technology with an engineering element. These courses are as follows:

	Full-time	*Part-time*
Chemical Engineering	B.E.	B.Sc. (Tech.)
Ceramic Engineering	B.Sc.	,,
Fuel Engineering	B.E.	,,
Metallurgy*	B.Sc.	,,
Mining Engineering†	B.E.	—
Textile Engineering	B.Sc.	—

Entrance to these courses, which are of four years' duration full-time (pass or honours) and six years' duration part-time, is conditional upon Engineering I being taken as the elective subject in the common first year and on transference to the Faculty of Applied Science before second year. Full-time Engineering students may enter the Mining Engineering course after the second year of courses in Mechanical, Electrical or Civil Engineering without loss in standing of subjects completed.

Part-time engineering students may enter the courses offered by the Schools of Chemical Engineering, Chemical Technology and Metallurgy after the second stage part-time or the common full-time first year. They may enter the Mining Engineering course after the fourth stage. In all cases the requirements for the degree of B.Sc. (Tech.) demand three years approved concurrent industrial training.

The degrees of B.E. (pass or honours) in Chemical Engineering and Mining Engineering are recognised by the Institution of Engineers of Australia for exemption from the Associate Membership examinations.

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*A part-time course is also available at Wollongong.
†Part-time courses are available only at Wollongong and Broken Hill.

Ceramic Engineering

Ceramics are inorganic, non-metallic materials which usually require the use of high temperatures in their processing. Products of the industry include glass, refractories, bricks, tiles, pipes, abrasives, cement, plaster, nuclear ceramics, whitewares, enamels and electric insulators, dielectrics and magnetic materials. The ceramic engineer is concerned with the relationship between the atomic and crystal structure of materials and their chemical, physical and engineering properties, as well as the methods of their manufacture and fabrication into useful shapes.

Graduates in Ceramic Engineering take positions in the fields of research and development, production control, product evaluation and technical service.

Chemical Engineering

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

The Department of Fuel Technology, the first of its kind in Australia, was established to meet the growing need of industrial and research establishments for personnel with specialized training in the science and technology of fuels and their utilisation.

A degree in Fuel Engineering qualifies for exemption from the examinations for admission to corporate membership of the Institute of Fuel.

Metallurgy

Metallurgy deals with the nature, production, properties and uses of metals. Its special importance today is associated with the demands for better materials for aircraft, rockets, nuclear reactors and the like.

The School of Metallurgy is located at Kensington, and also has a department in Wollongong. It has excellent facilities for teaching and research. Emphasis in these courses is on the application of science to technological problems and in this respect there is a close relationship between metallurgy and engineering.

Information on the Metallurgy courses and on opportunities for post-graduate work for engineering graduates in the School of Metallurgy may be obtained from the University Calendar, or from Professor Hugh Muir at the School of Metallurgy.

Mining Engineering

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.

During the undergraduate course, students will spend portion of the long vacations obtaining practical experience in mining. Mining companies prepare programmes so that the students obtain a comprehensive experience in many aspects of the profession. This experience is important and it is related to the academic training received in the School. Practical experience in mining, gained as a student, can contribute to the experience record of mining engineers when making application for a statutory certificate of competency from one of the Australian State Government Departments of Mines.

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

Textile Engineering

The textile industry, being a manufacturing one, depends on many types of machinery and engineering services to produce its products. In order to cope with technological problems in production, quality control and research, a competent textile engineer must have a good understanding of the fundamental sciences and extensive theoretical and practical knowledge of the applied textile and engineering sciences.

There are many challenging and lucrative positions for textile engineers in industry and research.

HIGHER DEGREES AND GRADUATE COURSES

Research Degrees

The higher degrees of Master of Engineering, Master of Surveying, and of Doctor of Philosophy are awarded on the presentation of a thesis, satisfactory to the examiners, which embodies the results of an original investigation or design. Candidates for these degrees must possess a bachelor's degree in an appropriate field and meet the conditions governing the award of these degrees. The full conditions are set out in the University Calendar and in the Handbook of the Graduate School of Engineering.

The degree of Doctor of Science is also awarded for a contribution of distinguished merit in the field of engineering.

Courses of Study for Graduate Awards

In addition to the research degrees listed above, the Faculty offers courses of instruction at the graduate level leading to the award of the degree of Master of Technology or a graduate diploma.

Courses for the Degree of Master of Technology

Structural Engineering, Water Engineering, Public Health Engineering, Engineering Construction, Surveying (offered by the School of Civil Engineering); Electrical Engineering; Transportation and Traffic Engineering; Highway Engineering; Nuclear Engineering; Refrigeration and Air Conditioning, and Industrial Engineering (offered by the School of Mechanical Engineering).

Courses for Graduate Diplomas

Highway Engineering and Industrial Engineering.

Full details of all these courses are given in the section on post-graduate study in the University Calendar, in the Handbooks of the appropriate Schools, and in the Handbook of the Graduate School of Engineering.

Special Courses

Short, intensive graduate and special courses are provided throughout each year designed to keep practising engineers in touch with the latest developments in their various fields. The programmes of such courses for 1967 are published separately.

OUTLINES OF UNDERGRADUATE COURSES

SCHOOL OF CIVIL ENGINEERING

Civil engineering is broad in its scope, utilizing other specialized branches of engineering in planning, co-ordinating and constructing national works such as water supply and conservation projects, hydro-electric development, roads, railways, bridges, tunnels, large buildings, and irrigation, sewerage and harbour and river development. The civil engineer adapts the forces of nature for the use and convenience of mankind. His academic training must include a study of science and of engineering practice. He must combine this with experience and judgment and the knowledge and personality necessary to control large organisations of workers. This profession offers to a young man a considerable variety of types of work, ranging from specialized research and investigations, through routine design and construction work to higher positions which are often largely managerial and organizational in their nature.

The School of Civil Engineering offers two courses in civil engineering; a four-year full-time course leading to the degree of Bachelor of Engineering, and a six-year part-time course leading to the degree of Bachelor of Science (Technology) — B.Sc. (Tech.). This course may also be completed in three years of part-time study and two years of full-time study. Details of courses leading to the Bachelor of Surveying degree are set out below under the heading "Department of Surveying".

The full-time Civil Engineering course is being revised in stages. The first stage is the intoduction of a revised Second Year programme in 1967. The length of the Second Year programme has been extended from 24 to 30 weeks, and a new pattern of subjects introduced. When the new Third Year is introduced in 1968 the length of that programme will be reduced from 24 to 21 weeks. A further change in 1967 is the modification of the Fourth Year programme. All students will follow the same 30 week programme whereas previously there was a 24 week pass programme, and a 30 week programme for students aiming for Honours. All students will now be considered for the award of Honours, which will be granted for meritorious performance in all years of the course with particular emphasis on the latter years.

CIVIL ENGINEERING—FULL-TIME COURSE

FIRST YEAR

(30 weeks day course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12 —12

SECOND YEAR

(30 weeks day course)

		Hours per week for 3 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
8.261	Geotechnics*	2 — 1
8.441	Engineering Surveying†	1½— 1½
8.621	Engineering Construction	2 — 0
10.022	Mathematics	3 — 1
26.501 / 26.571	English *or* An Introduction to Modern Drama	1 — ½
		16½—10½

THIRD YEAR‡

(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.501S	Fluid Mechanics	1 — 1½
6.801S	Electrical Engineering	1½— 2½
8.122S	Structures	3 — 3
8.221S	Engineering Materials	3½— 2½
8.423S	Engineering Surveying†	1½— 1½
8.611S	Civil Engineering	2½— 0
	Two 30-hour General Studies Electives**	3 — 0
		15½—10½

* A total of 2½ hrs./week only in Term III.
† A one-week Survey Camp must be attended in Term III.
‡ Lectures cease at end of 3rd week of third term.
** Terms 1 and 2 only.

FOURTH YEAR
(30 weeks day course)

		Hours per week Terms I & II lec. lab./tut.	Term III lec. lab./tut.
8.132	Structures	2 — 3	1½— 1½
8.142	Engineering Analysis	1½— 1½	1 — 1
8.223	Engineering Materials	3 — 2½	1½— 1½
8.522	Hydraulics	1½— 1½	1½— 1½
8.613	Civil Engineering	5 — 0	0 — 0
8.011	Thesis	0 — 3	0 —15
	General Studies, Advanced Elective	3 — 0	0 — 0
		16—11½	5½—20½

CIVIL ENGINEERING—PART-TIME COURSE

FIRST STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
2.001	Chemistry I	2 — 4
10.001	Mathematics I	4 — 2
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
		6 — 6

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.212	Physics II(T)	1½— 1½
5.301	Engineering Mechanics	1½— ½
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics II, Part I	1 — 1
26.501	English	1 — ½
		6½— 5½

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
5.501	Fluid Mechanics	1 — 1
5.701	Thermodynamics	1 — 1
8.121	Structures	1½— 1½
8.421	Engineering Surveying*	1 — 0
25.531	Geology†	1½— ½
26.501/2	English	1 — 0
		7 — 4

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
6.801	Electrical Engineering	1½— 1½
8.221	Engineering Materials	3 — 2
8.422	Engineering Surveying*	1 — ½
8.521	Hydraulics	1 — 1
	One 30-hour General Studies Elective	1 — 0
		7½— 5

* Saturday fieldwork additional. Also, a one-week survey camp must be attended in sixth week of third term.

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

SIXTH STAGE

(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
8.131	Structures	2 — 2
8.141	Engineering Computations	1 — 0
8.222	Engineering Materials	1 — 1
8.611	Civil Engineering	2 — 0
8.612	Civil Engineering	2 — 0
	One 30-hour General Studies Elective	1 — 0
		9 — 3

CIVIL ENGINEERING — CONVERSION COURSE

(A.S.T.C. Diploma to B.Sc. (Tech.) Degree)

Recent A.S.T.C. diploma holders in Civil Engineering may qualify for the degree of Bachelor of Science (Technology) by completing the following course of study. The programme outlined is that required of recent diplomates. Diplomates of many years standing may be required to take additional subjects.

FIRST STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part 2	1½— 1½
2.001/2	Chemistry I, Part 2	1½— 1½
5.301	Engineering Mechanics	1¼— ¾
10.022/2	Mathematics	1½— ½
	One 30-hour General Studies Elective	1 — 0
		6¾— 4¼

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II(T)	1½— 1½
8.131	Structures	2 — 2
8.141	Engineering Computations	1 — 0
8.222	Engineering Materials (Soil Mechanics)*	2 — 0
8.521	Hydraulics	1 — 1
		7½— 4½

* First term only.

DEPARTMENT OF SURVEYING

The Department of Surveying offers a four-year full-time course and a seven-year part-time course, both leading to the degree of Bachelor of Surveying.

Surveying is broad in its scope. The academic training is first in the basic sciences of mathematics, physics and geology; a number of engineering subjects are studied; then surveying and its various branches, geodesy, astronomy and photogrammetry; and their application in trigonometric, engineering, cartographic and cadastral work. There is a correspondingly wide choice of types of surveying open to the graduate in surveying.

Surveying involves taking measurements in the field, and the course includes practical classes in which the theory studied in lectures is applied to actual surveys and acquaintance is made with surveying instruments. Survey camp must be attended for two weeks at the end of the second and third years of the course. In addition, students must gain practical experience under a surveyor for at least twenty-four weeks during vacations, preferably for eight weeks after the second year and for sixteen weeks after the third year.

For those wishing to become Registered Surveyors after graduation the degree confers exemption from all written examinations of the Board of Surveyors. Additional time must, however, be served under a Registered Surveyor, some exemption from this time being obtainable in respect of vacation experience, provided the Board gives prior recognition. For further information consult the Registrar of the Board.

SURVEYING—FULL-TIME COURSE

Bachelor of Surveying

FIRST YEAR

(30 weeks day course)

		Hours per week for 3 terms lec. tut., etc.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
8.801	Surveying I	2 — 4
10.001	Mathematics I	4 — 2
		12 —12

SECOND YEAR

(30 weeks day course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II(T)	2 — 2
8.711	Engineering for Surveyors	2½— ½
8.802	Surveying II*	3 — 2½
8.841	Surveying Computations	1 — ½
10.022	Mathematics	3 — 2
10.361	Statistics	1½— 0
25.531	Geology†	1½— ½
26.501	English *or*	1 — ½
26.571	An Introduction to Modern Drama	
		15½— 8½

THIRD YEAR**

(21 weeks day course)

		Hours per week for 21 weeks lec. tut., etc.
8.712S	Engineering for Surveyors	2 — 0
8.803S	Surveying III*	2 — 1½
8.821S	Geodesy*	2½— 2
8.831S	Astronomy	2 — 1
8.842S	Surveying Computations	1½— 1
8.851S	Photogrammetry	2 — 1½
8.881S	Land Law, Valuation and Utilization†	3½— 0
	Two 30-hour General Studies Electives	3 — 0
		18½— 7

* A two-week survey camp must be attended as part of this subject.

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

** Terms 1 and 2 only.

FOURTH YEAR
(30 weeks day course)

		Hours per week for 3 terms lec. tut., etc.
6.811	Electronic Instrumentation for Surveyors	1 — 0
8.822	Geodesy	2 — 1½
8.832	Astronomy	1½— 1
8.852	Photogrammetry	1 — 3½
8.882	Cadastral Surveying	1½— ½
11.411	Town Planning*	1 — 1
25.533	Geophysics†	2 — 0
8.081	Thesis	3 — 0
	General Studies, Advanced Elective	2 — 0
		15 — 7½

SURVEYING—PART-TIME COURSE
Bachelor of Surveying

FIRST STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
8.801	Surveying I	3 — 3
10.001	Mathematics I	4 — 2
		7 — 5

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
		6 — 6

* Lectures cease at end of Second Term.

† During Term III there will be only one hour of lectures per week. A one-day Geophysical excursion is an essential part of the subject.

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II (T)	2 — 2
8.711	Engineering for Surveyors	2½— ½
8.841	Surveying Computations	1 — ½
10.022/1	Mathematics II, Part I	1½— 1
26.501	English	1 — ½
		8 — 4½

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
8.802	Surveying II*	3 — 2½
10.022/2	Mathematics II, Part II	1½— 1
10.361	Statistics	1½— 0
25.531	Geology†	1½— ½
26.501/2	English	1 — 0
	One 30-hour General Studies Elective	1 — 0
		9½— 4½

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
8.712	Engineering	1½— 0
8.803	Surveying III**	1½— 1
8.831	Astronomy	1½— ½
8.842	Surveying Computations	1 — ½
8.881	Land Law, Valuation and Utilization†	2½— 0
	One 30-hour General Studies Elective	1 — 0
		9 — 2

* Students must attend a two-week survey camp.
† Two one-day excursions are an essential part of the course.
** A one-week survey camp must be attended as part of this subject.

SIXTH STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
6.811	Electronic Instrumentation for Surveyors ..	1 — 0
8.821	Geodesy*	1½— 1½
8.851	Photogrammetry	1½— 1
8.882	Cadastral Surveying	1½— ½
25.533	Geophysics†	2 — 0
	General Studies Advanced Elective	2 — 0
		9½— 3

SEVENTH STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
8.822	Geodesy	2 — 1½
8.832	Astronomy	1½— 1
8.852	Photogrammetry	1 — 3½
11.411	Town Planning**	1 — 1
		5½— 7

SCHOOL OF ELECTRICAL ENGINEERING

In preparation for a career in any branch of electrical engineering students must acquire a knowledge of the basic sciences of mathematics and physics. Students should realize that electrical engineering, perhaps more than most other branches of engineering, is closely linked with the pure sciences, and requires a scientific outlook and approach for a proper understanding of its problems.

The School offers a full-time course of four years' duration leading to the degree of Bachelor of Engineering (pass or honours), and a six-year part-time course for the degree of Bachelor of Science (Technology). This course may also be completed in three years of part-time and two years of full-time study. Special conversion courses are provided for holders of the A.S.T.C. diploma in Electrical or Radio Engineering.

The degrees of Bachelor of Engineering and Bachelor of Science (Technology) are recognized by the Institution of Electrical Engineers, England, as giving complete exemption from the examinations required for admission to the grade of Associate Member.

* A one-week survey camp must be attended as part of this subject.
† A one-day Geophysical excursion is an essential part of this subject.
** 20 weeks only. Lectures cease at end of Term II.

In the early years of the electrical engineering courses students will concentrate on the basic sciences, mathematics, physics and chemistry, and, as well, will receive an introduction to engineering. In the final year students will elect, with the approval of the Head of the School, to study in one of the specialized fields of electrical engineering (referred to as options), at the same time taking the common subjects in electrical engineering.

The elective electrical options are the following:

(a) Power and control systems and apparatus — concerned with the generation, distribution and control of electrical energy, and

(b) Communications — concerned with radio line communications, radar and other navigational aids, and television.

Each student in the full-time course is required to work on a project under the guidance of members of the lecturing staff. Generally, the project will involve the design and construction of experimental apparatus together with laboratory tests. Where possible the projects will be related to the research programme of the School and will be designed to develop the student's initiative. Each student will be required to deliver a seminar paper and to prepare a thesis based on the results of the project work.

Provision is made in the full-time course for students to undertake additional work in their third and fourth years towards the award of an honours degree.

ELECTRICAL ENGINEERING—FULL-TIME COURSE

The full-time course is of four years' duration and leads to the degree of Bachelor of Engineering (pass or honours). The four years of the course each require full-time day attendance at the University for thirty weeks. Practical experience in industry is to be obtained up to a total of 20 weeks, preferably at the end of the second and third years for a period of 10 weeks per year.

FIRST YEAR
(30 weeks day course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12—12

SECOND YEAR*
(30 weeks day course)

		Hours per week for 3 Terms lec. lab./tut.
1.112	Physics	4 — 4
4.921	Materials Science	1 — ½
5.301	Engineering Mechanics	1 — 1
5.701	Thermodynamics	1 — 1
6.101	Electric Circuit Theory	1 — 2
8.112	Materials and Structures	1½— 1½
10.111	Pure Mathematics II	3 — 2
26.501 / 26.571	English *or* An Introduction to Modern Drama	1 — ½
		13½—12½

THIRD YEAR—PASS COURSE
(30 weeks day course)

		Hours per week for 30 weeks lec. lab./tut.
6.064	Introduction to Computer Science	1½— ½
5.501 / 10.351	Fluid Mechanics *or* Statistics	1 — 1 / 1 — ½
6.102	Electric Circuit Theory	3 — 3
6.201	Electric Power Engineering	2 — 3
6.301	Electronics	3 — 3
10.033	Mathematics†	2 — 0
	Two 30-hour General Studies Electives**	3 — 0
		15½—10½

FOURTH YEAR**—PASS COURSE
(30 weeks day course)

		Hours per week for 21 weeks lec. lab./tut.
6.001S	Electrical Engineering	4 — 1½
6.322S	Electronics	2 — 3
6.911	Thesis‡	0 — 2
	Advanced Elective, General Studies	3 — 0
	Plus one of the following options:—	

* This year also meets the requirements of the Second Year of the Science course for the degree of Bachelor of Science.
† Students who have taken the subjects Physics III and Mathematics III in the Science Course are exempt from this subject.
** Terms 1 and 2 (21 weeks) only.
‡ Full-time in Third Term.

Option I—		
	Power and Control Apparatus and Systems—	
6.202S	Power Systems	2 — 2
6.212S	Electrical Machines	2 — 2
6.401S	Control Systems	2 — 2
	or	
Option II—		
	Communications—	
6.302S	Communications	2 — 2
6.312S	Communications	2 — 2
6.332S	Communications	2 — 2
		15 —12½

Optional Subjects

Students in doubt concerning optional subjects in the third and fourth years should consult the Head of the School.

Third Term of Fourth Year

In the fourth year the formal lecture work extends over twenty-one weeks (the first two terms). This is followed by a study vacation of three weeks and examinations are held during the first three weeks of the third term. The balance of this term is mainly devoted to directed laboratory and research work on an approved subject, with special reading and study associated with the preparation of a thesis; seminar work is also carried out. The thesis must be submitted by 5th December.

Additional for Honours

A full-time honours course in electrical engineering is offered, involving additional work in third and fourth years. Candidates for honours must obtain the permission of the Head of the School to enter the course.

Candidates for honours will complete the syllabus for the third and fourth years of the pass course as outlined above with the addition of:

Third Year

6.501 Electrical Engineering Honours—two hours of lectures per week for thirty weeks.

Fourth Year

6.502S Electrical Engineering Honours—three hours of lectures per week for twenty-one weeks.

6.921 Honours Thesis—two hours per week for twenty-one weeks; then full-time in third term.

DOUBLE DEGREE OF B.SC., B.E. IN ELECTRICAL ENGINEERING

Full-time students in Electrical Engineering may qualify for the double degree of Bachelor of Science, Bachelor of Engineering in five years of full-time study. Having completed first and second years of the Electrical Engineering course students will take a special third year consisting of two Group III Science subjects (see the Science course regulations in the University Calendar) plus two 30-hour General Studies Electives. In their fourth year students in the combined course will take the normal third year of the Electrical Engineering course, less the Humanities subjects taken in the special third year. In their fifth year they will complete the normal fourth year of the Electrical Engineering course.

