THE UNIVERSITY OF NEW SOUTH WALES

FACULTY of ENGINEERING

HANDBOOK

1964

THE UNIVERSITY OF NEW SOUTH WALES

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Calendar of Dates

1964

First Term .... March 2nd to May 16th.
Second Term .... June 1st to August 8th.
Third Term .... August 31st to October 31st.
Annual Examinations .... September 19th to October 3rd.
    (24-week courses)
Annual Examinations .... November 7th to 28th.
    (30-week courses)

January —
    Wednesday 22 .... Last day for acceptance of applications to enrol by new students and students repeating First Year.
    Tuesday   28 .... Deferred examinations begin — all courses.

February —
    Saturday   8 .... Deferred examinations end.
    Monday   17 .... Enrolment week begins for new First Year students.
    Monday   24 .... Enrolment week begins for students re-enrolling.

March —
    Monday   2 .... First term lectures begin.
    Friday   20 .... Conferring of Degrees — Newcastle University College.
    Friday   27 to
    Monday   30 .... Easter Holidays.
    Tuesday   31 .... Last day for acceptance of enrolments.

April —
    Friday   3 .... Conferring of Degrees — Wollongong University College.
    Saturday   25 .... Anzac Day — Public Holiday.

May —
    Wednesday   6 .... Conferring of Degrees.
    Saturday   16 .... First term ends.

June —
    Monday   1 .... Second term begins.
    Monday   15 .... Queen's Birthday — Public Holiday.
    Tuesday   30 .... Last day for acceptance of applications for examinations — 24-week courses.

Last day for acceptance of applications for readmission after exclusion under rules governing re-enrolment.

August —
Friday	7	Last day for acceptance of applications for examinations — 30-week courses.
Saturday	8	Second term ends.
Monday	31	Third term begins.

September —
Saturday	19	Annual examinations begin — 24-week courses.

October —
Saturday	3	Annual examinations end — 24-week courses.
Monday	5	Six Hour Day — Public Holiday. One and two week survey camps begin.
Friday	9	One-week survey camp ends.
Monday	12	Industrial training begins for students attending one-week survey camp.
Friday	16	Two-week survey camp ends.
Monday	19	Industrial training begins for students attending two-week survey camp.
Saturday	31	Third term lectures cease.

November —
Saturday	7	Annual examinations begin — 30-week courses.
Saturday	28	Annual examinations end — 30-week courses.

1965

January —
Monday	25 to	
Saturday	6 February	Deferred examinations (all courses).

February —
Monday	15	Enrolment Week begins for new First Year students.
Monday	22	Enrolment Week begins for students re-enrolling.

March —
Monday	1	First Term lectures begin.

Faculty of Engineering

Dean
Professor A. H. Willis
Chairman
Associate Professor J. F. D. Wood

SCHOOL OF CIVIL ENGINEERING

Professor of Civil Engineering and Head of School
C. H. MUNRO, B.E.(Syd.), F.R.S.A., F.R.S.H., M.I.E.Aust., Am.Soc.C.E.
Professor of Civil Engineering
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Senior Lecturer
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Department of Concrete Technology
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Lecturers
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B. J. F. PATTEN, B.E. (Syd.), A.M.I.E.Aust.

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Senior Lecturers
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I. R. WOOD, B.E.(N.Z.), M.E.
Lecturers
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Lecturers

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    A.M.I.C.M. & E.E.(S.A.).

Lecturers

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Senior Lecturer

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Lecturer

O. O. C. A. BILS, Dipl.Ing. (Berl.).

SCHOOL OF TRAFFIC ENGINEERING

Professor of Traffic Engineering and Head of School

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Senior Lecturers

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H. J. A. TURNER, B.Sc. (Lond.), M.E., A.R.C.S., A.M.I.E.E.

Lecturer

J. I. TINDALL, B.E. (Qld.).

General Information

LOCATIONS OF SCHOOLS AND LABORATORIES OF THE FACULTY OF ENGINEERING

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

(i) Kensington

The Schools of 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, together with the Schools of the Faculty of Arts which, on behalf of the Board of Studies in General Education, provide 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 School of Civil Engineering and the Broadway branch of the library. Also located there is the Broadway branch of the Students' Amenities Office.