Approval to enrol in the double degree course is granted on the recommendation of the Head of the School and requires the approval of the Dean of the Faculty of Engineering and the Dean of the Faculty of Science.

ELECTRICAL ENGINEERING—PART-TIME COURSE

The six-year part-time course in Electrical Engineering leads to the degree of Bachelor of Science (Technology).

FIRST STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
2.001	Chemistry I	2 — 4
10.001	Mathematics I	4 — 2
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
		6 — 6

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.112/1	Physics II, Part I	2 — 2
4.921	Materials Science	1 — ½
6.101	**Electric Circuit Theory**	1 — 2
10.111/1	Pure Mathematics II, Part I	2 — ½
26.501	English	1 — ½
		7 — 5½

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.112/2	Physics II, Part II	2 — 2
6.152	Electric Circuit Theory	2 — 2
6.356	Electronics	1½— ½
10.111/2	Pure Mathematics II, Part II	2 — ½
26.501/2	English	1 — 0
		8½— 5

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.301	Engineering Mechanics	1½— ½
6.251	Electric Power Engineering	1½— 2
6.357	Electronics	1½— 2
8.112	Materials and Structures	1 — 2
	One 30-hour General Studies Elective	1 — 0
		6½— 6½

SIXTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.701	Thermodynamics	2 — 0
6.052	Electrical Engineering	1 — 0
	One 30-hour General Studies Elective	1 — 0

Plus one of the following options:—

Option I—		
	Power and Control—	
6.262	Electrical Machines	2 — 2
6.454	Power and Control Systems	2 — 2
Option II—		
	Communications—	
6.352	Communications	1½— 2½
6.362	Communications	1½— 2½
		8/7—4/5

ELECTRICAL ENGINEERING—
COMBINED FULL-TIME/PART-TIME COURSE

The Electrical Engineering course leading to the degree of Bachelor of Science (Technology) may be completed in three years of part-time study and two years of full-time study as follows:

Stage 1 —Part-time (as for the Stage 1 of the B.Sc. (Tech.) course in Electrical Engineering).

Stage 2 —Part-time (as for Stage 2 of the B.Sc. (Tech.) course in Electrical Engineering).

Stage 3A—Full-time (as for Second Year of the full-time course in Electrical Engineering).

Stage 4A—Full-time (as for Third Year of the full-time course in Electrical Engineering).

Stage 5A—Part-time (as set out below).

STAGE 5A

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
6.052	Electrical Engineering	1 — 0
	Plus one of the following options:—	
Option I—		
	Power and Control—	
6.262	Electrical Machines	2 — 2
6.454	Power and Control Systems	2 — 2

Option II—

Communications—

6.352	Communications	1½— 2½
6.362	Communications	1½— 2½
		5/4—4/5

CONVERSION COURSES — ELECTRICAL ENGINEERING

(From A.S.T.C. Diploma to B.E. or B.Sc. (Tech.) Degrees)

The programmes of study to be followed by A.S.T.C. diplomates from the School of Electrical Engineering who wish to qualify for the degree of Bachelor of Engineering or Bachelor of Science (Technology) depend on the content of the courses which have been completed for the diploma.

The subjects required to complete the degree may be obtained on application in writing to the Head of the School of Electrical Engineering.

Additional for Honours

Conversion students who wish to be considered for the degree of Bachelor of Engineering with honours will be required to do additional work as outlined for full-time students. A credit or honours diploma is the normal pre-requisite for entrance to the honours course and students who wish to study for honours should apply to the Head of the School at least two years before they expect to complete the course.

SCHOOL OF MECHANICAL ENGINEERING

The courses in this School are planned to provide the appropriate academic training for the professional engineer in the fields of aeronautical, industrial and mechanical engineering, and for the naval architect.

In the early years of all these courses the emphasis is placed on the study of the basic sciences — mathematics, physics and chemistry. This is followed by the study of the engineering sciences — thermodynamics, fluid mechanics, theory of machines, materials and structures, and their application in the field of design. In the courses in industrial engineering, the more advanced sections of thermodynamics and fluid mechanics are replaced by industrial engineering subjects. General Studies subjects form a regular part of all courses, four being included in full-time and three in part-time courses.

Industrial experience is an integral part of the full-time course. Students must complete two periods of approved industrial training, one period in an engineering workshop between the second and third years and the other, between third and fourth years, in a drawing office or assisting a professional engineer.

Each student is required to prepare a short paper and deliver it in the seminar period, and each full-time student is also required to present a thesis at the end of his final year.

The full-time courses in mechanical and industrial engineering of four years' duration lead to the degree of Bachelor of Engineering.

Part-time courses of six years' duration leading to the degree of Bachelor of Science (Technology) are offered in mechanical engineering, aeronautical engineering, industrial engineering and naval architecture. The part-time courses may also be completed by a combination of three years of part-time and two years of full-time study.

Within the School of Mechanical Engineering a student who has successfully completed the first two stages of any of the Bachelor of Science (Technology) courses mentioned above may transfer to second year of the full-time mechanical or industrial engineering B.E. courses.

Recent A.S.T.C. diplomates may convert to the degrees of Bachelor of Engineering or Bachelor of Science (Technology) by courses of full-time or part-time study respectively.

The award of the degree B.E. or B.Sc. (Tech.) in Mechanical Engineering is recognized by the Institution of Mechanical Engineers, London, as giving exemption from Parts I and II of the examinations required for admission to the grade of Associate Member.

The Institution of Engineers, Australia, grants full exemption from examinations for admission to the grade of Associate Member to holders of the degree of B.E. or B.Sc. (Tech.) in any of the undergraduate courses offered by the School.

A major revision of syllabi is in progress in the School of Mechanical Engineering. The most important effect of this for 1967 is the introduction of revised Second and Fourth Year Courses of 30 weeks' duration for full-time students. A Third Year Course of 21 weeks' duration will be introduced in 1968.

Further, due to a recent change of School policy, honours are in future to be awarded on the basis of a student's performance throughout his four years' course for Bachelor of Engineering. Prior to this year, extra work was required of an Honours student in his Third and Fourth years of study.

MECHANICAL ENGINEERING — FULL-TIME COURSE

FIRST YEAR

(30 weeks day course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12 —12

SECOND YEAR

(30 weeks day course)

		Hours per week		
		Term I lec. lab./tut.	Term II lec. lab./tut.	Term III lec. lab./tut.
5.061	Technical Orientation	1 — 0	1 — 0	1 — 0
5.111	Mechanical Engineering Design	4 — 0	2 — 2	1 — 3
5.311	Mechanics	1½— 1	1½— 1	1½— 1
5.611	Fluid Mechanics/ Thermodynamics	2 — 2½	2 — 2½	2 — 2½
6.801	Electrical Engineering	1 — 2	1 — 2	1 — 2
8.151	Mechanics of Solids	2 — 1	2 — 1	2 — 1
8.251	Properties of Materials	1½— 1½	1½— 1½	1½— 1½
10.022	Mathematics	2½— 1½	2½— 1½	2½— 1½
26.501 or 26.571	English *or* An Introduction to Modern Drama	1 — ½	1 — ½	1 — ½
		16½—10	14½—12	13½—13

THIRD YEAR*

(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.101S	Mechanical Engineering Design	0 — 5
5.204S	Mechanical Technology	2 — 0
5.302S	Theory of Machines	1¾— 1¼
5.401S	Numerical Methods	1 — ½
5.402S	Mechanics of Solids	1½— 1½
5.502S	Fluid Mechanics	1½— 1½
5.702S	Thermodynamics	1 — 2
6.801S	Electrical Engineering	1½— 2½
	Two 30-hour General Studies Electives†	3 — 0
		13 —14½

FOURTH YEAR

(30 weeks day course)

		Hours per week Terms I & II lec. lab./tut.	Term III lec. lab./tut.
5.103	Mechanical Engineering Design	0 — 3	0 — 3
5.323S	Automatic Control	2 — 1	—
5.306S	Theory of Machines	1½— 1½	—
5.504	Fluid Mechanics	1 — 1	1 — 1
5.704	Thermodynamics	1 — 1	1 — 1
6.802S	Electrical Engineering	1½— 1½	—
10.371 / 18.121	Statistics *or* Engineering Administration	1 — 1 2 — 0	1 — 1 2 — 0
5.021S	Seminar	0 — 1½	0 — 1½
5.051	Thesis	0 — 4	0 —15
	General Studies, Advanced Elective†	3 — 0	—
		11 —15½	3 —22½

* Lectures cease at the end of the 3rd week of third term. This year is being reviewed by Faculty, and it is anticipated that new subjects will be offered in 1968 and thereafter.

† Terms 1 and 2 only.

MECHANICAL ENGINEERING — PART-TIME COURSE

This course is of six years' duration, and leads to the degree of Bachelor of Science (Technology).

FIRST STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
2.001	Chemistry I	2 — 4
10.001	Mathematics I	4 — 2
		6 — 6

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
		6 — 6

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II	1½— 1½
5.201	Mechanical Technology	1 — 0
5.301	Engineering Mechanics	1½— ½
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics	1½— ½
26.501	English	1 — ½
		7½— 4½

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
4.911	Materials Science	1 — 1
5.101/1	Mechanical Engineering Design	0 — 2
5.203	Mechanical Technology	1 — 0
5.501	Fluid Mechanics	½— 1½
5.701	Thermodynamics	½— 1½
10.022/2	Mathematics	1½— ½
26.501/2	English	1 — 0
		6 — 6

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.101/2	Mechanical Engineering Design	0 — 2
5.302	Theory of Machines	1½ — 1
5.303	Mechanical Vibrations*	1½ — 0
5.402	Mechanics of Solids	1 — 1
6.801	Electrical Engineering	1 — 2
5.023	Seminar†	0 — 1½
	One 30-hour General Studies Elective	1 — 0
		6 — 7½

SIXTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.102	Mechanical Engineering Design	1 — 2
5.321	Automatic Control Engineering	1 — 0
5.502	Fluid Mechanics	1 — 1½
5.702	Thermodynamics	1 — 1½
6.802	Electrical Engineering	1 — 1
	One 30-hour General Studies Elective	1 — 0
		6 — 6

MECHANICAL ENGINEERING — COMBINED FULL-TIME/PART-TIME COURSE

The Mechanical Engineering course leading to the degree of Bachelor of Science (Technology) may be completed in three years of part-time study and two years of full-time study as follows:

Stage 1 — Part-time (as for the Stage 1 of the B.Sc. (Tech) course in Mechanical Engineering).

Stage 2 — Part-time (as for Stage 2 of the B.Sc. (Tech.) course in Mechanical Engineering).

Stage 3A — Full-time (as for Second Year of the full-time course in Mechanical Engineering).

Stage 4A — Full-time (as for Third Year of the full-time course in Mechanical Engineering).

Stage 5A — Part-time (as set out below).

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* Term 1 only.
† Terms 2 and 3 only.

STAGE 5A

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.102	Mechanical Engineering Design	1 — 2
5.303	Mechanical Vibrations*	1½— 0
5.321	Automatic Control Engineering	1 — 0
6.802	Electrical Engineering	1 — 1
		4½— 3

MECHANICAL ENGINEERING — CONVERSION COURSE

(A.S.T.C. Diploma to B.Sc. (Tech.) Degree)

Recent A.S.T.C. diploma holders in Mechanical Engineering may qualify for the degree of Bachelor of Science (Technology) by completing the following course of study. The programme outlined is that required of recent diplomates. Diplomates of many years standing may be required to take additional subjects.

FIRST STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut
1.001/2	Physics I, Part II	1½— 1½
1.212	Physics II(T)	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
10.022/2	Mathematics	2 — 0
26.521	Philosophy	1 — 0
		7½— 4½

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.306S	Theory of Machines†	1 — 1
5.504	Fluid Mechanics	1 — 1
5.321	Automatic Control Engineering	1 — 0
	One 30-hour General Studies Elective	1 — 0
		4 — 2

* Term I only.
† 21 weeks only

AERONAUTICAL ENGINEERING — PART-TIME COURSE

This course is of six years' duration and leads to the degree of Bachelor of Science (Technology). For outlines of the first two stages, see the Mechanical Engineering part-time course.

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II	1½— 1½
4.911	Materials Science	1 — 1
5.301	Engineering Mechanics	1½— ½
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics	1½— ½
		6½— 5½

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.303	Vibrations*	1½— 0
5.402	Mechanics of Solids	1 — 1
5.501	Fluid Mechanics	½— 1½
5.701	Thermodynamics	½— 1½
6.801	Electrical Engineering	1 — 2
10.022/2	Mathematics	1½— ½
26.501	English	1 — ½
		7½— 6½

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.302	Theory of Machines	1½— 1
5.702	Thermodynamics	1 — 1½
5.811	Aerodynamics	2 — 1
5.822	Aircraft Strength of Materials	1½— ½
26.501/2	English	1 — 0
	One 30-hour General Studies Elective	1 — 0
		7½— 4½

* Term 1 only.

SIXTH STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.812	Aerodynamics*	2½— 1½
5.823	Aircraft Materials and Structures	2 — 1
5.831	Aircraft Propulsion	2 — 0
	One 30-hour General Studies Elective	1 — 0
		7½— 2½

AERONAUTICAL ENGINEERING— COMBINED FULL-TIME/PART-TIME COURSE

The Aeronautical Engineering course leading to the degree of Bachelor of Science (Technology) may be completed in three years of part-time study and two years of full-time study as outlined below.

STAGE 1(A)
(30 weeks full-time course)

		Hours per week for 3 terms lec. lab./tut
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12 —12

STAGE 2(A)†
(30 weeks full-time course)

		Hours per week Term I lec. lab./tut.	Term II lec. lab./tut.	Term III lec. lab./tut.
5.061	Technical Orientation	1 — 0	1 — 0	1 — 0
5.111	Mechanical Engineering Design	4 — 0	2 — 2	1 — 3
5.311	Mechanics	1½— 1	1½— 1	1½— 1
5.611	Fluid Mechanics/ Thermodynamics	2 — 2½	2 — 2½	2 — 2½
6.801	Electrical Engineering	1 — 2	1 — 2	1 — 2
8.151	Mechanics of Solids	2 — 1	2 — 1	2 — 1
8.251	Properties of Materials	1½— 1½	1½— 1½	1½— 1½
10.022	Mathematics	2½— 1½	2½— 1½	2½— 1½
26.501 / 26.571	English *or* An Introduction to Modern Drama	1 — ½	1 — ½	1 — ½
		16½—10	14½—12	13½—13

* Terms 1 and 2 only (2½ to 4½ hours per week for third term).
† Stage 2(A) is the same as the second year of the full-time Mechanical Engineering course.

STAGE 3(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.302	Theory of Machines	1½— 1
5.303	Vibrations*	1½— 0
5.402	Mechanics of Solids	1 — 1
5.702	Thermodynamics	1 — 1½
6.801	Electrical Engineering	1 — 2
		6 — 5½

STAGE 4(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.306S	Theory of Machines†	1 — 1
5.811	Aerodynamics	2 — 1
5.822	Aircraft Strength of Materials	1½— ½
	Two 30-hour General Studies Electives	2 — 0
		6½— 2½

STAGE 5(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut
5.812	Aerodynamics‡	2½— 1½
5.823	Aircraft Materials & Structures	2 — 1
5.831	Aircraft Propulsion	2 — 0
		6½— 2½

AERONAUTICAL ENGINEERING — CONVERSION COURSE

(A.S.T.C. Diploma to B.Sc. (Tech.) Degree)

Recent A.S.T.C. diploma holders in Aeronautical Engineering may qualify for the degree of Bachelor of Science (Technology) by completing the following course of study. The programme outlined is what will be required of recent diplomates. Diplomates of many years' standing may be required to take additional subjects.

* Term 1 only.
† 24 weeks only.
‡ Terms 1 and 2 only (2½ to 4½ hours per week for third term).

FIRST STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
1.212	Physics II(T)	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
	One 30-hour General Studies Elective	1 — 0
		5½— 4½

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.702	Thermodynamics	1 — 1½
	Aerodynamics (Special)	1½— 1½
	Aircraft Structures (Special)*	1½— 1½
		4 — 4½

NAVAL ARCHITECTURE—PART-TIME COURSE

This course is of six years' duration and leads to the degree of Bachelor of Science (Technology). For outlines of the first two stages, see the Mechanical Engineering part-time course.

The Royal Institution of Naval Architects grants exemption from all examinations for associate membership to holders of the B.Sc. (Tech.) degree in Naval Architecture.

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II	1½— 1½
5.901	Naval Architecture	2 — 2
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics	1½— ½
		6½— 5½

* 4 hours per week in third term.

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
4.911	Materials Science	1 — 1
5.501	Fluid Mechanics	¾— 1¼
5.902	Naval Architecture	2½— 2½
10.022/2	Mathematics	1½— ½
26.501	English	1 — ½
		6¾— 5¾

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.502	Fluid Mechanics	1 — 1¼
5.701	Thermodynamics	¾— 1¼
5.903	Naval Architecture	3 — 3
26.501/2	English	1 — 0
	One 30-hour General Studies Elective	1 — 0
		6¾— 5¾

SIXTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.904	Naval Architecture	3 — 5
6.801	Electrical Engineering	1 — 2
	One 30-hour General Studies Elective	1 — 0
		5 — 7

NAVAL ARCHITECTURE—
COMBINED FULL-TIME/PART-TIME COURSE

The Naval Architecture course leading to the degree of Bachelor of Science Technology) may be completed in three years of part-time study and two years of full-time study as outlined on the following pages.

STAGE 1(A)

(30 weeks full-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12 —12

STAGE 2(A)*

(24 weeks full-time course)

		Hours per week for 24 weeks lec. lab./tut.
1.212S	Physics II	2 — 2½
4.911S	Materials Science	1½— 1½
5.301S	Engineering Mechanics	1½— 1
5.501S	Fluid Mechanics	1 — 1½
5.901	Naval Architecture†	2 — 2
8.112S	Materials and Structures	2 — 2
10.022S	Mathematics	4 — 1
26.501	English *or*	3 — 0 **
26.571	An Introduction to Modern Drama	
		16¾—11½

STAGE 3(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.502	Fluid Mechanics	1 — 1½
5.701	Thermodynamics	¾— 1½
5.902	Naval Architecture	2½— 2½
	One 30-hour General Studies Elective	1 — 0
		5½— 5½

STAGE 4(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.903	Naval Architecture	3 — 3
6.801	Electrical Engineering	1 — 2
		4 — 5

* This course is under review.
† 30 weeks course.
** Terms 1 and 2 only.

STAGE 5(A)
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.904	Naval Architecture	3 — 5
	One 30-hour General Studies Elective	1 — 0
		4 — 5

NAVAL ARCHITECTURE—CONVERSION COURSE
(A.S.T.C. Diploma to B.Sc. (Tech.) Degree)

Recent A.S.T.C. diploma holders in Naval Architecture may qualify for the degree of Bachelor of Science (Technology) by completing the following course of study. The programme outlined is what will be required of recent diplomates. Diplomates of many years' standing may be required to take additional subjects.

FIRST STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
1.212	Physics II(T)	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
4.911	Materials Science	1 — 1
5.201	Mechanical Technology	1 — 0
10.022/1	Mathematics	1 — 1
10.022/2	Mathematics	1½— ½
	One 30-hour General Studies Elective	1 — 0
		5½— 2½

DEPARTMENT OF INDUSTRIAL ENGINEERING

The Department of Industrial Engineering offers a full-time and a part-time course in industrial engineering leading to the degree of Bachelor of Engineering and Bachelor of Science (Technology) respectively. These courses are designed for students with engineering ability whose interests lie in the planning, developing and control of manufacturing operations. Completion of either of these courses gives full exemption from associate membership examinations of the Institution of Engineers, Australia, and the Institution of Production Engineers. Completion of the full-time B.E. course is accepted by the Institution of Mechanical Engineers, London, as giving exemption from all examinations required for associate membership; completion of the part-time B.Sc. (Tech.) course is recognized as giving exemption from Parts I and II of the examinations required for associate membership.

The first two years of the full-time course and the first four years of the part-time course provide the student with a sound foundation in the basic science and engineering subjects, and this knowledge is used and extended in the later years in the study of the industrial subjects. Finally, the problems associated with the practical economics of manufacturing operations are studied. These three fields of study provide the student with the training necessary to carry out an industrial job and to examine it critically in the light of economic efficiency.

Traditional engineering courses do not embrace the problems which are characteristic of industrial engineering. These problems include the analysis of a product to ensure satisfactory functioning with regard to methods and sequence of manufacturing operations; the disposition of buildings and of equipment in relation to buildings to permit efficient handling of materials; the avoidance or elimination of bottlenecks; the related problems of quality and cost control, testing and inspection; labour and personnel relations; and, finally, the problem of distribution and sales.

The financial and economic aspects are studied as the problem in manufacturing has not been solved until the final translation of the product into money has been accomplished successfully. While it is not intended to develop an expert in accounting practice or economics, it is intended to produce an engineer with an appreciation of the problems of cost and one who can apply considerations of ultimate economy to all industrial problems.

The full-time student gains practical experience in industry during the recess periods in the first, second and third years of the course.

The Work of the Industrial Engineer

The industrial engineer may initially be employed in any of the four major areas of industrial activity:

a) Industrial Economic Analysis

One of the principal functions of industrial engineering is to analyse a product, project or process from the economic point of view to ensure that an adequate profit can be obtained from it. A general working knowledge of economics and management skill has to be directed towards the making of decisions on how to operate an enterprise most efficiently. The basis for such decisions is furnished largely by the application of mathematics and statistics to operations research, industrial marketing and other fields affecting all phases of operation of industry.

b) Planning and Control of Production

Manufacturing processes and operations must be planned in detail throughout an enterprise to ensure that they proceed smoothly and economically. Functions in this field include the establishment of production standards, the setting of production targets and, finally, control of quality.

The ultimate responsibility of those in charge of the planning and control of production is to ensure that the goods, as originally specified, perform satisfactorily and are produced when required at an optimum cost.

c) Product and Process Design

The design interest of the industrial engineer goes beyond normal mechanical design to develop a product that will not only function effectively but also have a pleasing appearance.

Further, the product has to be adapted to suit existing manufacturing equipment, or a manufacturing process has to be developed by means of which an existing product can be manufactured at the right price and at the right quality. The design work of the industrial engineer incorporates also problems of equipment selection and application for both economy and performance.

d) Methods Engineering

Methods engineering is particularly concerned with the coordination of men, materials and machines, so that an enterprise will run at maximum efficiency. A considerable knowledge of engineering in general, as well as an understanding of human factors and materials science, is necessary for methods engineering work. Time and motion study is part of methods engineering. In many

cases the methods engineer works in close co-operation with the design department and executives engaged in industrial economic analysis.

Employment in any of the fields mentioned may lead to specialization in the more mathematical aspects of industrial engineering, such as operations research and systems engineering, or it may lead, according to the preference of the student, to a position of responsibility in industrial management.

INDUSTRIAL ENGINEERING—FULL-TIME COURSE

FIRST YEAR
(30 weeks day course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	2 — 4
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		12 —12

SECOND YEAR
(30 weeks day course)

		(Hours per week) Term I lec. lab./tut.	Term II lec. lab./tut.	Term III lec. lab./tut.
5.061	Technical Orientation	1 — 0	1 — 0	1 — 0
5.111	Mechanical Engineering Design	4 — 0	2 — 2	1 — 3
5.311	Mechanics	1½— 1	1½— 1	1½— 1
5.611	Fluid Mechanics/ Thermodynamics	2 — 2½	2 — 2½	2 — 2½
6.801	Electrical Engineering	1 — 2	1 — 2	1 — 2
8.151	Mechanics of Solids	2 — 1	2 — 1	2 — 1
8.251	Properties of Materials	1½— 1½	1½— 1½	1½— 1½
10.022	Mathematics	2½— 1½	2½— 1½	2½— 1½
26.501 / 26.571	English *or* An Introduction to Modern Drama	1 — ½	1 — ½	1 — ½
		16½—10	14½—12	13½—13

THIRD YEAR*—PASS COURSE
(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.101A	Mechanical Engineering Design	0 — 3
5.302S	Theory of Machines	1¾— 1¼
6.801S	Electrical Engineering	1¼— 2¼
10.381S	Statistics	1 — 1
18.111S	Industrial Administration	1 — 0
18.211S	Production Control	2¼— 1
18.311S	Methods Engineering	3 — 1
18.411S	Design for Production I	3 — 1
	Two 30-hour General Studies Electives†	3 — 0
		16¾—10¾

FOURTH YEAR*—PASS COURSE
(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.306S	Theory of Machines†	1¼— 1¼
5.323S	Automatic Control Engineering†	2 — 1
6.802S	Electrical Engineering†	1¼— 1¼
14.061	Accounting	1 — 0
14.062	Accounting for Engineers	3 — 0
14.041	Industrial and Commercial Law	1 — 0
18.412S	Design for Production II	2 — 2
18.511S	Industrial Marketing	1 — 1
18.611S	Engineering Economic Analysis	1 — 1
18.031S	Minor Thesis	0 — 3
	General Studies, Advanced Elective†	3 — 0
		17 —11

* Lectures cease at the end of the 3rd week of third term. Third and fourth years are being reviewed by Faculty, and it is anticipated that new subjects will be offered in third year in 1968 and thereafter and in fourth year in 1969 and thereafter.

† Terms 1 and 2 only.

ADDITIONAL FOR HONOURS THIRD YEAR*—HONOURS COURSE

(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.101A	Mechanical Engineering Design	0 — 3
5.302S	Theory of Machines	1½— 1½
6.801S	Electrical Engineering	1½— 2½
10.381S	Statistics	1 — 1
12.121S	Psychology	3 — 0
18.111S	Industrial Administration	1 — 0
18.211S	Production Control	2½— 1
18.311S	Methods Engineering	3 — 1
18.411S	Design for Production I	3 — 1
	Two 30-hour General Studies Electives†	3 — 0
		19½—10½

FOURTH YEAR‡—HONOURS COURSE

(30 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.306S	Theory of Machines†	1½— 1½
5.325S	Automatic Control Engineering†	2 — 1
6.802S	Electrical Engineering †	1½— 1½
14.061	Accounting	1 — 0
14.062	Accounting for Engineers	3 — 0
14.041	Industrial and Commercial Law	1 — 0
18.412S	Design for Production II	2 — 2
18.511S	Industrial Marketing	1 — 1
18.611S	Engineering Economic Analysis	1 — 1
18.291S	Professional Elective	3 — 0
18.041	Thesis and Project‡	0 — 1
	General Studies, Advanced Elective†	3 — 0
		20 — 9

* Lectures cease at end of 3rd week of third term.

† Terms 1 and 2 only.

‡ 28 hours per week for the final 6 weeks of third term are occupied in work on a thesis and a project.

INDUSTRIAL ENGINEERING — PART-TIME COURSE

This course is of six years' duration and leads to the degree of Bachelor of Science (Technology).

FIRST STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
2.001	Chemistry I	2 — 4
10.001	Mathematics I	4 — 2
		6 — 6

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001	Physics I	3 — 3
5.001	Engineering I	3 — 3
		6 — 6

THIRD STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics	1½ — 1½
5.301	Engineering Mechanics	1½ — ¾
8.112	Materials and Structures	1½ — 1½
10.022/1	Mathematics	1½ — ½
18.111/1	Industrial Administration, Part I	1 — 0
26.501	English	1 — ½
		7¾ — 4¾

FOURTH STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
4.911	Materials Science	1 — 1
5.101/1	Mechanical Engineering Design	0 — 2
5.501	Fluid Mechanics	¾ — 1½
5.701	Thermodynamics	¾ — 1½
10.022/2	Mathematics	1½ — ½
18.111/2	Industrial Administration, Part II	1 — 0
26.501/2	English	1 — 0
		6 — 6

FIFTH STAGE

(30 weeks part-time course)

		Hours per week for— Terms 1 & 2 lec. lab./tut.	Term 3 lec. lab./tut.
5.302	Theory of Machines	1½ — 1	1½ — 1
6.801	Electrical Engineering	1 — 2	1 — 2
10.381S	Statistics*	2 — 0	2 — 0
18.221	Production Control	1½ — 0	2 — 1
18.421	Design for Production I	1 — 1	2 — 1
	One 30-hour General Studies Elective	1 — 0	1 — 0
		8 — 4	9½ — 5

SIXTH STAGE

(30 weeks part-time course)

		Hours per week for— Term 1 lec. lab./tut.	Terms 2 & 3 lec. lab./tut.
5.321	Automatic Control Engineering	1 — 0	1 — 0
6.802	Electrical Engineering	1 — 1	1 — 1
18.321	Methods Engineering	1 — 1	1 — 1
18.422	Design for Production II	1 — 1	2 — 1
18.521	Industrial Marketing	1 — 0	1 — 0
18.621	Engineering Economics	2 — 1	1 — 1
	One 30-hour General Studies Elective	1 — 0	1 — 0
		8 — 4	8 — 4

INDUSTRIAL ENGINEERING — COMBINED FULL-TIME/PART-TIME COURSE

The Industrial Engineering course leading to the degree of Bachelor of Science (Technology) may be completed in three years of part-time study and two years of full-time study as follows:

Stage 1 — Part-time (as for Stage 1 of the B.Sc. (Tech.) course in Industrial Engineering).

* 24 weeks only.

Stage 2 — Part-time (as for Stage 2 of the B.Sc. (Tech.) course in Industrial Engineering).

Stage 3A — Full-time (as for Second Year of the full-time course in Industrial Engineering).

Stage 4A — Full-time (as for Third Year of the full-time course in Industrial Engineering).

Stage 5A — Part-time (as set out below).

STAGE 5A

(30 weeks part-time course)

		Hours per week for— Term 1 lec. lab./tut.	Terms 2 & 3 lec. lab./tut.
5.321	Automatic Control Engineering	1 — 0	1 — 0
6.802	Electrical Engineering	1 — 1	1 — 1
18.422	Design for Production II	1 — 1	2 — 1
18.521	Industrial Marketing	1 — 0	1 — 0
18.621	Engineering Economics	2 — 1	1 — 1
		6 — 3	6 — 3

DESCRIPTIONS OF SUBJECTS
TEXT AND REFERENCE BOOKS

SCHOOL OF CIVIL ENGINEERING

8.011 Thesis

For students in the full-time courses in Civil Engineering and Surveying.

8.112 Materials and Structures

Theory of Structures — Moduli of elasticity, simple stress and strain. Compound bars, temperature stresses. Thin shells. Stress at a point. Strain at a point. Principal stresses and strain. Relationship between load, shear force and bending moment. Moments of inertia, principal moments of inertia. Stresses due to axial force, bending moment shear force, and torsion. Differential equations of simple beam theory. Deflection of beams. Statically indeterminate beams. Strain energy. Deflections at a single load. Shock loads. Theory of centrally loaded column and eccentrically loaded columns.

Properties of Materials — Materials laboratory practice, types of testing machine, precision of measurement, theory of errors. Load-deformation behaviour of engineering materials under tension, compression, shear. Impact, hardness, fatigue, creep.

REFERENCE BOOKS

Timoshenko and MacCulloch. *Elements of Strength of Materials.*
Shanley. *Strength of Materials.*
Timoshenko. *Strength of Materials,* Vol. I. Van Nostrand.
Davis, Troxell and Wiskocil. *Testing and Inspection of Engineering Materials.* McGraw-Hill.
Salmon. *Materials and Structures,* Vol. I.
Stanford. *The Creep of Metals and Alloys.* Temple Press.
Jastrzeleski. *Nature and Properties of Engineering Materials.* Wiley.
Marin, J. *Mechanical Behaviour of Engineering Materials.* Prentice-Hall.

8.121 Structures

Relation between design, analysis and proportioning. Design principles, factors of safety; load factors. Structural hazards. Factors affecting design — erection and transport, availability of materials and plant.

Design procedure — specification, drawings. Design of riveted and welded joints. Design of columns and struts. Design of beams, and plate web girders. Design of roof trusses. Reinforced concrete design applied to statically determinate structures. Simple beams and slabs, tee-beams, doubly reinforced beams, concentrically and eccentrically loaded columns. Column footings.

8.122S Structures

Relation between design, analysis and proportioning. Design principles; factors of safety; load factors. Structural hazards. Design procedure — specifications, drawings. Design of riveted and welded joints.

Design of columns and struts. Design of steel beams and girders. Design of roof trusses. Reinforced concrete design. Simple beams and slabs, tee-beams, doubly reinforced beams, concentrically and eccentrically loaded columns. Column footings. Influence lines for statically determinate structures. Three-moment equation. Moment distribution, solution of continuous beams. Three-dimensional statics. Strain energy methods for the solution of one-fold statically indeterminate rigid frame and pin-jointed truss problems. Deflections by unit load method; Castigliano's theorems. Williot-Mohr diagrams.

TEXT BOOKS

S.A.A. Interim Code Nos. 350, 351, 352.
S.A.A. Code CA2 — 1963.

REFERENCE BOOKS

Bresler and Lin. *Design of Steel Structures.* Wiley.
Stewart, D.S. *Practical Design of Simple Steel Structures,* Vols. I and II. Constable.
Grinter, L. E. *Design of Modern Steel Structures.* Macmillan.
Grinter, L. E. *Elementary Structural Analysis and Design.* Macmillan.
Gray and Others. *Steel Designer's Manual.* Lockwood.
Wilbur and Norris. *Elementary Structural Analysis.* McGraw-Hill.
Pippard and Baker. *Analysis of Engineering Structures.* Arnold.
Sutherland and Rees. *Introduction to Reinforced Concrete Design.*
Peabody. *The Design of Reinforced Concrete Structures.* Wiley
Fisher-Cassie. *Structural Analysis.*
Ferguson. *Reinforced Concrete Fundamentals.*
Gaylord and Gaylord. *Design of Steel Structures.* McGraw-Hill.

8.131 Structures

Influence lines for statically determinate structures. Strain energy theory, application to analysis of statically indeterminate framed structures, and pin-jointed trusses. Deflections by unit load method. Williot-Mohr diagram. Analysis of frames by moment distribution. Analysis of arches. Timber design, special characteristics of timber. Joints in timber. Beams and columns. Timber structures. Retaining walls and small dams. Design of continuous structures in reinforced concrete. Continuous beams and slabs, simple continuous frame. Introduction to prestressed concrete. Pre-tensioning and post-tensioning.

8.132 Structures

Elastic analysis of pin-jointed and rigid-jointed plane and space structures using the force and displacement methods and extension to matrix methods. Plastic analysis of simple steel structures.

Design of retaining walls and small dams. Design of continuous structures in reinforced concrete. Introduction to ultimate load method

in reinforced concrete design. The principles of prestressed concrete design with simple applications. Special characteristics of timber. The design of timber structures.

REFERENCE BOOKS

Winter, Urquhart and O'Rourke. *Design of Concrete Structures.* 7th Edition. McGraw-Hill, 1964.
Hoff. *The Analysis of Structures.* Wiley.
Lin, T. Y. *Design of Pre-Stressed Concrete Structures.* Wiley.
Pearson and Others. *Timber Engineering Design Handbook.* Boyd.
Timoshenko and Young. *Theory of Structures.* McGraw-Hill.
Parcel and Moorman. *Analysis of Statically Indeterminate Structures.* Wiley.
Ferguson. *Reinforced Concrete Fundamentals.*

8.141 Engineering Computations

Intercept charts for three or more variables. Nomograms. Solution of algebraic and transcendental equations by simple iteration methods. Introduction to finite differences. Solution of differential and partial differential equations by using finite differences. Application to instability problems. Relaxation methods applied to solution of problems involving differential equations such as Poisson's equation.

8.142 Engineering Analysis

Intercept charts for three or more variables. Nomographic charts. Solution of algebraic and transcendental equations by simple iteration methods. Matrices — multiplication, inversion. Solution of linear simultaneous equations. Finite differences. The difference equation. Solution of differential and partial differential equations by using differences. Application to instability problems. Relaxation methods applied to solution differential equations such as Poisson's equation.

Introduction to probability. Random variable and standard elementary distributions. Sampling distributions. Estimation of parameters. Standard tests of hypotheses. Introduction to regression analysis.

REFERENCE BOOKS

McCracken and Dorn. *Numerical Methods and Fortran Programming.* Wiley, 1964.
Salvadori and Baron. *Numerical Methods in Engineering.* 2nd Ed. Prentice Hall, 1962.
Hall, A. S. *Construction of Graphs and Charts.* Pitman.
Shaw. *Relaxation Methods.* Dover.

8.151 Mechanics of Solids

Statics of bars. Geometrical properties of plane figures. Stress and strain; uniaxial stress. Stresses and deformations due to bending, shear and torsion. Stress and strain at a point; combined stresses. Assemblages of bars and beams. Structural instability. Dynamic loading.

TEXT BOOK

Shanley. *Strength of Materials.* McGraw-Hill.

REFERENCE BOOKS

Timoshenko and MacCulloch. *Elements of Strength of Materials.* McGraw-Hill.
Timoshenko. *Strength of Materials,* Vol. I. McGraw-Hill.
Salmon. *Materials and Structures,* Vol. I. Longmans.
Higdon, Ohlsen and Stiles. *Mechanics of Materials.* Wiley.

8.211 Building Science IIB (Mechanics of Materials)

An introductory course. The load-deformation behaviour of engineering materials is considered with reference to the use of materials in structures, and to materials laboratory practice. Special emphasis is made of the need for efficient utilization of materials with reference to strength, durability, appearance and economy.

Concrete Technology — Principal types of cements, their properties and simple testing; cement handling and storage. Concrete aggregates, characteristics, grading and testing. Admixtures. Factors affecting concrete properties. Basic concrete mix requirements and mix design methods. The manufacture of concrete and job control.

REFERENCE BOOKS

A.C.I. Manual of Concrete Inspection.
Davis, Troxell and Wiskocil. *Testing and Inspection of Engineering Materials.* McGraw-Hill.
Withey and Washa. *Materials of Construction.* Wiley.
British Standard Handbook No. 2846. *Reduction Presentation of Experimental Results.*
U.S. Bureau of Reclamation. *Concrete Manual.*
Murdock, L. J. *Concrete Materials and Practice.* Arnold.
Jastrzeleski. *Nature and Properties of Engineering Materials.* Wiley.

8.221 and 8.221S Engineering Materials

Concrete Technology — Physical and chemical properties of cements. Production, testing and selection of aggregates. Pozzolans, admixtures. Workability, strength and other properties of concrete. Target strengths and the design and proportioning of mixes.

Soil Mechanics — Physical and mechanical properties affecting capillarity and compressibility and their relevance to seepage, uplift and the settlement of buildings located above buried compressible soil strata. Shearing strength, bearing capacity and earth pressure. Soil identification and testing of physical properties.

Metallurgy — The atomic structure of metals. The grain structure of metals; effects of manufacturing processes. Structure, properties and heat treatment of commercially important alloys. The selection and properties of structural steels. Corrosion.

TEXT BOOKS

Troxell and Davis. *Composition and Properties of Concrete.* McGraw-Hill.
Scott, R. F. *Principles of Soil Mechanics.* Addison-Wesley, 1963.
Wu, T. H. *Soil Mechanics.* Allyn and Bacon, 1966.

REFERENCE BOOKS

Terzaghi. *Theoretical Soil Mechanics.* Wiley.
U.S. Bureau of Reclamation. *Concrete Manual.*
Murdock, L. J. *Concrete Materials and Practice.* Arnold.
Terzaghi and Peck. *Soil Mechanics in Engineering Practice.* Wiley.
H.M.S.O. Publication. *Soil Mechanics for Road Engineers.*
Bishop and Henkel. *The Measurement of Soil Properties in the Triaxial Test.*
Ackroyd, T. N. W. *Concrete Properties and Manufacture.*
Fulton, F. S. *Concrete Technology.*
S.A.A. Specifications A2, A77, A100-110, CAZ.

8.222 Engineering Materials

Concrete Technology — Permeability, durability, elastic modulus, creep and other concrete properties; concrete volume changes. Design and proportioning of concrete mixes; lightweight concrete. Manufacture and field control of concrete.

Soil Mechanics — Studies of theoretical and applied sections of soil mechanics relating to foundations and earth dams. Treatment of modern soil technology studies and stabilization work.

8.223 Engineering Materials

Concrete Technology — Permeability, durability, elastic modulus, creep and other concrete properties; concrete volume change. Effect of creep and drying shrinkage on stress distribution of structural concrete; thermal effects. Design and proportioning of concrete mixes. Special concretes for high strength, mass and lightweight. Manufacture and field control of concrete.

Soil Mechanics — Advanced studies of theoretical and applied soil mechanics; foundations, mass soil behaviour, tunnels and arching, stability of slopes, earth dams, soil technology and stabilization work.

Properties of Materials — Elastic and inelastic behaviour of materials; theories of failure; design factors. Non-destructive test procedures. Experimental stress analysis methods. Structure and mechanical properties of timber. Properties of laminated sections. Properties and use of structural aluminium alloys, plastic materials and some clay products.

TEXT BOOKS

Troxell and Davis. *Composition and Properties of Concrete.* McGraw-Hill.
Wu, T. H. *Soil Mechanics.* Allyn and Bacon, 1966.

REFERENCE BOOKS

Terzaghi and Peck. *Soil Mechanics in Engineering Practice.* Wiley.
Bishop and Henkel. *The Measurement of Soil Properties in the Triaxial Test.*
U.S. Bureau of Reclamation. *Concrete Manual.*
Houwink. *Elasticity, Plasticity and Structure of Matter.*
Murdock, L. J. *Concrete Materials and Practice.* Arnold.
Terzaghi. *Theoretical Soil Mechanics.* Wiley.
U.S. Bureau of Reclamation. *Earth Manual,* 1960.

Hetenyi. *Handbook of Experimental Stress Analysis.* Wiley.
Jessop and Harris. *Photo-Elasticity — Principles and Practice.*
Charlton. *Model Analysis of Structures.*
Mills, Hayward and Radar. *Materials of Construction.* Wiley.
Wallis. *Australian Timber Handbook.*
Ford, H. *Advanced Strength of Materials.*
Scott, R. F. *Principles of Soil Mechanics.* Addison-Wesley.
Ackroyd, T. N. W. *Concrete, Properties and Manufacture.*
Fulton, F. S. *Concrete Technology.*
S.A.A. Specifications CA2, A64.
H.M.S.O. Publication. *Soil Mechanics for Road Engineers.*

8.242S Soil Mechanics for Building

Determination of simple soil properties. Formation and classification of soils, classification tests. Fundamental characteristics of soils — clay mineralogy. Compaction. Permeability; stratification. Pore pressure and effective stress, seepage pressure, critical hydraulic gradient. Compression of soils. Retaining walls. Introductory foundation analysis. Principles of shear strength and application to slope stability.

TEXT BOOKS

Wu, T. H. *Soil Mechanics.* Allyn and Bacon, 1966, *or*
Terzaghi and Peck. *Soil Mechanics in Engineering Practice.* Wiley.

REFERENCE BOOKS

Terzaghi. *Theoretical Soil Mechanics.* Wiley.
H.M.S.O. Publication. *Soil Mechanics for Road Engineers.*
Bishop and Henkel. *The Measurement of Soil Properties in the Triaxial Test.*
Teng, W. C. *Foundation Design.* Prentice-Hall, 1962.
Leonards, G. *Foundation Engineering.* McGraw-Hill, 1962.

8.251 Properties of Materials

Basic structure of solid materials; atomic and molecular bonds; crystal and amorphous structure. Classification and properties of solid materials; monomers and polmers; ceramics; metals and metal phases.

Mechanical behaviour of materials. Response to static loading in tension, compression, shear and bending. Use of static test data in analysis and design; variability of material properties; factors of safety. Hardness tests. Creep in solid materials. Response to dynamic loading; fatigue; impact and shock. Deterioration of engineering materials.

TEXT BOOK

Polakowski and Ripling. *Strength and Structure of Engineering Materials.* Prentice-Hall.

REFERENCE BOOKS

Van-Vlack. *Elements of Materials Science.* Addison-Wesley.
Cook-Rabenowicz. *Physical Measurement and Analysis.* Addison-Wesley.
Stanford. *The Creep of Metals and Alloys.*
Jastrzeleski. *Nature and Properties of Engineering Materials.*
Marin. *Mechanical Behaviour of Engineering Materials.*

8.261 Geotechnics

Introduction to aspects of engineering geology and rock and soil characteristics to provide a basis of subsequent work in Soil Mechanics and Concrete Technology. Main topics covered are structural geology; petrology; clay mineralogy; soil properties groundwater. Some previous study of geology is assumed. 1967 and 1968 will include a broader treatment of engineering geology than indicated above.

TEXT BOOKS

Blyth. *Geology for Engineers.* 4th Ed., 1960.

Wu, T. H. *Soil Mechanics.* Allyn and Bacon, 1966.

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.

8.411 Surveying

Introduction. Chaining, methods of measurement, corrections, chain surveys. Level, differential levelling, booking. Contours, volumes of earthworks. Theodolite, methods of reading angles, applications in building. Traversing, setting out.

TEXT BOOK

Clark, D. *Plane and Geodetic Surveying.* Vol. I, 5th Edition, Constable, 1965.

REFERENCE BOOK

Bannister and Raymond. *Surveying.* Pitman, 1959.

8.421 Engineering Surveying

Historical introduction. Types of surveys. Linear measurements, corrections and accuracies. The level and its use. The plane table. The theodolite and its use. Triangulation and traversing and their adjustment. Tachometry. Contour surveys. Determination of areas and volumes. Methods of setting out. Nature of errors in measurements.

8.422 Engineering Surveying

Geodetic surveying. Control surveys. Differential, trigonometrical and barometric levelling. Spherical trigonometry and elementary field astronomy. Setting out of curves and engineering structures. Elements of map projection. Elementary photogrammetry.

8.423S Engineering Surveying

Geodetic surveying. Control surveys. Differential, trigonometrical and barometric levelling. Spherical trigonometry and elementary field astronomy. Setting out of curves and engineering structures. Elements of map projection. Elementary photogrammetry. Survey computations and adjustment.

REFERENCE BOOK

Clark, D. *Plane and Geodetic Surveying.* Vol. II, 5th Edition, Constable, 1963.

8.431 Surveying and Cartography

History of surveying and its relationship with town planning. Types of survey, methods of measurement, corrections, chain surveys. Level, differential levelling. Contours, volumes of earthworks. Theodolite, applications in building. Traversing, setting out. Basic concepts of land tenure, land registration and cadastral surveying. Outline of photogrammetry. Plotting. Preparation of plans, methods of enlargement and reduction, plan registration. Measurement of areas by planimeter.

8.441 Engineering Surveying

Linear measurement. Levelling. Angle measurement. Theodolite traversing and triangulation. Tacheometry. Application of survey techniques; contour surveys, detail surveys, provision of information for design purposes, setting out engineering works, estimation of areas and volumes, etc. Outline of photogrammetry.

TEXT BOOK

Bannister and Raymond. *Surveying*. Pitman, 1959.

REFERENCE BOOK

Clark, D. *Plane and Geodetic Surveying*. Vol. I, 5th Edition, Constable, 1965.

8.521 Hydraulics

Dimensional analysis, hydraulic model theory, surface resistance in flow in pipes and channels. Pipe networks, waterhammer. Channel flow, steady non-uniform flow. Flow measurement. Hydraulic machinery, characteristic curves. Graphical flow nets, percolation.

8.522 Hydraulics

Dimensional analysis, hydraulic model theory, scale effect, distorted models. Fluid turbulence, velocity distribution, surface resistance, in flow past plane boundaries and in pipes and channels. Pipe flow, pipe networks, waterhammer. Channel flow, steady non-uniform flow, backwater curves, hydraulic pump, unsteady flow, waves, flood routing. Flow measurement. Hydraulic machinery, radial and axial flow, characteristic curves, cavitation. Potential flow, flow nets, percolation.

REFERENCE BOOKS

Rouse. *Engineering Hydraulics*. Wiley.
Van Te Chow. *Open Channel Hydraulics*. McGraw-Hill.
Stepanoff. *Axial and Centrifugal Pumps*. Wiley.
Vallentine. *Applied Hydrodynamics*. Butterworth.
H.M.S.O. Hydraulics Research Paper No. 2. *Charts for the Design of Channels and Pipes*.
Parmakian. *Water Hammer Analysis*. Prentice-Hall.
H.M.S.O. Hydraulics Research Paper No. 1. *Resistance of Fluids Flowing in Channels and Pipes*.

8.611 and 8.611S Civil Engineering

Public Health Engineering — Processes of decomposition and decay; chemical and biochemical measurement of degree of pollution; basic

principles of the treatment of polluted waters. Water supply schemes; principles and practice of water treatment; sewerage systems; construction of sewers; pumping stations; sewage treatment and disposal; swimming pools; refuse disposal.

Engineering Hydrology — A basic course dealing with principles and modern techniques. Topics covered are: meteorology, climatology, evaporation, analysis of hydrologic data, stream gauging, the runoff process, infiltration, design storm synthesis, unitgraphs, synthetic unitgraphs, flood frequency studies, rational method, water balance, water losses, rainfall runoff relationships, stream flow correlations, storage determination, groundwater.

TEXT BOOKS

Fair and Geyer. *Water Supply and Waste-Water Disposal.* Wiley.
Linsley, Kohler and Paulhus. *Hydrology for Engineers.* McGraw-Hill.

REFERENCE BOOKS

Rich, L. G. *Unit Processes in Sanitary Engineering.* Wiley.
Steel. *Water Supply and Sewage.* McGraw-Hill.
Babbitt and Doland. *Water Supply Engineering.* McGraw-Hill.
Imhoff and Fair. *Sewage Treatment.* Wiley.
Imhoff, Muller and Thistlethwaite. *Disposal of Sewage and Other Water Borne Wastes.* Butterworth.
Camp, T. R. *Water and Its Impurities.* Rheinhall.
Phelps. *Stream Sanitation.* Wiley.
Timm. *An Introduction to Chemistry.*
Linsley, Kohler and Paulhus. *Applied Hydrology.* McGraw-Hill, 1949.
Wisler and Brater. *Hydrology.* 2nd Ed. 1959. Wiley.
Petterssen. *Introduction to Meteorology.* McGraw-Hill, 1941.
Haurwitz. *Meteorology.* McGraw-Hill.
Haurwitz and Austin. *Climatology.* McGraw-Hill.
Butler. *Engineering Hydrology.* Prentice-Hall.
Johnstone and Cross. *Elements of Applied Hydrology.* Ronald Press.
Commonwealth Bureau of Meteorology. *Bulletin No. 1. The Climate and Meteorology of Australia.*
Commonwealth Dept. of Civil Aviation. *Manual of Meteorology.*
Chow, V. T. *Handbook of Applied Hydrology.* McGraw-Hill.

8.612 Civil Engineering

Road Engineering — Road location and surveys, road design standards, road alignment, design of curves and intersections; types and functions of pavements. Pavement thickness. Road maintenance. Urban stormwater drainage. Economic analysis of routes and schemes.

Engineering Construction and Administration — Construction plant and equipment; drilling and tunnel equipment, earthmoving plant, hoisting and conveying equipment, pumping and pile-driving plant, workshop plant. Construction methods; earthworks foundations, coffer-dams, caissons, piling, steel, timber, and concrete construction. Prestressed concrete, bridges, wharves, dams, pipelines and multi-storeyed buildings. Engineering

administration; contracts, tenders, contract documents, estimates, quantities, specifications, costing, financial comparison of projects, personnel, management and organization.

Irrigation Engineering—Sources of water, water requirements, methods of application to land. Soil deterioration. Investigation and design. Maintenance and operation of irrigation systems; water metering.

TEXT BOOKS

Antill and Ryan. *Civil Engineering Construction.* A. & R.
Ryan, P. W. S. *Engineering Administration.* A. & R.
O'Neill, L. V. *Fundamentals of Estimating and Construction Cost Control.* Tait, 1966.

REFERENCE BOOKS

Creager, Justin and Hynes. *Engineering for Dams.* Wiley.
Ackerman and Locher. *Construction Planning and Equipment.* McGraw-Hill.
Houk. *Irrigation Engineering.* Wiley.
Goldman. *Financial Engineering.* Wiley.

8.613 Civil Engineering

Roads and Railway Engineering — Road location and surveys. Road design standards, road alignment, design of curves and intersections; types and functions of pavements. Pavement thickness. Road maintenance. Urban stormwater drainage. Economic analysis of routes and schemes.

Railway engineering: Permanent way. Track ballasting, points and crossings. Signalling, special structures, rolling stock, general.

Irrigation, Hydro-electric, and Harbours and Rivers Engineering — Sources of water, water requirements, methods of application to land. Soil deterioration. Investigation and design, maintenance and operation of irrigation systems; water metering.

Hydro-electric power schemes, combined thermal and hydro systems. Hydro-electric potential, determination of storage requirements and plant capacity.

Natural and artificial harbours, training of river estuaries, tides and wave action, docks, wharves, slipways; sea-bed exploration, hydrographic surveying.

Engineering Construction and Administration — Construction plant and equipment; compressed air drilling and tunnel equipment, earthmoving plant, hoisting and conveying equipment, pumping and pile-driving plant. Construction methods; earthworks, foundations, coffer-dams, caissons, piling, steel, timber and concrete construction. Bridges, wharves, dams, pipelines and multi-storeyed buildings.

TEXT BOOKS

Antill and Ryan. *Civil Engineering Construction.* A. & R.
Ryan, P. W. S. *Engineering Administration.* A. & R.
O'Neill, L. V. *Fundamentals of Estimating and Construction Cost Control.* Tait, 1966.

REFERENCE BOOKS

Du Platt Taylor. *Docks, Wharves and Piers.* Eyre and Spottiswoode.
Webb. *Railroad Constructions.* Wiley.
Houk. *Irrigation Engineering.* Wiley.
Creager, Justin and Hynes. *Engineering for Dams.* Wiley.
Ackerman and Locher. *Construction Planning and Equipment.* McGraw-Hill.
Fair and Geyer. *Water Supply and Waste-Water Disposal.* Wiley.
Guthrie Brown. *Hydro-Electric Engineering Practice.* Blackie.

8.621 Engineering Construction

Construction plant and equipment; compressed air services, drilling, earthmoving, tunnelling and blasting, hoisting and conveying, pile-driving, etc.; aggregate and concrete plant. Principles of construction administration; evolution of management; objectives of management; principles of organisation; motivation and communication; project management. The role of government and local government authorities. An introduction to construction planning and scheduling; cost control and cost accounting; tenders and the preparation of estimates; scheduling of operations; linear programming, critical path and PERT techniques; contracts and specifications.

TEXT BOOKS

O'Neill, L. V. *Fundamentals of Estimating and Construction Cost Control.* Tait, 1966.
Antill, J. and Ryan, P. *Civil Engineering Construction.* A. & R.
Ryan, P. W. S. *Engineering Administration.* A. & R.

REFERENCE BOOKS

Refer to subjects 8.612 and 8.613S.

DEPARTMENT OF SURVEYING

8.801 Surveying I

Historical development of surveying methods and instruments, geodesy, cartography and astronomy. Introduction to modern aspects. Cartographic drawing and equipment. Surveying methods and instruments. Computations.

TEXT BOOK

Clark, D. *Plane and Geodetic Surveying.* Vol. I, 5th Edition, Constable, 1965.

REFERENCE BOOK

Sandover, J. A. *Plane Surveying.* Arnold, 1961.

8.802 Surveying II

Introduction to errors of observation. Engineering surveys; investigation and setting out surveys including height determination by barometric, trigonometric and differential levelling. Plane triangulation, traversing, contours, areas, volumes. Horizontal and vertical curves, hydrographic

surveying. Cartography, topographical surveys, atlas map projections, map reproduction. Geometrical optics, lens systems and thick lenses, aberrations of optical systems, applications.

TEXT BOOKS

Clark, D. *Plane and Geodetic Surveying.* Vol. I, 5th Edition, Constable, 1965.

Clark, D. *Plane and Geodetic Surveying.* Vol. II, 5th Edition, Constable, 1963.

8.803S Surveying III

Graduation errors, linear and angular. Optical and electronic distance measurement. Mining and tunnel surveys. Survey methods for engineering projects.

TEXT BOOKS

Clark, D. *Plane and Geodetic Surveying.* Vol. I, 5th Edition, Constable, 1965.

Clark, D. *Plane and Geodetic Surveying.* Vol II, 5th Edition, Constable, 1963.

Hardy and Perrin. *The Principles of Optics.* McGraw-Hill, 1956.

REFERENCE BOOK

Sandover, J. A. *Plane Surveying.* Arnold, 1961.

8.821 and 8.821S Geodesy I

Figure of the earth, geoid, ellipsoid. Differential geometry. Angle, directions and distance measurement, estimates and tests of precision. Surveyors' projections, transformations from plane to spheroid. Adjustment of control surveys, triangulation, trilateration. Approximate adjustments.

TEXT BOOKS

Clark, D. *Plane and Geodetic Surveying.* Vol. II, 5th Edition, Constable, 1963.

Bomford, G. *Geodesy.* Clarendon Press, 1962.

REFERENCE BOOKS

Rainsford, H. F. *Surveying Adjustments and Least Squares.* Constable, 1957.

Eisenhart, L. P. *A Treatise on Differential Geometry of Curves and Surfaces.* Dover, 1960.

Thomas, P. D. *Conformal Projections in Geodesy and Cartography.* U.S. Coast Geodetic Survey Special Publication No. 251, 1952.

8.822 Geodesy II

Calculations on the ellipsoid; longitude, latitude and reverse azimuth. Major horizontal control surveys, plumb line deviations and Laplace stations. Base lines, precise traversing, trilateration, high precision levelling. Reconnaissance, methods of estimating precision.

TEXT BOOKS

Clark, D. *Plane and Geodetic Surveying.* Vol. II, 5th Edition, Constable, 1963.
Richardus and Allman. *Project Surveying.* North Holland, 1966.

8.831S Astronomy I

The celestial sphere and the astronomical triangle. Time. Latitude, longitude and azimuth determinations; best position, balancing, circum- and ex-meridian methods. Position lines. Sun observations.

TEXT BOOKS

Textbook of Field Astronomy. H.M.S.O., 1960.
Star Almanac for Land Surveyors for 1967. H.M.S.O.

8.832 Astronomy II

Precise time of observation. Geodetic methods for determination of precise latitude, longitude and azimuth. Astrolabes. Reduction of star-co-ordinates from Mean to Apparent Place.

REFERENCE BOOK

Roelofs, R. *Astronomy Applied to Land Surveying.* Ahrend, 1950.

8.841 Surveying Computations

Plane trigonometry formulae, use of tables, calculation of triangles, areas, roadways, subdivisions, curves. Co-ordinate and traverse computations.

TEXT BOOK

Seven Figure Mathematical Tables. Chambers, 1958.

8.842S Surveying Computations

Transformations. Resection, intersection. Error theory. Adjustment by least squares, variance-covariance matrix.

TEXT BOOKS

Richardus and Allman. *Project Surveying.* North Holland, 1966.
Seven Figure Mathematical Tables. Chambers, 1958.

REFERENCE BOOKS

Vega. *Seven Figure Logarithmic Tables.*
Shortrede. *Logarithms of Sines and Tangents for Every Second.* Layton.
Tables of Natural Sines, Tangents etc. to Every Ten Seconds. D.M.R., 1949.

8.851S Photogrammetry I

Photogrammetric optics, stereoscopic vision. Geometry of air photo, central perspective projection. Survey cameras, photographic materials. Radial triangulation, rectification, mosaics. Photogrammetric orientation, photo-interpretation.

8.852 Photogrammetry II

Camera calibration, focal length, principal point. Stereoscopic instruments, restitution and approximate instruments. Aerial triangulation, propagation of errors, strip and block adjustment. Flight planning, auxiliary instruments. Aerial mapping.

TEXT BOOK

Hallert, B. *Photogrammetry*. McGraw-Hill, 1960.

8.881S Land Law, Valuation and Utilization

Survey Law — General outline, history. Land tenure, boundaries, easements. Common law, statute law. Equity and case law. Relevant acts and regulations.

Land Valuation — General principles, unimproved and improved capital value, valuation of freehold and leasehold, depreciation. Relevent acts, regulations and court procedures. Urban and rural valuations.

Land Utilization — Climate, vegetation, soils. Erosion and conservation. Land types; classification and use. Tree identification.

TEXT BOOK

Murray, J. F. N. *Principles and Practice of Valuation*. C'wealth Inst. of Valuers, 1966.

8.882 Cadastral Surveying

Land tenure, registration and cadastral surveys in selected countries. Survey practice law, professional ethics, surveyors' rights, powers and duties. Cadastral surveys in New South Wales; searches, Torrens and Old System title surveys, identification surveys, field records and plans.

TEXT BOOK

Willis. *Survey Investigation*. Registrar-General's Dept.

REFERENCE BOOK

Dawson and Sheppard. *Land Registration*. H.M.S.O., 1956.

SCHOOL OF ELECTRICAL ENGINEERING

6.001S Electrical Engineering

Advanced circuit theory, analysis and synthesis, electrical measurements and electric and magnetic field theory. The laboratory work in electrical measurements is part of the co-ordinated course serving this subject and 6.322S Electronics.

CIRCUIT THEORY SECTION

TEXT BOOK

Van Valkenburg. *An Introduction to Modern Network Synthesis*. Wiley.

REFERENCE BOOKS

Guillemin. *Synthesis of Passive Networks*. Wiley.
Tuttle. *Network Synthesis*. Wiley.

CONTROL SECTION

No specified Text or Reference Books.

FIELD THEORY SECTION

TEXT BOOK

Reitz and Milford. *Foundations of Electromagnetic Theory.* Addison Wesley, 1960.

REFERENCE BOOK

Fano, Chu and Adler. *Electromagnetic Fields, Energy and Forces.* Wiley.

MEASUREMENTS SECTION

TEXT BOOK

Golding and Widdis. *Electrical Measurements and Measuring Instruments.* Pitman, 1963.

REFERENCE BOOKS

Terman and Pettit. *Electronic Measurements.* McGraw-Hill.
Harris. *Electrical Measurements.* Wiley.

SWITCHING THEORY, COMPUTER ORGANISATION AND PROGRAMMING SECTION

TEXT BOOK

Nashelsky. *Digital Computer Theory.* Wiley.

REFERENCE BOOKS

Bartee, Lebow and Reed. *Theory and Design of Digital Machines.* McGraw-Hill.
Caldwell. *Switching Circuits and Logical Design.* Wiley.
Marcus. *Switching Circuits for Engineers.* Prentice-Hall.
Arden. *Introduction to Digital Computing.* Addison-Wesley.
Chu. *Digital Computer Design Fundamentals.* McGraw-Hill.
Warfield. *Principles of Logic Design.* Ginn and Co.

6.052 Electrical Engineering

Measurement methods in electrical engineering.

TEXT BOOK

Golding and Widdis. *Electrical Measurements and Measuring Instruments.* Pitman, 1963.

REFERENCE BOOKS

Harris. *Electrical Measurements.* Wiley.
Terman and Pettit. *Electrical Measurements.* McGraw-Hill.

6.064 Introduction to Computer Science

An introductory course covering basic machine organization, order coder, procedure oriented languages and problem solving.

TEXT BOOK

Nashelsky. *Digital Computer Theory.* Wiley.

REFERENCE BOOKS

Arden. *An Introduction to Digital Computing.* Addison-Wesley.
Bartee, Lebow and Reed. *Theory and Design of Digital Machines.* McGraw-Hill.
Sherman. *Programming and Coding Digital Computers.* Wiley.

6.101 Electric Circuit Theory

A first course in the basic principles of electrical engineering and their application to the solution of circuits. The rationalized MKS system of units. Solution of DC networks under steady state conditions. Characteristics of two terminal linear and non-linear components. Electrostatics. Single transients in electric circuits. Alternating voltages and currents. Components. Series RL and RC circuits. Power. Resonance.

TEXT BOOKS

Timbie and Bush. *Principles of Electrical Engineering.* 4th Edition, Wiley,
or
Clement and Johnson. *Electrical Engineering Science.* McGraw-Hill.
C.R.C. *Standard Mathematical Tables.* Chemical Rubber Publishing Co.,
or
Burlington. *Mathematical Tables and Formulas.* McGraw-Hill.

REFERENCE BOOKS

Ham and Sleeman. *Scientific Basis of Electrical Engineering.* Wiley.
McGreevy. *The MKS System of Units.* Pitman.
M.I.T. *Electric Circuits.* Wiley.

6.102 Circuit Theory

General network theory. Mesh and nodal equations. Steady state and transient analysis of lumped parameter systems, Laplace transformation. Three phase circuits, balanced and unbalanced. Feedback theory, stability, Nyquist criterion, elementary compensation techniques. Fourier series analysis, Fourier integral. Transmission lines.

TEXT BOOKS

Network Analysis Section
Ley, Lutz and Rehberg. *Linear Circuit Analysis.* McGraw-Hill.
Feedback Theory Section
Kuo. *Automatic Control Systems.* Prentice-Hall.
Transmission Lines Section
Magnusson. *Transmission Lines and Wave Propagation.* Allyn and Bacon.

REFERENCE BOOKS

Bohn. *The Transform Analysis of Linear Systems.* Addison-Wesley.
Kerchner and Corcoran. *Alternating Current Circuits.* 4th Ed. Wiley.
Prensky. *Electronic Instrumentation.* Prentice-Hall.

6.152 Circuit Theory

Syllabus as for 6.102 except feedback theory.

TEXT BOOK

No specified Text.

REFERENCE BOOKS

Clement and Johnson. *Electrical Engineering Science.* McGraw-Hill.
Edminister. *Electric Circuits.* Schaum.
Le Page and Seely. *General Network Analysis.* McGraw-Hill.
Ley, Lutz and Rehberg. *Linear Circuit Analysis.* McGraw-Hill.
Scott. *Linear Circuits — Parts I and II.* Addison-Wesley.

6.201 Electric Power Engineering

Introduction to the principles of steady state operation of transformers and rotating machines used for the conversion of energy. Generalized machines. DC machines. Metadynes. Transformers. Three phase and single phase synchronous and induction machines.

TEXT BOOK

Fitzgerald and Kingsley. *Electric Machinery. 2nd Ed.,* McGraw-Hill.

REFERENCE BOOKS

Clayton. *Design and Performance of D.C. Machines.* Pitman.
Draper. *Electrical Machines.* Longmans.
M.I.T. *Magnetic Circuits and Transformers.* Wiley.
Say. *Design and Performance of A.C. Machines.* Pitman.

6.202S Power Systems

The performance of power systems under steady load and fault conditions. Transformers. Transmission line parameters. Steady state and unbalanced loads and faults. Voltage surges. System stability. System protection. The laboratory work is part of the co-ordinated course serving this subject and 6.401S Control Systems and 6.212S Machines.

TEXT BOOK

Stevenson. *Elements of Power System Analysis.* 2nd Ed., McGraw-Hill.

REFERENCE BOOKS

Kimbark. *Power System Stability.* Vols. I, II and III. Wiley.
Starr. *Generation Transmission and Utilization of Electrical Power.* Pitman.
Westinghouse Electric Corp. *Electrical Transmission and Distribution Reference Book.*

6.212S Machines

Aspects of machine operation will be developed from the basic treatment of 6.201, to include cross-field machines, parallel operation of synchronous machines, developments on induction machines, both individually and in combination with A.C. commutator machines for power factor and speed control. Transient operation, saturation, harmonics, saliency, and unbalanced conditions will be considered. The laboratory work is part of the co-ordinated course serving this subject and 6.401S Control Systems and 6.202S Power Systems.

TEXT BOOK

Fitzgerald and Kingsley. *Electric Machinery.* McGraw-Hill.

REFERENCE BOOKS

Adkins. *The General Theory of Electrical Machines.* Chapman and Hall.
Clayton. *Performance and Design of D.C. Machines.* Pitman.
Draper. *Electrical Machines.* Longmans.
Kimbark. *Power System Stability. Vol. III* Wiley.
Say. *Performance and Design of A.C. Machines.* Pitman.
Taylor. *Performance and Design of A.C. Commutator Motors.* Pitman.
Tustin. *Direct Current Machines for Control Systems.* Sporn.
Veinott. *Theory and Design of Small Induction Motors.* McGraw-Hill.
White and Woodson. *Electromechanical Energy Conversion.* Wiley
Wood. *Theory of Electrical Machines.* Butterworth.

6.251 Electric Power Engineering

Syllabus and Book List as for 6.201.

6.262 Electrical Machines

Covers aspects of rotating machines as components of power and control systems.

Book List as for 6.212S.

6.301 Electronics

An introduction to the physical basis of electronics and electronic circuits. Topics include solid state, vacuum and gas-filled devices, rectifiers, amplifiers, oscillators and an introduction to radio communications.

ELECTRON PHYSICS SECTION

TEXT BOOK

Gray, De Witt, Boothroyd and Gibbons. *Physical Electronics and Circuit, Models of Transistors,* S.E.E.C. Vol. II. Wiley, 1964.

REFERENCE BOOKS

Adler-Smith and Logini. *Introduction to Semiconductor Physics.* S.E.E.C. Vol. I. Wiley.
Nussbaum. *Semiconductor Device Physics.* Prentice-Hall.
Van der Ziel. *Solid State Physical Electronics.* Prentice-Hall.

ELECTRONIC CIRCUITS SECTION

TEXT BOOKS

Joyce and Clarke. *Transistor Circuit Analysis.* Addison-Wesley.
Alley and Attwood. *Electronic Engineering.* Wiley, *or*
Ryder. *Electronic Applications and Fundamentals.* McGraw-Hill.

REFERENCE BOOKS

Semiconductor Electronics Education Committee Series. Wiley.
Vol. 1. Adler et al. *Introduction to Semiconductor Physics.*
Vol. 3. Searle et al. *Elementary Circuit Properties of Transistors.*
Vol. 4. Thornton et al. *Characteristics and Limitations of Transistors.*
Vol. 5. Thornton et al. *Multistage Transistor Circuits.*

Vol. 6. Harris. *Digital Transistor Circuits.*
Vol. 7. Thornton et al. *Handbook of Basic Transistor Circuits.*
G. E. *Silicon Controlled Rectifier Manual.*
Hunter. *Handbook of Semiconductor Electronics.* 2nd Edition. McGraw-Hill.
Phillips. *Transistor Circuit Engineering.* McGraw-Hill.
Terman. *Electronic and Radio Engineering.* 4th Edition. McGraw-Hill.
Texas Instruments Inc. *Transistor Circuit Design.* McGraw-Hill.

Data Handbooks

R.C.A. *Semiconductor Products Handbook,* HB10.
Mullard. *Technical Handbook.*
Fairchild. *Semiconductor Products Manual.*

6.302S Communications A

Theory and practice of certain aspects of communications engineering. Topics include modulation theory, demodulation, calculation, use and measurement of noise factor, oscillators, tuned amplifiers, transmitters and receivers. An integrated laboratory course is provided to serve the subjects 6.302S Communications A, 6.312S Communications B and 6.332S Communications C.

6.312S Communications B

Topics generally include guided propagation, information theory and noise, transmission lines, telephone networks, line communication equipment.

6.332S Communications C

Topics include propagation radiation, aerials, radar, navigational aids, radio astronomy, acoustics, vision, TV systems and equipment.

The Text and Reference Book list for these *three subjects* combined is the same as the combined list for the *two* subjects 6.352 and 6.362.

6.322S Electronics

A co-ordinated presentation of the theory and practice of semiconductors and thermionic devices. Topics include rectification and inversion, amplification, modulation and demodulation, switching circuits and square loop magnetics.

TEXT BOOK

No specified Text.

REFERENCE BOOKS

Dean. *An Introduction to Counting Techniques and Transistor Circuit Logic.* Chapman and Hall.
G. E. *Silicon Controlled Rectifier Manual.*
Joyce and Clarke. *Transistor Circuit Analysis.* Addison-Wesley.
Landley, Davis and Albrecht. *Electronic Designers Handbook.* McGraw-Hill.

Millman and Taub. *Pulse, Digital and Switching Waveforms.* McGraw-Hill.
Motorola. *Power Transistor Handbook.*
Motorola. *Silicon Zener Diode and Rectifier Handbook.*
Motorola. *Switching Transistor Handbook.*
Schaefer. *Rectifier Circuits.* Wiley.
Texas Instruments Inc. *Transistor Circuit Design.* McGraw-Hill.

6.352 Communications

Syllabus as for 6.302S.

TEXT BOOK

Terman. *Electronic and Radio Engineering.* 4th Edition, McGraw-Hill.

REFERENCE BOOKS

Semiconductor Electronics Education Committee Series. Wiley.
Vol. 2. Gray, De Witt, Boothroyd and Gibbons. *Physical Electronics and Circuit Models of Transistors.*
Vol. 3. Searle et al. *Elementary Circuit Properties of Transistors.*
Vol. 4. Thornton et al. *Characteristics and Limitations of Transistors.*
Vol. 5. Thornton et al. *Multistage Transistor Circuits.*
Joyce and Clarke. *Transistor Circuit Analysis.* Addison-Wesley.
Millman and Taub. *Pulse, Digital and Switching Waveforms.* McGraw-Hill, 1965.
Phillips. *Transistor Engineering.* McGraw-Hill.
Schwartz. *Information, Transmission, Modulation and Noise.*
Sturley. *Radio Receiver Design.* Chapman and Hall.
Tucker. *Modulators and Frequency Changers.* McDonald, 1953.

6.356 Electronics

An introduction to the physical basis of electronics and of electronic circuits. Topics include principles of operation of solid state, vacuum and gas-filled devices. Basic types of electronic amplifiers.

TEXT BOOK

Phillips. *Transistor Engineering.* McGraw-Hill, *or*
Gray, De Witt, Boothroyd and Gibbons. *Physical Electronics and Circuit Models of Transistors.* Wiley.

REFERENCE BOOKS

Alley and Attwood. *Electronic Engineering.* Wiley.
Gray, De Witt, Boothroyd and Gibbons. *Physical Electronics and Circuit Models of Transistors.* Wiley.
Hunter. *Handbook of Semiconductor Electronics.* 2nd Edition. McGraw-Hill, 1962.
Joyce and Clarke. *Transistor Circuit Analysis.* Addison-Wesley.
Myers, Wong and Gordy. *Reliability Engineering for Electronic Systems.* Wiley.
Phillips. *Transistor Engineering.* McGraw-Hill.
Van der Ziel. *Solid State Physical Electronics.* Macmillan.
Lindmayer and Wrigley. *Fundamentals of Semiconductor Devices.* Van Nostrand, 1965.

6.357 Electronics

An extension of 6.356 with topics including rectifiers, amplifiers, oscillators, modulation and demodulation and switching circuits.

TEXT BOOK

No specified Text.

REFERENCE BOOKS

Alley and Attwood. *Electronic Engineering.* Wiley.
Angelo. *Electronic Circuits.* McGraw-Hill.
Fitchen. *Transistor Circuit Analysis and Design.* Van Nostrand.
Hakim and Barrett. *Transistor Circuits in Electronics.* Iliffe.
Joyce and Clarke. *Transistor Circuit Analysis.* Addison-Wesley.
Pierce. *Transistor Circuit Theory and Design.* Merrill.

6.362 Communications

Syllabus as for 6.312S.

TEXT BOOK

No specified Text.

REFERENCE BOOKS

Glazier and Lamont. *Transmission and Propagation.* Her Majesty's Stationery Office, 1958.
Hallen. *Electromagnetic Theory.* Chapman and Hall.
Hancock. *An Introduction to the Principles of Communication Theory.* McGraw-Hill.
Javid and Brenner. *Analysis, Transmission and Filtering of Signals.* McGraw-Hill.
Jordan. *Electromagnetic Waves and Radiating Systems.* Constable.
Karbowiak. *Trunk Waveguide Communication.* Chapman and Hall, 1965.
Kimbark. *Electrical Transmission of Power and Signals.* Wiley.
Krauss. *Electromagnetics.* McGraw-Hill.
Lovering. *Radio Communication.* Longmans Green.
Russell. *Modulation and Coding in Information Systems.* Prentice-Hall.
Skilling. *Electric Transmission Lines.* McGraw-Hill.
Starr. *Telecommunications.* Pitman.

6.401S Control Systems

Stability and performance, including compensation of linear control systems using frequency response and root locus techniques. Use of analogue computers. Process control. Control system components. The laboratory work is part of the co-ordinated course serving this subject and 6.202S Power Systems and 6.212S Machines.

TEXT BOOK

No specified Text.

REFERENCE BOOKS

Bower and Schultheiss. *Introduction to Servomechanism.* Wiley.
Chestnut and Mayer. *Servomechanism and Regulating System Design.* Vol. I. Wiley.

Gilbert. *The Design and Use of Electronic Analogue Computers.* Chapman and Hall.
Gille, Pelegrin and Decauline. *Feedback Control Systems.* McGraw-Hill.
Raven. *Automatic Control Engineering.* McGraw-Hill.
Stockdale. *Servomechanisms.* Pitman.

6.454 Power Systems and Control

Power Systems — Performance of transformers and power systems under steady load and fault conditions. *Control* — A study of the performance and analysis of automatic control systems.

TEXT BOOKS

M.I.T. *Magnetic Circuits and Transformers.* Wiley.
Shinners. *Control System Design.* Wiley.
Stevenson. *Elements of Power System Analysis.* 2nd Edition. McGraw-Hill, 1962.

REFERENCE BOOKS

Bower and Schultheiss. *Introduction to Servomechanisms.* Wiley.
Kimbark. *Power System Stability.* Vols. I, II and III. Wiley.
Raven. *Automatic Control Engineering.* McGraw-Hill.
Stockdale. *Servomechanisms.* Pitman.
Westinghouse Electric Corp. *Electrical Transmission and Distribution Reference Book.*

6.501 Electrical Engineering (Honours)

Material will be selected from the following:

Engineering differential equations; Laplace and Fourier transforms; complex variables; generalized feedback theory; stability criteria; statistical methods of analysis; analogous system simulation; signal flow and matrix methods in electrical engineering.

TEXT BOOK

Faddeeva. *Computational Methods of Linear Algebra.* Dover.

REFERENCE BOOKS

Cunningham. *Introduction to Nonlinear Analysis.* McGraw-Hill.
Hohn. *Elementary Matrix Algebra.* Macmillan.
Varga. *Matrix Iterative Analysis.* Prentice-Hall.

6.502S Electrical Engineering (Honours)

Material will be selected from the following:

Machine matrix equations; the primitive electrical machine; root locus applications; pulse techniques; sampled data; analysis of linear and nonlinear systems containing noise; information theory; circuit synthesis; applications of electromagnetic theory; combinational and sequential switching theory.

TEXT BOOKS

Lee. *Statistical Theory of Communication.* Wiley.
Reitz and Milford. *Foundations of Electromagnetic Theory.* Addison-Wesley, 1960.
Shercliff. *A Textbook of Magnetohydrodynamics.* Pergamon.

REFERENCE BOOKS

Caldwell. *Switching Circuits and Logical Design.* Wiley.
Cowling. *Magnetohydrodynamics.* Interscience.
Marcus. *Switching Circuits for Engineers.* Prentice-Hall.
Phister. *Logical Design of Digital Computers.* Wiley.
Spiegel. *Theory and Problems of Vector Analysis.* Interscience.

6.801 and 6.801S Electrical Engineering

A special course for metallurgists and engineers not intending to follow electrical engineering as a profession. Presentation of the fundamental principles of electric and magnetic circuits and vacuum tubes and the application of these principles to the theory, performance and control of electrical equipment.

6.802 and 6.802S Electrical Engineering

More advanced work following on 6.801 with emphasis on applications of electronic equipment and the theory of control systems and instrumentation.

TEXT BOOK

Smith. *Circuits, Devices and Systems.* Wiley.

REFERENCE BOOKS

Del Toro. *Principles of Electrical Engineering.* Prentice-Hall.
Sutcliffe. *Electronics for Students of Mechanical Engineering.* Longmans.

6.811 Electronic Instrumentation for Surveyors

Measurement of time, frequency and distance. Propagation of electromagnetic waves affecting the accuracy of tellurometry, time measurement, position finding and navigational aids.

6.841 Electronic Instrumentation

Fundamentals of electronic instrumentation, in particular the operation and use of equipment at audio and sub-audio frequencies for the measurement and recording of small signals in the presence of noise. The laboratory course comprises mainly demonstration experiments. Up to four weeks of field instruction will be included in the course.

6.901S Seminar

6.911 Thesis

For pass degree students in the fourth year of the full-time course.

6.921 Thesis

For honours degree students in the fourth year of the full-time course.

SCHOOL OF MECHANICAL ENGINEERING

5.001 Engineering I

A. *Descriptive Geometry and Engineering Drawing*

Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position and of measurement. Construction of the ellipse. Various surfaces and solids, their sections, developments and intersections in solid geometry. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualize problems and processes involved in their solution.

Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic and isometric projections. The student will be required to sketch and to make accurate detail drawings and/or assembly drawings of a number of machine parts and elements.

B. *Engineering Mechanics*

Statics: Two-dimensional force systems. Laws of equilibrium. Concurrent and non-concurrent forces, funicular polygon. Statics applied to rigid bars. Concepts of shear force, axial force and bending moment. Statics of pin-jointed frames, analytical and graphical treatment. Three-dimensional statics. Composition and resolution of forces. General laws of equilibrium.

Graphs: Construction of graphs, lines charts. Linearization, logarithmic graphs. Graphical differentiation and integration.

C. *Mechanical Technology*

Materials and processes. Definitions. Ferrous metals. Semi-finishing: Casting; forging; extruding; drawing. Elementary machining processes. Simple machine tools: Drilling machine; lathe; shaper. Non-detachable joints; soldering, brazing, welding, riveting.

(A) Descriptive Geometry

TEXT BOOK

Robertson. *Descriptive Geometry.* Hardcover ed. Pitman.

REFERENCE BOOK

Abbott. *Practical Geometry and Engineering Graphics.*

(B) Engineering Drawing

TEXT BOOK

Institution of Engineers, Australia. *Australian Standard Engineering Drawing Practice.* (A.S. C.Z.1, 1966.)

(C) Mechanical Technology

TEXT BOOK

De Garmo. *Materials and Processes in Manufacturing.* Macmillan.

(D) Engineering Mechanics

TEXT BOOKS

Hall, A. S. *Construction of Graphs and Charts.* Pitman.
Hall, A. S. and Archer, F. E. *Engineering Mechanics Lecture Notes.*

REFERENCE BOOKS

Rule and Watts. *Engineering Mechanics.* McGraw-Hill.
Timoshenko and Young. *Engineering Mechanics.* McGraw-Hill.

5.001/1 and 5.001/2 Engineering I—Parts 1 and 2

Part 1 consists of the sections on Descriptive Geometry and Engineering Drawing. Part 2 consists of the sections on Engineering Mechanics and Workshop Technology.

5.011 Engineering I

This subject consists of the Descriptive Geometry and the Engineering Mechanics section of 5.001.

5.021S Seminar

For students in the full-time course in Mechanical Engineering.

5.023 Seminar

For students in the B.Sc. (Tech.) course in Mechanical Engineering.

5.041 Thesis

For students in the part-time course in Mechanical Engineering.

5.051 Thesis

For students in the full-time course in Mechanical Engineering.

5.061 Technical Orientation

Designed to inform students of the art and technique of technical communication, the forms of engineering professional work and the nature of the courses of instruction. A major objective is to bring staff and students together in an atmosphere of discussion and enquiry. May include one or two visits to special establishments.

5.101S Mechanical Engineering Design

Design procedures, loadings and factors of safety, standards. Stresses in bolts. Discussion of problems involving simple stresses. Design of shafts and bearings, belt drives, friction clutches, springs and screws for power applications. Design of spur gear drives in accordance with BSS 436, introduction of worm gear design in accordance with BSS 721. Design of hand brakes and shoe brakes. Crane design.

TEXT BOOKS

Faires, V. M. *Design of Machine Elements,* 4th Edition, 1965.
Matousek. *Engineering Design.*

REFERENCE BOOKS

Dobrovolsky et al. *Machine Elements.*
Shigley. *Mechanical Engineering Design.*
Phelan. *Fundamentals of Mechanical Design.*
Marks. *Mechanical Engineer's Handbook.*
Kent. *Mechanical Engineer's Handbook — Design and Production.*
Aust. Standard Engineering Drawing Practice, 1966.
B.S. 1916, Part 1, 1953. *Limits and Fits for Engineering.*
B.S. 1916, Part 2, 1953. *Guide to the Selection of Fits.*
Oberg and Jones. *Machinery Handbook.*
B.S. 2517, 1959. *Definitions for Use in Mechanical Engineering.*
For revision and additional information students may consult
Timoshenko and Goodier. *Theory of Elasticity.*
Timoshenko and Young. *Strength of Materials,* 4th Edition.
Laughner and Hargan, Editors. *Handbook of Fastening and Joining of Metal Parts.*
Lyman and Gerlach, Editors. *Metals Handbook.*

5.101/1 and 5.101/2 Mechanical Engineering Design — Parts 1 and 2

Students in the Bachelor of Science (Technology) course in Mechanical Engineering will take 5.101S in two parts. 5.101/1 consists of the work set out under A and 5.101/2 consists of the work set out under B.

5.101A Mechanical Engineering Design

For full-time Industrial Engineering students. Consists of the subject-matter of 5.101/1.

TEXT BOOKS

A.S. No. C.B.2, 1960, *S.A.A. Crane and Hoist Code.*
B.S. 436, 1940. *Machine Cut Helical and Spur Gears.*
Matousek. *Engineering Design.*
Shigley. *Mechanical Engineering Design.*

REFERENCE BOOKS

Faires. *Design of Machine Elements,* 4th Edition, 1965.
Aust. Standard Engineering Drawing Practice, 1966.
Merritt. *Gears.*
Marks. *Mechanical Engineer's Handbook.*
Phelan. *Fundamentals of Mechanical Design.*
Kent. *Mechanical Engineer's Handbook, Design and Production.*
B.S. 1916, Part 1, 1953. *Limits and Fits for Engineering.*
B.S. 1916, Part 2, 1953. *Guide to the Selection of Fits.*
B.S. 721, 1963. *Machine Cut Gears — Worm Gearing.*
Regulations under Scaffolding and Lifts Act, 1912-1958.

5.102 Mechanical Engineering Design

Lectures — Advanced application of strength of materials with respect to the design of reciprocating machinery. Balancing of rotating and reciprocating masses. Flywheel determination. Governors.

Drawing Office — Design of elements encountered in reciprocating machinery. Crankshafts, connecting rods, pistons, cams, governors, etc.

TEXT BOOKS

Matousek. *Engineering Design.*
Purday. *Diesel Engine Designing.*
Faires. *Design of Machine Elements,* 4th Edition, 1965.

REFERENCE BOOKS

Shigley. *Mechanical Engineering Design.*
Ricardo. *High-speed Internal Combustion Engines.*
Mackerle. *The Air-cooled Engine.*
B.S. 649, 1958. *Diesel Engines for General Purposes.*
Aust. Standard Engineering Drawing Practice, 1966.
B.S. 2517, 1959. *Definitions for Use in Mechanical Engineering.*
Marks. *Mechanical Engineer's Handbook.*
Kent. *Mechanical Engineer's Handbook, Design and Production.*
Oberg and Jones. *Machinery Handbook.*
B.S. 1916, Part 1, 1953. *Limits and Fits for Engineering.*
B.S. 1916, Part 2, 1953. *Guide to the Selection of Fits.*

5.103 Mechanical Engineering Design

Lectures — Advanced application of strength of materials with respect to various design problems.

Drawing Office — Major design project and relevant engineering investigations.

TEXT BOOKS

Faires. *Design of Machine Elements,* 4th Edition, 1965.
Matousek. *Engineering Design.*
Pippenger and Koff. *Fluid Power Controls.*

REFERENCE BOOKS

These are the same as those shown for 5.101/1, with the following additions:

Marin. *Mechanical Behaviour of Engineering Materials.*
Spotts. *Mechanical Design Analysis.*
Shigley. *Mechanical Engineering Design.*

5.111 Mechanical Engineering Design

Introductory lectures illustrating the interdependence of design and technology. Mechanical technology. Introduction to workshop metrology. Philosophy and technique of design. Simple creative design assignments. Basic engineering elements.

TEXT BOOK

Faires. *Design of Machine Elements.* Macmillan.

REFERENCE BOOKS

Rolt. *Tools for the Job.* Batsford.
Finch, T. K. *The Story of Engineering.*

5.201 Mechanical Technology

General principles. Geometry of machine parts. Kinematics of machine tools. Action of metal-cutting tools. Mechanisms used in machine tools. Machine tool components. Actual machine tools. Centre lathes. Drilling and tapping. Milling. Lathes retaining tool settings. Semi- and fully-automatic lathes. Boring, boring mills. Horizontal boring machines. Jig-boring. Reciprocating machine tools. Planer, shaper, slotter. Broaching.

TEXT BOOKS

De Garmo. *Materials and Processes in Manufacturing.*

Davis. *Industrial Organisation and Management.* Harper, 1956. For 5.202S only.

REFERENCE BOOKS

Wright-Baker. *Modern Workshop Technology.*

Town. *Machine Shop Technology.*

5.203 Mechanical Technology

Gear-cutting. Grinding. Complex surfaces, profiling, automated machines. Dimensional accuracy, surface finish. Finishing processes. lapping, honing, super-finishing, gear-shaving. Plastic yielding of metals. Blanking and shearing. Bending. Hollow-ware. Forging. Casting. Rolling. Welding.

5.204S Mechanical Technology

Lathes retaining tool settings. Semi- and fully-automatic lathes. Boring, boring mills. Horizontal boring machines. Jig-boring, fine-boring. Reciprocating machine tools. Planer, shaper, slotter. Broaching. Gear-cutting. Grinding. Complex surfaces, profiling, automated machines. Dimensional accuracy, surface finish. Finishing processes, lapping, honing superfinishing, gear-shaving. Plastic yielding of metals. Blanking and shearing. Bending. Hollow-ware. Forging. Casting. Rolling. Welding.

For 5.203 and 5.204S

TEXT BOOK

De Garmo. *Materials and Processes in Manufacturing.*

REFERENCE BOOKS

Wright-Baker. *Modern Workshop Technology.*

Town. *Machine Shop Technology.*

Crane. *Plastic Working in Metals.*

5.301S and 5.301 Engineering Mechanics

Fundamentals of vector algebra. Kinematics of the plane motion of a particle. Dynamics of the plane motion of a particle. Unconstrained motion of a particle. Constrained motion of a particle Satellites. Systems of connected particles. Kinematics of the plane motion of a rigid body.

Dynamics of the plane motion of a rigid body. Kinematics and dynamics of the relative motion; Coriolis effects. The gyroscope.

TEXT BOOK

Beer and Johnston. *Mechanics for Engineers.* Vector Edition.

REFERENCE BOOKS

Timoshenko and Young. *Engineering Mechanics.*
Higdon and Stiles. *Engineering Mechanics.*

5.302S and 5.302 Theory of Machines

Kinematics of simple mechanisms. Dynamics of simple mechanisms; Principle of virtual work. Kinematics of cams (analysis, synthesis). Dynamics of cams (springs). Kinematics of toothed gearing (involutometry, non-standard gears, cutter-setting corrections). Gear trains (simple, compound, epicyclic).

TEXT BOOK

Hirschhorn. *Kinematics and Dynamics of Plane Mechanisms.*

REFERENCE BOOKS

Mabie and Ocvirk. *Mechanisms and Dynamics of Machinery.*
Rosenauer and Willis. *Kinematics of Mechanisms.*
Holowenko. *Dynamics of Machinery.*
Rothbart. *Cams.*
Buckingham. *Analytical Mechanics of Gears.*

5.303 Mechanical Vibrations

Periodic motions; Fourier analysis; simple harmonic motion. One-degree-of-freedom system (free undamped, free damped, forced undamped, forced damped). Some vibration-measuring instruments. Vibration isolation. Whirling speeds of shafts (Rayleigh's method, Dunkerley's formula). Free torsional vibrations of shafts (two and three rotors only).

TEXT BOOK

Church. *Mechanical Vibrations.*

REFERENCE BOOKS

Den Hartog. *Mechanical Vibrations.*
Burton. *Vibration and Impact.*

5.306S Theory of Machines (Transition Subject)

Kinematics of complex mechanisms. Dynamic motion analysis. Advanced Kinematics of the plane motion. Mechanical vibrations. Inertia effects in machinery. Flywheel analysis.

TEXT BOOKS

Church. *Mechanical Vibrations.*
Holowenko. *Dynamics of Machinery.*
Hirschhorn. *Kinematics and Dynamics of Plane Mechanisms.*

REFERENCE BOOKS

Den Hartog. *Mechanical Vibrations.*
Burton. *Vibration and Impact.*
Mabie and Ocvirk. *Mechanisms and Dynamics of Machinery.*
Tse, Morse and Hinkle. *Mechanical Vibrations.*

5.311 Engineering Mechanics

Kinematics of Particle, rectilinear and curvilinear motions, Coriolis acceleration. Kinetics of Particle, Newton's laws, d'Alembert's principle, work, energy, impulse, momentum, Kepler's laws, satellites. Kinematics of Rigid Body, translation, fixed-axis rotation, general plane motion. Kinetics of Rigid Body, Moment of inertia, Steiner's law, centre of percussion, equivalent two-mass system, work, energy, impulse, momentum. Kinetics of Rigid Body in three-dimensional space, steady precession of gyroscope.

Book List as for 5.301

5.321 Automatic Control Engineering

Block diagrams and Laplace transform methods for system analysis. Transfer functions. Response functions. The general criterion for stability. Routh's criterion. Types of controller action and their effects on system response. Analysis of some pneumatic control system components including one or two types of pneumatic controller.

REFERENCE BOOKS

Chestnut and Mayer. *Servomechanisms and Regulating System Design*, Vol. 1.
Eckman. *Automatic Process Control.*
Raven. *Automatic Control Engineering.*
Young. *An Introduction to Process Control System Design.*

5.323S Automatic Control Engineering

Block diagrams and Laplace transform methods for system analysis. Transfer functions. Response functions. The general criterion for stability. Routh's criterion. Electronic Analogue Computer. Nyquist criterion. Bode diagrams. Types of controller action and their effects on system response. Optimum settings. Analysis of pneumatic controllers, correcting units and measuring units.

TEXT BOOK

Raven. *Automatic Control Engineering.*

REFERENCE BOOKS

Langhill. *Automatic Control Systems Engineering.* Vol. 1. Prentice-Hall.
Eckman. *Automatic Process Control.*
Young. *An Introduction to Process Control System Design.*
Nixon. *Principles of Automatic Control.*
Chestnut and Mayer. *Servomechanisms and Regulating System Design*, Vol. 1.

5.401S Numerical Methods

Introduction to digital computers—algorithms, flow charts, FORTRAN programming. Roots of non-linear equations; iteration. Systems of linear equations—direct and iterative methods. Finite differences; interpolation; numerical differentiation and integration. Solution of ordinary differential equations—series and stepwise methods. Finite difference methods for partial differential equations. Iterative methods in boundary value and initial value problems. Treatment of problems of particular importance to mechanical engineers.

REFERENCE BOOKS

Southworth and De Leeuw. *Digital Computation and Numerical Methods.* McGraw-Hill.

Salvadori and Baron. *Numerical Methods in Engineering.* Prentice-Hall.

Nielsen. *Methods in Numerical Analysis.* Macmillan.

Plumb. *Introduction to Fortran Programming.* McGraw-Hill.

5.402S and 5.402 Mechanics of Solids

Statically indeterminate beams. Oblique bending; bending of unsymmetrical and of composite beams. Shear stresses in thin-walled sections due to bending; shear centre. Stress distribution in curved beams. Torsion —membrane analogy. Thin-walled sections; solid non-circular sections.

Analysis of stress and strain—elastic strain energy, strain energy of distortion, theories of failure. Applications in design. Analysis of thick-walled and compound cylinders.

Energy methods and applications; statically indeterminate cases. Buckling of columns. Axial load and bending interaction. Tangent modulus; inelastic column curves. Local buckling. Strength under combined loadings—analysis of various modes of failure; interaction method.

TEXT BOOK

Shanley. *Strength of Materials.* McGraw-Hill.

REFERENCE BOOKS

Seely and Smith. *Advanced Mechanics of Materials.* Wiley.

Timoshenko and Young. *Elements of Strength of Materials.* Van Nostrand.

Den Hartog. *Advanced Strength of Materials.* McGraw-Hill.

5.501S and 5.501 Fluid Mechanics

Fluid properties: statics of liquids and gases; statics of moving systems; forces on surfaces. One-dimensional flow of inviscid incompressible fluid: streamlines; continuity, Euler and Bernoulli equations: energy equation. Introduction to dimensional analysis. Physical concept of boundary layer. Laminar and turbulent motion. Flow in pipes and conduits. Fluid measurements. Elementary study of unsteady flows. Linear and angular momentum theorems and elementary applications to turbomachines.

TEXT BOOKS

Barna. *Fluid Mechanics for Engineers, or*

Streeter. *Fluid Mechanics.* 4th Ed., *or*

Vennard. *Elementary Fluid Mechanics.* 4th Edition.

REFERENCE BOOK

B.S. 1042. *Flow Measurement.*

5.502S and 5.502 Fluid Mechanics

Dimensional analysis. Theory of models. Boundary layer theory on flat plates. Resistance of bodies. One-dimensional gas dynamics; isentropic, adiabatic flows. Flow of gases and vapours in nozzles. Theory of centrifugal pumps, axial flow pumps and turbines: similitude laws: cavitation.

TEXT BOOKS

Barna. *Fluid Mechanics for Engineers, or*
Shepherd. *Principles of Turbomachinery.*

REFERENCE BOOKS

Shapiro. *Dynamics and Thermodynamics of Compressible Fluid Flow.* Vol. 1, Parts 1 and 2.
Addison. *Centrifugal and Axial Flow Pumps.*
Streeter. *Fluid Mechanics.* 4th Ed.
Francis. *Fluid Mechanics.*
Zucrow. *Aircraft Propulsion.* Vol 1.

5.504 Fluid Mechanics

Three topics will be selected from:—

1. Dynamics of Fluid Flow: general form of conservation equations; kinematics, dilatation, rotation, circulation. Navier-Stokes equations, general equations of energy, entropy and vorticity; boundary layer solutions, laminar and turbulent: potential flow theory, airfoils, wings and propellers. 2. One dimensional gasdynamics: adiabatic, diabatic and isothermal flows in constant and variable area ducts; shock waves; combustion, detonation; generalised theory, simple combined solution. 3. Hydraulics turbines: characteristics and performance, selection and design problems. 4. Surges and water hammer. 5. Centrifugal and axial flow compressors, and gas turbines: design and performance criteria.

REFERENCE BOOKS

To be prescribed by the Lecturers.

5.511 Fluid Mechanics

Introduction to dynamics together with the subject matter shown under 5.501 Fluid Mechanics.

5.611 Fluid Mechanics/Thermodynamics

An integrated course in thermodynamics and fluid mechanics covering 5.501 Fluid Mechanics and 5.701 Thermodynamics.

Text and Reference Books are the same as those for 5.501 and 5.701.

5.701S and 5.701 Thermodynamics

Fundamental thermodynamic concepts. First and second laws and corollaries. Reversibility. General thermodynamic relations. Properties of a perfect gas, liquids and vapours. Non-flow and flow processes. Multi-stream steady flow processes. Carnot cycle. Rankine cycle, reheat and regenerative feed heating. Boilers and boiler auxiliaries. Otto, Diesel and mixed cycles. Cycles having Carnot efficiency.

TEXT BOOK

Van Wylen and Sonntag. *Fundamentals of Classical Thermodynamics.* Wiley.

REFERENCE BOOKS

Rogers and Mayhew. *Engineering Thermodynamics, Work and Heat Transfer, or*
Van Wylen. *Thermodynamics.*

Jones and Hawkins. *Engineering Thermodynamics.*
Mooney. *Introduction to Thermodynamics and Heat Transfer.*
Lee and Sears. *Thermodynamics.*
Beckwith and Buck. *Mechanical Measurements.*
Moore. *Theory and Application of Mechanical Engineering Measurements.*

5.702S and 5.702 Thermodynamics

Heat pump and refrigeration cycles. Vapour compression, absorption and compressed air systems. Properties of non-reactive mixtures of gases and vapours. Gibbs-Dalton law. Psychrometry. Hygrometric chart. Thermodynamic charts. Reciprocating engines and compressors, criteria of performance. Axial and radial flow, turbines and compressors. Gas turbine cycles with heat exchange, inter-cooling and reheat. Steady heat conduction through composite wall cylinders. Three-dimensional steady heat conduction in homogeneous materials. Relaxation processes. Unsteady one-dimensional heat conduction. Electrical analogy. Heat transfer by free and forced convection. Similarity parameters. Heat exchangers. Radiation heat exchange between black and non-black surfaces. Radiation geometric factors. Reciprocity theorem. Radiation from gases and flames.

TEXT BOOK

Rogers and Mayhew. *Engineering Thermodynamics, Work and Heat Transfer.*

REFERENCE BOOKS

Lee and Sears. *Thermodynamics.*
Van Wylen. *Thermodynamics.*
Giedt. *Principles of Engineering Heat Transfer.*
Soo. *Thermodynamics of Engineering Science.*
Shepherd. *Introduction to the Gas Turbine.*
Kearton. *Steam Turbine Theory and Practice.*

5.704 Thermodynamics

Thermodynamic relations. Equations of state for real substances. Unsteady state heat conduction. Mass, momentum and energy transport in fluids. Hydrodynamic and thermal boundary layers. Forced and free convection. Gas turbine cycle analysis. Analysis of flow through gas turbine components, matching of components. Air conditioning processes, components and systems. Reacting Mixtures.

REFERENCE BOOKS

To be prescribed by the Lecturers.

5.711 Thermodynamics

Fundamental thermodynamic concepts. First and Second laws of Thermodynamics and corollaries. Reversibility. General thermodynamics relations. Properties and pure substances. Equations of State. Non-flow and flow processes.

5.811 Aerodynamics

Navier-Stokes equations; elementary boundary layer theory; turbulence, convection, friction and form drag; airfoil characteristics. Vor-

ticity and circulation; Prandtl wing theory, induced drag, spanwise lift distribution, wing characteristics. Static longitudinal stability and control. Manoeuvrability. Standard atmosphere, performance calculations. One-dimensional gas dynamics, isentropic, adiabatic and nozzle flow; rocket equation.

TEXT BOOKS

Kuethe and Schetzer. *Foundations of Aerodynamics,* 2nd Edition.
Perkins and Hage. *Airplane Performance Stability and Control.*

REFERENCE BOOKS

Streeter. *Fluid Dynamics.*
Houghton and Brock. *Aerodynamics for Engineering Students.*

5.812 Aerodynamics

Potential theory of an ideal fluid, conformal Kutta-Joukowski transformation. Vortex streets. Aircraft dynamic stability. Advanced performance calculations. Normal oblique and conical shock and expansion waves. High speed wing theory.

TEXT BOOK

Perkins and Hage. *Airplane Performance Stability and Control.*

REFERENCE BOOKS

Air Registration Board. *British Civil Airworthiness Requirements.*
Royal Aeronautical Society. *Aerodynamics and Performance Data Sheets.*
Bonney. *Engineering Supersonic Aerodynamics.*
Vallentine. *Applied Hydrodynamics.*
Kaufmann. *Fluid Mechanics.*

5.822 Aircraft Strength of Materials

Equilibrium of forces, plane frames, space frames; inertia forces, load factors; beams—two moment equation, shear and bending stress distribution in various thin webbed beams, tapered beams, beams with variable flange areas. Semi-monocoque structures. Deflection of structures —Maxwell's and Castigliano's theorems, Williot diagram. Statically indeterminate structures—beams, trusses, stiff-jointed frames, using methods of superposition, energy, moment distribution, elastic centre; shear distribution in two-cell beam. Aircraft materials, physical properties and their measurement. Dimensionless stress-strain data.

TEXT BOOKS

Peery. *Aircraft Structures, or*
Niles and Newell. *Airplane Structures,* Vol. 1.

REFERENCE BOOK

Timoshenko. *Strength of Materials,* Part 1.

5.823 Aircraft Materials and Structures

Warping—open and closed sections; shear lag—simple cases; torsion of tube with root restraint; cut-outs in monococque structures. Beam columns—analytical and graphical methods. Buckling—columns with various end conditions, initial eccentricity; energy solution for columns, solution of non-uniform columns. Thin plates, buckling in compression,

shear, bending. Stringers, various forms of instability. Tension field beams: complete and incomplete. Plasticity effects in compression, bending and torsion. Strain gauges—theory use of rosettes. Mechanical testing of aircraft structures. Fatigue. Creep. Aero-elasticity.

TEXT BOOKS

Timoshenko and Goodier. *Theory of Elasticity.*
Peery. *Aircraft Structures.*

REFERENCE BOOKS

Gerard. *Introduction to Structural Stability Theory.*
Bruhn. *Analysis and Design of Flight Vehicle Structures.*
Williams. *Theory of Aircraft Structures.*
Royal Aeronautical Society. *Structures Data Sheets.*
Royal Aeronautical Society. *Handbook of Aeronautics No. 1.*
Shanley. *Weight-Strength Analysis of Aircraft Structures.*
Hendry. *Elements of Experimental Stress Analysis.*

5.831 Aircraft Propulsion

Aircraft power plant and propulsion systems. Basic thrust equations; propulsive efficiency. Propeller theory, characteristics and performance. Power plant thermodynamics. Fuels and combustion. Internal aerodynamics. Compressors and turbines, subsonic and supersonic intake diffusers, nozzles. Design and performance of aircraft reciprocating internal combustion engine and gas turbine systems. Ramjets, Rockets.

REFERENCE BOOKS

Shepherd. *Introduction to the Gas Turbine.*
Hesse. *Jet Propulsion.*
Zucrow. *Gas Turbines and Jet Propulsion.*
Schmidt. *The Internal Combustion Engine.*
Sutton. *Rocket Propulsion Elements.*
Shapiro. *Dynamics and Thermodynamics of Compressible Fluid Flow.*

5.901 Naval Architecture

Hydrostatics. Stability at small angles. Free surface effects. Inclining experiment. Trim due to weights and flooding. Grounding. Permeability. Ship arrangements and equipment. Building methods. Connections. General treatment of ship's structure. Lofting. Fairing of lines. Development of curved elements.

TEXT BOOK

Rossell and Chapman. *Principles of Naval Architecture,* Vol. I.

REFERENCE BOOKS

De Rooij. *Practical Shipbuilding.*
Arnott. *Design and Construction of Steel Merchant Ships.*

5.902 Naval Architecture

Stability at large angles and after flooding. Dynamic stability. Trochoidal wave theory. Wave patterns. Rolling, heaving and pitching. Launching—arrangements, procedure and calculations. Details of ship's

structure. Analysis and design of beams, girders, longitudinals, connections, pillars and lifting arrangements. Structural design to the requirements of a classification society.

TEXT BOOKS

Rossell and Chapman. *Principles of Naval Architecture.* Vols. I and II.
Arnott. *Design and Construction of Steel Merchant Ships.*

REFERENCE BOOKS

Wah. *A Guide for the Analysis of Ship Structures.*
Robb. *Theory of Naval Architecture.*
De Rooij. *Practical Shipbuilding.*
Lloyd's Register of Shipping. *Rules and Regulations for the Construction and Classification of Steel Ships.*

5.903 Naval Architecture

Hydrodynamics. Propulsion systems. Propeller theory and design. Trials and analysis of data. Steering. Design of rudders. Prime movers and auxiliaries. Ship systems—refrigeration, ventilation, pumping, flooding and draining. Elements of hull design. Longitudinal strength, transverse strength, strength of plate panels.

TEXT BOOK

Rossell and Chapman. *Principles of Naval Architecture,* Vol. II.

REFERENCE BOOKS

Wah. *A Guide for the Analysis of Ship Structures.*
Van Lammeren. *Resistance, Propulsion and Steering of Ships.*
Bullen. *The Ventilation of Ships.*
Schokker, Neuerburg and Vossnack. *The Design of Merchant Ships.*
Robb. *Theory of Naval Architecture.*

5.904 Naval Architecture

Design criteria, methods and data. Freeboard, tonnage and subdivision. Arrangements, equipment and specifications. Modern shipbuilding methods and prefabrication. Design of a vessel to provide dimensions, lines, hydrostatic curves, estimates of stability and trim, midship section and structural profile, freeboard, tonnage, power requirements, propeller design and general arrangements.

TEXT BOOK

Munro-Smith. *Merchant Ship Design.*

REFERENCE BOOKS

Schokker, Neuerburg and Vossnack. *The Design of Merchant Ships.*
The Commonwealth of Australia Navigation Act.
Ministry of Transport. *Instruction as to the Survey of Passenger Steamships.* Vol. I and II.
Ministry of Transport. *Instructions as to the Tonnage Measurement of Ships.*
Ministry of Transport. *Measurements of Vessels for the Panama Canal.*
Manning. *The Theory and Technique of Ship Design.*
Todd. *Ship Hull Vibration.*

DEPARTMENT OF INDUSTRIAL ENGINEERING

18.031S Minor Thesis

For pass students in the full-time course in Industrial Engineering.

18.041 Major Thesis

For honours students in the full-time course in Industrial Engineering.

18.111S Industrial Administration

Follows on and complements section (b) of 5.202S Mechanical Technology. The completion of the organization with job specifications. The use of operation instructions. Further analysis of the subsidiary functions to general management; their location in the organization and the use of common industrial techniques in their performance. Problem cases relating to the subsidiary functions are analysed and solved.

18.111/1 and 18.111/2 Industrial Administration

An examination of the principles and practices used in the development of an organization so that it can attain an industrial objective. The completion of the organization with job specifications. The use of operation instructions. An analysis of the principal functions of general management, production, engineering, sales, finance and personnel, followed by that of the subsidiary functions, their location in the organization and the use of common industrial techniques in their performance. Problem cases relating to the subsidiary functions are analysed and solved.

TEXT BOOKS

Buffa. *Modern Production Management.* Wiley, 1961.
Factories, Shops and Industries Act 43. Govt. Printing Office, 1962.
Moroney. *Facts from Figures.* Pelican A 235.

REFERENCE BOOK

Carson. *Production Handbook.* Ronald Press, New York.

18.121S Engineering Administration

Introduction to scientific management. Economic efficiency in the use of resources and facilities in manufacturing operations. Value engineering. Organization and the control function. Introduction to the use of mathematical techniques in the planning of production, in quality control, and batch control. The control of men in production and distribution. Fitting the workplace to the man. The use of incentives. Some aspects of industrial legislation. Arbitration and conciliation. Contracts and awards.

18.211S Production Control

The detailed mechanics of control of jobbing production in a metal working factory with variations on this basic system to cover repetitive batch production, and then continuous line production with flow control. Control of other types of manufacturing activity. Includes basic functions of each section of the manufacturing organization and the inter-relations

and necessary information flow between them. Cost considerations and implications of various policies. Requirements for automation. Application of fluid duplicator, punched card, and computer systems of control. Introduction to operations research in inventory and production control covering building of mathematical models of relevant situations, and their manipulation to yield decision rules. Replenishment rules. Linear programming applications, and the simplex method of solution. The transportation method. Total value and incremental value analysis under conditions of certainty and uncertainty.

18.221 Production Control

Similar to 18.211S Production Control.

TEXT BOOKS

Moore. *Production Control.* Int. Edition. McGraw-Hill.
Bowman and Fetter. *Analysis for Production Management.* Rev. Edition Irwin, 1961.

18.291S Production Control

For honours students in Industrial Engineering.

18.311S Methods Engineering

Planning and installation of manufacturing plants; location and site analysis; buildings and facilities; process and equipment selection; plant layout; maintenance problems. Ergonomics; work and effort; the dimensions of the workplace; workplace layout; the working environment and performance efficiency; fitting the job to the worker. Work measurement; motion and time study; recording and charting; work sampling; estimates for pre-determined motion times. Process analysis for production efficiency. Incentives: methods, improvement and work simplification.

Laboratory Work — Application of the laws of motion economy; workplace layout; the sequencing of manufacturing operations, time study; operation analysis and charting; the normal range of human movements and application to design of machine controls. Parameters and manifestations of physical fatigue.

18.321 Methods Engineering

Subject matter is similar to that of 18.311S Methods Engineering.

TEXT BOOKS

Barnes. *Motion and Time Study.* 5th Edition, Wiley, *or*
Niebel. *Motion and Time Study.* 3rd Edition, Irwin, Illinois.

REFERENCE BOOKS

Carson. *Production Handbook. 2nd Edition,* Ronald Press.
Maynard. *Industrial Engineering Handbook.* McGraw-Hill, 1956.
Ryan. *Work and Effort.* Ronald Press.
Quick, Duncan and Malcolm. *Work Factor Time Standards.* McGraw-Hill

18.411S Design for Production I (Materials and Processes)

Divided into two sections: (i) **Theory**—General. Growth of mass production and its influence on product design. Economic considerations. Product and process development. Materials and processes—Broad considerations in selecting materials and processes. (ii) **Laboratory**—A study of some of the fundamentals of metal removal, tool life, chip formation, and press tool application.

18.412S Design for Production II (Interchangeable Manufacture)

Theory — Interchangeable manufacture: manufacturing, assembly and servicing costs; advantages and disadvantages of pursuing interchangeable principle. The use of standards. Tolerancing and the determination of accumulated tolerances. Design for interchangeable or unit assembly: design, dimensioning and tolerancing to fulfil functioning and manufacturing and inspection requirements. Metrology: basic principles of precision measurement, metrological practice in measurement, principles of construction, care and use of measuring equipment.

Laboratory — Metrology: assignments associated with gauging and tooling. Surface finish, inspection: non-destructive testing, quality control and sampling inspection.

18.421 Design for Production I

Subject matter similar to 18.411S Design for Production I.

TEXT BOOKS

Eary and Johnson. *Process Engineering for Manufacture.* Prentice-Hall. 1962.
B.S. 308 1964. *Engineering Drawing Practice.*
B.S. 1609 1949. *Press Tool Sets.*
B.S. 1916. *Limits and Fits for Engineering.* Parts 1 and 2.

REFERENCE BOOKS

Begmann and Amstead. *Manufacturing Processes.* Wiley.
Lindberg. *Processes and Materials of Manufacture.* Prentice-Hall.

18.422 Design for Production II (Interchangeable Manufacture)

Subject matter similar to 18.412S Design for Production II.

TEXT BOOKS

Gladman, C. *Manual for Geometric Analysis of Engineering Designs.* Aust. Trade Publications, 1966.
Parker, S. *Drawings and Dimensions.* Pitman, 1956.
B.S. 1916-1953. *Limits and Fits for Engineering.* Part 1 and 2.
B.S. 308-1964. *Engineering Drawing Practice.*

18.511S Industrial Marketing

Marketing in the Economy — The basic tasks of marketing. The economic environment of the market. Considerations of demand and supply. *Nature and Organization of Buying and Selling* — The sales prac-

tices and problems of manufacturers and distributors. Standardization differentiation and non-price competition. *Specialization and Integration* — Channels of distribution. Transfer of ownership between manufacturers, wholesalers, and retailers. Agents and distributors. Stability and change in marketing channels. *Pricing and Product Policy* — Established and new product policy. Mechanism of pricing. Pricing problems and policies. Price structures. *Marketing Efficiency and Control* — Objectives and form of control. Market research. Budgeting and accounting control. Measures of efficiency and performance. Sales aids. Selection and training of personnel. Government regulations. Characteristics of regional markets. Planning of marketing areas. Transportation economics.

18.521 Industrial Marketing

Subject-matter similar to 18.511S Industrial Marketing.

TEXT BOOK

Alexander, Cross and Cunningham. *Industrial Marketing*. Irwin, 1961.

REFERENCE BOOKS

Alexander, Surface and Alderson. *Marketing*, 3rd Edition.
Ferber. *Statistical Techniques in Market Research*. McGraw-Hill.

18.611S Engineering Economic Analysis

The Australian Economic Structure—National Income, role of Government, Australian labour structure, international trade. Economics of Industrial Organization—Competition, profit maximization, demand and cost analysis, prices and pricing. Theory of Investment—Interest, depreciation, choice between alternatives, economic life of capital equipment and replacement policy.

TEXT BOOK

Barish. *Economic Analysis*. McGraw-Hill.

REFERENCE BOOKS

Rautenstrauch and Villiers. *The Economics of Industrial Management*. 2nd Edition. Funk and Wagnalls, New York, 1957.
Edwards and Townsend. *Business Enterprise*. Macmillan, 1958.
Dean. *Managerial Economics*. Prentice-Hall, 1951.
Stigler. *The Theory of Price*. Rev. Edition. Macmillan, New York, 1952.
Sasieni, Yaspan and Friedman. *Introduction to Operation Research*. Wiley.

18.621 Engineering Economics

Subject matter the same as for 18.611S, but also includes an introduction to accounting and accounting controls.

TEXT BOOK

Barish. *Economic Analysis*. McGraw-Hill.

REFERENCE BOOKS

Stigler. *The Theory of Price*. Macmillan, 1952.
Dean. *Managerial Economics*. Prentice-Hall, 1951.
Grant. *Engineering Economic Analysis*. McGraw-Hill.
Sasieni, Yaspan and Friedman. *Introduction to Operations Research*. Wiley.

NON-ENGINEERING SUBJECTS

1.001 Physics I

Particle kinematics. Vectors. Particle dynamics. Conservation of momentum and energy. Statics of rigid bodies. Hydrostatics. Rotational motion about a fixed axis. Simple harmonic motion. Progressive waves. Velocity in various media. Interference, diffraction. Doppler effect. Stationary waves, resonance, beats. Electro-magnetic spectrum. Reflection, refraction. Spherical mirrors, lenses. Optical instruments. Dispersion. Spectra. Polarization. Elasticity. Elastic moduli. Fluid mechanics. Viscosity. Surface tension. Gravitation.

Temperature. Thermal expansion. Specific heat. Gas laws. Heat transfer. First law of thermodynamics. Elementary kinetic theory of gases. Hygrometry. Change of phase, latent heats, triple point.

Electrostatics. Electric charge and atomic structure. Electric field and potential. Capacitance. Energy stored in a capacitor. D.C. circuits. Ohm's law. Joule's law. Measuring instruments. Measuring circuits. Magnetism. Force on a current in a magnetic field. Motion of charged particles in electric and magnetic fields. Magnetic field of currents. Electromagnetic induction. Self and mutual inductance.

TEXT BOOKS

Resnick, R. and Halliday, D. *Physics for Students of Science and Engineering.* Vols. I and II, or Combined Volume. (Particularly recommended for students with a good background in Physics and Mathematics), Wiley, 1960, *or*

Ference, M., Lemon, H. B., and Stephenson, R. J. *Analytical Experimental Physics.* 2nd Edition, Chicago U.P., 1956.

In addition, students will be required to provide themselves with:

Curnow, C. *Complementary Physics,* University of New South Wales Press.

REFERENCE BOOKS

Richard, Sears, Wehr and Zemansky. *Modern University Physics,* Addison-Wesley, 1960.

Stephenson, R. J. *Mechanics and Properties of Matter,* 2nd Edition, Wiley, 1960.

Loney, S. L. *Dynamics,* C.U.P.

Starling, S. G. and Woodall, A. J. *Physics,* Longmans Green, 1950.

Synge, J. L. and Griffith, B. A. *Principles of Mechanics,* 3rd Edition, McGraw-Hill, 1959.

1.212 and 1.212S Physics IIT

Electricity and Magnetism — Electrostatics and magnetostatics. Kirchhoff's laws. Growth and decay of current in LR and CR circuits. Oscillations in LCR circuits. Steady state alternating currents in series LCR circuits.

Physical Optics — SHM and wave motion. Interference. Diffraction. Polarization.

Modern Physics — Photoelectric effect. Atomic model. X-rays. Elementary particles. Radioactivity. Semiconductors. Fission and fusion.

TEXT BOOKS

Resnick, R. and Halliday, D. *Physics for Students of Science and Engineering.* Vol. II, Wiley, 1960.

Wehr, M. R. and Richards, J. A. *Physics of the Atom.* Addison-Wesley, 1960.

REFERENCE BOOK

Jenkins, F. A. and White, H. E. *Fundamentals of Optics,* Ord. Edition. McGraw-Hill, 1957.

2.001 Chemistry I—(Common First Year)

Classification of matter and theories of the structure of matter. Atomic structure, the periodic table and chemical behaviour. Chemical bonds and molecular structure. Equilibrium and change in chemical systems. The structure, nomenclature and properties of organic compounds. Reactions of organic compounds.

2.001/1 Chemistry I—Part I

Classification of matter and theories of the structure of matter. Atomic structure, the periodic table and chemical behaviour. Chemical bonds and molecular structure. Equilibrium and change in chemical systems.

TEXT BOOKS

Ander and Sonnessa. *Principles of Chemistry.* Collier-Macmillan, 1965.

Sanderson. *Principles of Chemistry.* Wiley, 1963.

English and Cassidy. *Principles of Organic Chemistry.* McGraw-Hill, 1961.

Chemical Data Book. Wiley, 1966

REFERENCE BOOKS (for preliminary or supplementary reading).

C.H.E.M. Study Project. *Chemistry, an Experimental Science.* Freeman, 1963.

Barrow, Kenney, Lassila, Litle and Thompson. *Programmed Supplements for General Chemistry,* Vols. I and II. Benjamin, 1963.

Benfey. *The Names and Structures of Organic Compounds.* Wiley, 1966.

Glasstone and Lewis. Elements of Physical Chemistry. Macmillan, 1962.

2.001/1 Chemistry I—Part I

Not operating in 1967.

2.001/2 Chemistry I—Part 2

The structure, nomenclature and properties of organic compounds. Reactions of organic compounds. Further treatment of atomic structure, the periodic table and chemical behaviour. Further treatment of chemical bonds and molecular structure. Further treatment of equilibrium and change in chemical systems.

TEXT BOOKS

Sianko and Plane. *Chemistry*. McGraw-Hill, 1961.
Glasstone and Lewis. *Elements of Physical Chemistry*. Macmillan, 1962.
English and Cassidy. *Principles of Organic Chemistry*. McGraw-Hill, 1961.
Chemical Data Book. Wiley, 1966.

REFERENCE BOOKS

C.H.E.M. Study Project. *Chemistry, an Experimental Science*. Freeman, 1963.
Barrow, Kenney, Lassila, Litle and Thompson. *Programmed Supplements for General Chemistry*, Vols. I and II. Benjamin, 1963.
Benfey. *The Names and Structures of Organic Compounds*. Wiley, 1966.
Ander and Sonnessa. *Principles of Chemistry*. Collier-Macmillan, 1965.

4.921 and 4.921S Materials Science

The atomic structure of metals. The crystalline nature of metals and its significance. The solidification of metals. Plastic deformation of crystalline materials and its effect on properties. Phase equilibria in metallic alloys. The heat treatment of some ferrous and non-ferrous alloys. Corrosion. The electron theory of metals. Conductors, semi-conductors and insulators. Magnetic materials—structure and properties.

TEXT BOOK

Van Vlack, L. H. *Elements of Materials Science*. Addison-Wesley.

REFERENCE BOOKS

Goldman, J. E. *The Science of Engineering Materials*. Wiley.
Cottrell, A. H. *Theoretical Structural Metallurgy*. Arnold.

10.001 Mathematics I

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra.

TEXT BOOKS

Archbold, J. W. *Algebra*. Pitman. Third Edition. 1964.
Pedoe, D. *A Geometric Introduction to Linear Algebra*. Wiley. (Paperback.)
Thomas, G. B. *Calculus and Analytic Geometry*. Addison-Wesley.

REFERENCE BOOKS

Ball, R. W. *Principles of Abstract Algebra*. Holt, Rinehart and Winston.
Beaumont, R. A., and Pierce. *Algebraic Foundations of Mathematics*. Addison-Wesley.
Keane, A. and Senior, S. A. *Complementary Mathematics*. Science Press.
McCoy, N. H. *Introduction to Modern Algebra*. Allyn and Bacon.
Rose, I. H. *Algebra: An Introduction to Finite Mathematics*. Wiley.
Smith, W. K. *Limits and Continuity*. Collier-Macmillan. (Paperback.)
Taylor, H. E., and Wade, T. L. *University Freshman Mathematics*. Wiley.
Whitesitt, J. E. *Principles of Modern Algebra*. Addison-Wesley.

SUPPLEMENTARY READING LIST

Adler, I. *The New Mathematics.* Mentor Press.
Allendoerfer and Oakley. *Principles of Mathematics.* McGraw-Hill.
Courant and Robbins. *What Is Mathematics?* Oxford University Press.
Sawyer, W. W. *A Concrete Approach to Abstract Algebra.* Freeman.
Sawyer, W. W. *Prelude to Mathematics.* Pelican.

10.022S Mathematics

Differential equations. Laplace transform. Functions of several variables. Multiple integrals. Improper integrals. Fourier series. Three dimensional analytic geometry. Vector algebra. Matrix algebra.

TEXT BOOKS

Ayres, F., Jr. *Theory and Problems of Matrices.* Schaum, New York.
Gere, J. M., and Weaver, W., Jr. *Matrix Algebra for Engineers.* Van Nostrand Engineering Paperback.
Keane, A., and Senior, S. A. *Complementary Mathematics.* Science Press.
Keane, A., and Senior, S. A. *Mathematical Methods.* Science Press.

REFERENCE BOOKS

Birkhoff, G., and Maclane, S. *A Brief Survey of Modern Algebra.* Macmillan, New York.
Kaplan, W. *Advanced Calculus.* Addison-Wesley.
Rainville, E. D. *The Laplace Transform.* Collier-Macmillan. (Paperback.)

10.033 Mathematics

Selections from the following topics:—Inversion theorem for Laplace transforms. Step and pulse functions and their transforms. Fourier transforms. Transmission line problems. Potential theory. Electromagnetic theory. Wave equations, orthonormal functions. Calculus of variations. Lagrangian and Hamiltonian mechanics.

TEXT BOOKS

Carslaw, H. S., and Jaeger, J. C. *Operational Methods in Applied Mathematics.* Dover Publications, 1962.
Slater, J. C., and Frank, N. H. *Electromagnetism.* McGraw-Hill.
Pipes, L. A. *Applied Mathematics for Engineers and Physicists.* Second Edition. McGraw-Hill.

REFERENCE BOOKS

Hague, B. *An Introduction to Vector Analysis.*
Tranter, C. J. *Integral Transforms.*
Churchill, R. V. *Fourier Series and Boundary Value Problems.* McGraw-Hill.
Danese, A. E. *Advanced Calculus.* Vol. I. Allyn and Bacon.

10.111 Pure Mathematics II

Real and complex analysis. Differential equations. Linear algebra. Vector analysis. Fourier analysis. Special functions.

TEXT BOOKS

Pretter, M. H., and Morrey, C. B. *Modern Mathematical Analysis.* Addison-Wesley.

Churchill, R. V. *Introduction to Complex Variables and Applications.* McGraw-Hill International Students Edition.

REFERENCE BOOKS

Burkill, J. C. *Theory of Ordinary Differential Equations.* Oliver and Boyd.

Halmos, P. R. *Finite Dimensional Vector Spaces.* Van Nostrand.

Pierce, B. O. *A Short Table of Integrals.* Ginn.

10.351 Statistics

An introduction to probability theory, with finite, discrete and continuous sample spaces. Random variables: the standard elementary distributions including the binomial. Poisson and normal distributions. Sampling distributions, with emphasis on those derived from the normal distribution: t, x^2 and F. Estimation of parameters: the methods of moments and maximum likelihood, and confidence interval estimation. The standard tests of statistical hypotheses, and, where appropriate, the powers of such tests. An introduction to regression and the bivariate normal distribution. Auto-correlation.

10.361 Statistics

An introduction to probability theory. Random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of x^2, t and F. Estimation by moments and maximum likelihood; confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to linear regression. Least squares adjustment of data.

10.371S Statistics

Same as 10.351 except that auto-correlation is omitted.

10.381S Statistics

Subject matter same as 10.361.

TEXT BOOKS

Freund, J. E. *Mathematical Statistics.* Prentice-Hall.
Statistical Tables.

REFERENCE BOOKS

Derman, C., and Klein, M. *Probability and Statistical Inference for Engineers.* Oxford University Press.

Freeman, H. *Introduction to Statistical Inferences.* Addison-Wesley.

Hald, A. *Statistical Theory with Engineering Applications.* Wiley.

11.001H History of Fine Arts

This course 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. Pelican Books A.82.

Read, H. *The Meaning of Art. Penguin U.K., 1951.* Pelican Books, A.213.

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 & Hudson, ed., 1959, London.

Ragnar, M. *Modern Painting.* 1960, Skira.

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 Library).

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

The treatment of this historical review of architecture will be different from that 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 develop-

ment 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

Persher, 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.* Cheshire, 1962, Melbourne.

REFERENCE BOOKS

A list will be issued early in the lecture series.

11.411 Town Planning

The aims of town and regional planning, historical background, contemporary planning, planning techniques, New South Wales planning law and administration, parks and landscape, housing and neighborhood planning, traffic and transport, the central area, prospects for the future. Studio work on the design and layout of residential areas.

11.412 Town Planning

Emphasizes the architectural aspects with particular reference to requirements in community planning, government housing, residential and estate development.

TEXT BOOK

Brown, A. J., and Sherrard, H. M. *Town and Country Planning.* Melbourne, U.P., 1951.

REFERENCE BOOKS

Abercrombie, P. *Town and Country Planning.* 3rd edition, Oxford U.P., 1959.

Gibberd, F. *Town Design.* 3rd edition, Architectural P., 1959.

H.M.S.O. *Design in Town and Village.* 1953.

H.M.S.O. *Traffic in Towns.* 1963.

Howard, E. *Garden Cities of Tomorrow.* Faber & Faber, 1955.

Mumford, L. *The City in History.* Secker & Warburg, 1961.

Winston, D. *Sydney's Great Experiment.* A. & R., 1957.

14.041 Industrial and Commercial Law

TEXT BOOK

Dey and McKenzie. *Outline of Industrial Law.* Law Book Co., 1965.

14.061 Accounting

An examination of basic accounting theory and its application to the accounting needs of various types of business enterprise. The preparation, analysis and interpretation of accounting reports. An introduction to the use of accounting in the area of management decision making.

TEXT BOOK

Bierman, H. *Financial and Managerial Accounting: An Introduction.* 2nd Edition, Macmillan, 1963.

REFERENCE BOOKS

Anthony, R. N. *Management Accounting: Text and Cases.* 3rd Edition, Irwin, 1964.

Gordon, M. J., and Shillinglaw, G. *Accounting: A Management Approach.* 3rd Edition, Irwin, 1964.

14.062 Accounting for Engineers

Problems related to industrial situations will be examined and consideration given to their relevance in decision making. This will involve a broad study of such matters as manufacturing and cost accounts, budgeting and budgetary control, cost analysis and control and profit planning.

TEXT BOOKS

Burke, W. L., and Smyth, E. B. *Accounting for Management.* Law Book Co., 1966.

Anthony, R. N. *Management Accounting: Text and Cases.* 3rd Edition, Irwin, 1964.

REFERENCE BOOKS

Bierman, H. *Financial and Managerial Accounting: An Introduction.* 2nd Edition, Macmillan, 1963.

Barish, N. *Economic Analysis,* McGraw-Hill, 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. Groundwater, 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 Edition, 1960.

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, 1950, New York.

12.011 Psychology I

Theory—The subject-matter and methods of psychology, the biological and social determinants of behaviour, the basic processes of personality development, motivation, perception, thinking, learning, individual differences in ability patterns, the organizing of behaviour in the developing individual, and adjustment. Emphasis throughout the course is placed on scientific appraisal of human behaviour. Hypotheses and experimental and other evidence are examined for their scientific validity. **Practical**—Group experiments and demonstrations, and experience in methods of psychological observation and statistical procedures appropriate to them.

TEXT BOOKS

Whittaker, J. O. *Introduction to Psychology*. Saunders, 1965.
Whittaker, J. O. *Students Workbook to accompany "Introduction to Psychology*. Saunders, 1965.
Valentine, W. L., and Wickens, D. D. *Experimental Foundations of General Psychology*. Rinehart, 1960.

REFERENCE BOOKS

Deese, J. *Principles of Psychology*. Allyn and Bacon, 1964.
Lindgren, H. C., Byrne, D., and Petrinovich, L. *Psychology: An Introduction: Behavioural Science*. Wiley, 1966.
McKeachie, W. J., and Doyle, C. L. *Psychology*. Addison-Wesley, 1966.
Morgan, C. T., and King, R. A. *Introduction to Psychology*. McGraw-Hill, 1966.
Munn, N. L. *Psychology*. Fifth Edition. Houghton Mifflin, 1966.
Singer, J. E., and Whaley, F. L. *Patterns of Psychological Research: Readings for General Psychology*. Allyn and Bacon, 1966.
Morgan, C. T. *Physiological Psychology*. McGraw-Hill, 1964.
Scientific American, Readings from. *Frontiers of Psychological Research*. Freeman, 1964.

Additional References on specific topics will be detailed during lectures.

12.121S Psychology

See 12.011.

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 Petronovich, 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 (Advanced Elective)

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 introduction 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, 1964 or 1965, Melbourne, Canberra, Sydney.

Carter, C. F. *The Science of Wealth.* Arnold, 1963, Oxford.

26.152 Economics (Advanced Elective)

The subject is intended to follow 15.011H Economics. It will aim at a more penetrating study of central fields of economic theory and at the same time widen the scope of study by including 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.* 1962, Cheshire.

Homan, Hartz and Sametz. *The Economic Order.* Harcourt, Brace and Co.

Sametz, A. W. *Students' Guide to the Economic Order.* Harcourt, Brace and Co., 1958, New York.

26.301, 26.301S Music

The basic purpose of the course will be to encourage and develop students' capacities for intelligent and tolerant listening. It will extend the range of music examples much further back and forward in time than is done in historical music courses of a more stereotyped kind, and will go outside the normal Western concert-hall repertory in drawing comparisons with folk or traditional music of many countries and races, improvisational practice of several periods (showing, for example, the essential continuity of principle between medieval and Renaissance high art music, with particular emphasis on Asia). The course will pay considerable attention to the major developments in Western art music and their relation to the general history of European, American and Australian society and to other arts, but it will seek to avoid untenable assumptions of superiority concerning any one period or racial tradition. It will provide a general vocabulary for the thoughtful discussion of music without becoming deeply technical and will proceed on the basis that present-day developments, whatever their ultimate merits, should be a subject of major concern and not merely a hasty footnote to the main body of lectures.

An underlying purpose of the lectures will be to draw students' attention to the social or philosophical foundations of many unthinkingly accepted attitudes and judgments of conventional music history. In a preliminary sense, and without pretensions of doing more than this, it will attempt to give students guidance for their own future cultivation of a critical attitude towards current philosophies of music history and of a truly international sympathy with many kinds of music.

Familiarity with musical notation will not be a prerequisite for the course, but students will be encouraged to acquire some acquaintance with notation during the course.

TEXT BOOKS

Harman, A., and Mellers, W. *Man and His Music: The story of Musical Experience in the West.* Barrie and Rockliff, 1962, London.

Hartog, H. (ed.). *European Music in the Twentieth Century.* Penguin, 1961, London.

Covell, R. *Music in Australia.* Sun Books, 1966, Melbourne.

REFERENCE BOOKS

Allen, W. D. *Philosophies of Music History.* Dover, 1962, New York.

Dart, T. *The Interpretation of Music.* Hutchinson, 1960, London.

Kerman, J. *Opera as Drama.* Vintage, 1956, New York.

Lang, P. H. *Music in Western Civilisation.* Dent, 1942, London.

Mellers, W. *Music in a New Found Land.* Barrie and Rockliff, 1964, London.

Morgenstern S. (ed.). *Composers on Music.* Faber, 1956, London.

Nettl, B. *Folk and Traditional Music of the Western Continents.* Prentice-Hall, 1965, New Jersey.

Stevens, D., and Robertson, A. (eds.). *The Pelican History of Music.* Vol. 1, Penguin, 1960, London.

Stravinsky, Igor. *The Poetics of Music.* Vintage, 1959, New York.

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

E. M. Forster. *Where Angels Fear to Tread.* Penguin.
H. D. Lawrence. *Sons and Lovers.* Penguin.
Ernest Hemingway. *A Farewell to Arms.* Penguin.
Albert Camus. *The Outsider.* Penguin.
William Golding. *Lord of the Flies.* Penguin.
Carson McCullers. *The Ballad of the Sad Café.* Penguin.
Bernard Shaw. *Major Barbara.* Penguin.
Tennessee Williams. *A Streetcar Named Desire.* Penguin.
Tennessee Williams. *The Glass Menagerie.* Penguin.
Arthur Miller. *Death of a Salesman.* Penguin.
Three Australian Plays. Penguin.

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.

TEXT BOOKS

Bernard Shaw. *Major Barbara.* Penguin.
Sean O'Casey. *Juno and the Paycock.* St. Martin's Library.
Tennessee Williams. *A Streetcar Named Desire.* Penguin.
Tennessee Williams. *The Glass Menagerie.* Penguin.
Arthur Miller. *Death of a Salesman.* Penguin.
Three Australian Plays. Penguin.
Elizabeth Drew. *Poetry.* Dell.

26.502 English Literature (Advanced Elective)

A course on selected works from the literature of the eighteenth, nineteenth and twentieth centuries.

TEXT BOOKS

Alexander Pope. *Collected Poems.* Everyman.
John Keats. *Selected Poems.* Penguin.
T. S. Eliot. *Selected Poems.* Faber.
The following in any complete edition—
Daniel Defoe. *Moll Flanders.*
Jane Austen. *Persuasion.*
Henry James. *Washington Square.*
E. M. Forster. *A Passage to India.*
Patrick White. *The Tree of Man.*

26.503 English Language (Advanced Elective)

A course of 60 hours covering the history, development, structure and uses of English.

No special text.

Reference books will be prescribed during the course.

26.511 History

This course is designed to give a general introduction to modern Western civilisation. It will consist of 30 lectures, traversing in broad outline the history of Europe and the English-speaking world from the Renaissance to 1939. Within this framework six special fields will be selected for study. Each of these is a period of stress and sudden political economic or social change. It is in the human responses to these revolutionary situations that most of the factors operative in the modern world originated. In them the patterns of individual beliefs, the prejudices of races and nations, the fears and aspirations of social groups, can be seen in their formative stages. By studying six climacterics in modern history, the student will attain a general understanding of the historical background to the problems of the modern world. Although these crises assumed varying forms, they possessed in common the attributes of revolution, the central theme of the course.

The six fields of study are the intellectual revolutions of the sixteenth century (Renaissance and Reformation), the English revolutions of the seventeenth century, the American and French revolutions of the eighteenth century, the European industrial revolution of the late eighteenth and nineteenth centuries, and the Russian revolution of 1917. Each field will be studied broadly and will be assumed to extend beyond the dates normally accepted as the political demarcations of revolution. It will also be the aim of lecturers to illustrate the connections between one revolutionary situation and another, and to survey the main trends in world history between the various crises. Students will select **three** from the six fields for additional reading and will be expected to have only a broad general knowledge of the remainder of the course.

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, University paperback.

The Russian Revolution

Curtiss, J. S. *The Russian Revolution of 1917.* Anvil.
Hill, C. *Lenin and the Russian Revolution.* Teach Yourself History.

26.512 History (Advanced Elective)

Students taking the Advanced Elective in History will normally be expected to have passed 26.511. The object of the course is to provide students with some historical insight into the present world situation, and study will be directed to developments since 1919. In general, it falls into two parts, with the main division coming at the Second World War. Amongst the events examined during the period 1919-1939 are the peace settlement of 1919, the break-down of democratic institutions in Italy and Germany, the rise of Fascism and Nazism, the overthrow of the Tsarist autocracy in Russia and the emergence of a Communist regime in the Soviet Union. Attention is also devoted to the internal history of the democracies—Britain, France and the United States. This section will be rounded off by a discussion of foreign affairs with particular reference to Nazi policy and the events leading to war in 1939. The war itself and the changes it produced form the starting point for the second section of the course. The coming of the Cold War, the growing rivalry between Russia and the West, and the division of Europe into two integrated, hostile blocs, constitute a further major theme. This is followed by a review of Communist gains in Asia, the conflict that developed here and the efforts made by the West to hold back the Red advance. Finally the contraction of European influence in Asia and Africa and the decline of colonialism especially after 1945 is analysed in detail.

REFERENCE BOOKS

H. Stuart Hughes. *Contemporary Europe (1914-60).* Prentice-Hall, 1964.
G. Connell Smith. *The Pattern of the Post-War World.* Pelican, 1957.
England in the Twentieth Century. Pelican, 1965.
Brian Crozier. *South-East Asia in Turmoil.* Pelican, 1966.
C. P. Fitzgerald. *The Birth of Communist China.* Pelican, 1964.
Anthony Sampson. *Common Sense About Africa.* Gollancz, 1960.
Herbert Agar. *The Unquiet Years (U.S.A., 1945-55).* Chatto and Windus, 1956.

26.521 Philosophy

This course aims to convey something of the characteristic differences between philosophical and other questions, and of the kind of classification that may be sought by the methods of logical and philosophical analysis. The topics to be treated include:— (a) the distinction between what is *necessarily true* or *necessarily false* and what is *contingent.* The relation of this distinction to some others, e.g., between the certain and the uncertain, the *a priori* and the *a posteriori.* The relevance of these distinctions to the broad differences between empiricism and rationalism: (b) distinctions which have to do with the way in which *evidence* may be provided for and against beliefs, and the ways in which statements of different types lend themselves to confirmation and disconfirmation; and (c) an introductory account, using these distinctions, of some important philosophical questions drawn from the following: The nature of scientific laws: causality, determinism and free will; the distinction between the mental and the physical; the existence of God; the nature of perception, the fundamentals of ethics.

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.
Free Will. Prentice-Hall.

26.522 Philosophy (Advanced Elective)

An advanced elective for students who have completed either the 30-hour course or the 60-hour course. Two alternative versions of the course are given.

Syllabus A:

A survey of recent philosophy giving particular attention to the movement known as "logical positivism".

TEXT BOOKS

Ayer, A. J. *Language, Truth and Logic.* Gollancz.
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.

Syllabus B:

An introduction to symbolic logic, dealing with (a) the propositional calculus, (b) the predicate calculus of first and second order, including identity theory, (c) set theory. The material of the course is organised into two sections: (i) the presentation of the calculi mentioned and a discussion of the way in which they may be used in appraising arguments in ordinary language; and (ii) a discussion of deductive systems generally, and in particular of systems of the kind used in (i). Consistency of systems, completeness of systems, the decision problem.

TEXT BOOK

Copi, I. M. *Symbolic Logic.* Collier-Macaultan. Second edition, 1965.

26.531 Sociology

A study of the nature of human society. A comparison of modern society with the social systems of other societies will help to show that much of what is thought to be unalterable human nature is merely an

aspect of the social heritage which has been absorbed during the socialisation process. During the course, it will be shown that objective and scientific methods can be applied to the problems of human behaviour and human relations and that there is a wide area of investigation which has a direct bearing on the social implications of the technologist or scientist. 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 organisation; culture and cultural norms 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 (Advanced Elective)

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 Political Science

This course is an introduction to the Advanced Elective 54.012H Political Science and a unit in its own right for students taking no further Political Science courses. Approximately 10 lectures will be devoted to discussing some fundamental questions about politics in general—what politics is about, the meaning of a political system, concepts such as state, law, government, rights, etc. The other 20 lectures will be about three major political systems, Great Britain, the U.S.A. and Australia, showing both the common and the distinctive characteristics of each, and using these examples 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 and Unwin, 1964, London. (Paperback.)

Griffith, E. S. *The American System of Government.* Methuen, 1964, London. (University Paperback.)

Miller, J. D. B. *The Nature of Politics.* Penguin, 1964.

Sawer, G. *Australian Government Today.* Melbourne University Press, 1964. (Paperback.)

Moodie, G. S. *The Government of Britain.* Methuen. 1964, London. (University Paperback.)

REFERENCE BOOKS

Miller, J. D. B. *Australian Government and Politics.* Duckworth, 1963, London.
Andrews, W. G., ed. *Constitutions and Constitutionalism.* Second edition. Van Nostrand, 1963, New Jersey. (Paperback.)
Jupp, James. *Australian Party Politics.* Melbourne University Press, 1964. (Paperback.)
Dean, Howard E. *Judicial Review and Democracy.* Random House, 1966, New York. (Paperback.)
Harrison, Wilfrid. *The Government of Britain.* Hutchinson University Library, 1963, London.
Potter, Allen M. *American Government and Politics.* Faber, 1961, London. (Paperback.)

26.542 Political Science (Advanced Elective)

This course will follow on directly from 54.011H (or 54.011HS) with the purpose of extending the student's acquaintances with modern political systems. There will be three sections, each of about 20 lectures, dealing with (a) established Communist regimes (the U.S.S.R. and the East European Peoples' Democracies and China); (b) two aspects of Afro-Asian political systems; (c) the international political system and some aspects of world politics. Topics under (a) will include—the establishment and development of the Soviet system since 1917; the formal machinery of government; the Communist Party of Russia and the ruling parties of other regimes; "ideological" questions; developments in Russia and Communist bloc since the death of Stalin; the Sino-Soviet dispute. Under (b)—theoretical concepts necessary for understanding developing societies; the role of intellectuals and other elites; study of selected countries since independence. Under (c)—the development of the community of nations; the growth of international institutions and law; the nature and control of international conflict.

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, Second Edition, 1963.
Mills, C. W. *The Marxists.* Pelican, 1964.
Tinker, H. *Ballot Box and Bayonet.* O.U.P., 1964.

26.601 History of Technology

The history of technology and its associated implications. 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; and (6) The beginning of the Industrial Revolution.

TEXT BOOK

Forbes, R. J., and Dijksterhuis, E. J. *History of Science and Technology.* Vol. I and II. Penguin.

REFERENCE BOOK

Singer, C., and Holmyard, J. *History of Technology.* O.U.P., 1957.

STUDENT'S TIMETABLE

Time	Monday	Tuesday	Wednesday	Thursday	Friday
9-10					
10-11					
11-12					
12-1					
1-2					
2-3					
3-4					
4-5					
5-6					
6-7					
7-8					
8-9					