(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.

THE ACADEMIC YEAR

The Academic Year is divided into three terms of eleven, ten and nine weeks. The first term normally commences on the first Monday in March. There is a two-week vacation between first and second terms, and a three-week vacation between second and third terms. In certain years of full-time engineering courses, lectures cease in the third week of the third term and examinations for these years are conducted in the fourth and fifth weeks of third term. Where lectures extend over the full three terms the examinations are conducted over a three-week period, which commences one week after the end of lectures.

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UNDERGRADUATE COURSES

The Faculty of Engineering consists of the Schools of Civil Engineering, 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 and Bachelor of Surveying, and part-time courses leading to the degrees of Bachelor of Science (Technology) and Bachelor of Surveying.

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 (pass or honours). Candidates for honours take additional work in the third and fourth years. A four-year full-time course in Surveying is offered by the School of Civil Engineering leading to the degree of Bachelor of Surveying at pass and honours levels. Candidates for honours in Surveying take additional work in fourth year.

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

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 Civil, Electrical, Mechanical and Industrial 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;

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(ii) the second year of the courses for the degree of Bachelor of Engineering in Civil, Electrical, Mechanical or Industrial Engineering, provided that students in Civil, Mechanical or Industrial Engineering shall have taken the Mathematics and Physics subjects prescribed for second year of the Electrical Engineering course;

(iii) two Group III Science subjects, together with the appropriate Humanities (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 Civil, Electrical, Mechanical or Industrial Engineering.

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

Introduction of revised courses and consequent exemptions: The introduction of common first year subjects in 1961 led to the extensive revision of existing full-time engineering courses and the course outlines set out later in this section incorporate these revisions. In 1961 the first three years of these revised courses were introduced in the Schools of Civil and Mechanical Engineering and the first two years in the School of Electrical Engineering. From 1963 all years of the new courses will be offered in all Schools.

The following exemptions in humanities subjects apply to students who have completed part of the superseded engineering courses:

(i) Students who have completed years 1 and 2 of the superseded B.E. course, which included G10 English and G20 History, will be exempted from 50.011 English included in the second year and 51.011 History and 52.011 Philosophy included as alternatives in the third year of the new courses outlined below.

(ii) Students who have completed year 1 of the superseded B.E. course which included G10 English will be exempted from 50.011 English in the second year of the new courses set out below.

Industrial training requirements: All full-time engineering courses incorporate periods of industrial training. In all of these courses, except Electrical Engineering, the periods occupy the latter half of the third term and the long vacations between second and third years, and between third and fourth years. In the second and third years of these courses, students finish lectures at the end of the third week of the third term, take their examinations in the fourth and fifth weeks, attend the survey camp (where required) in the sixth week (surveying students in their sixth and seventh weeks) and then commence their industrial training. 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. 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 assist students to obtain this employment either as sponsored students or as trainees employed on a temporary basis. Private students (i.e., those not already committed to an employer under the terms of a scholarship or bond) may make their own arrangements for industrial training, but the employment and training must be 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 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.

These new courses replace the courses which the University has offered since 1951 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.

Students who have elected to continue in the diploma course and subsequently complete the requirements within the period allowed (see below), or those who have been awarded the A.S.T.C. diploma, may be given advanced standing in a course leading to the B.Sc. (Tech.) or to the B.E. degree. Permission to meet the requirements of either degree by further study should be obtained from the Head of the appropriate School.

Any student continuing in a part-time B.E. or Diploma course who fails to maintain normal progress will be required to transfer to the appropriate B.Sc. (Tech.) course with advanced standing. For a student to make "normal progress" he shall have completed:

    (i) all subjects up to and including Stage I by the end of 1961;

    (ii) all subjects up to and including Stage II by the end of 1962;

    (iii) all subjects up to and including Stage III by the end of 1963;

     (iv) all subjects up to and including Stage IV by the end of 1964;

     (v) all subjects up to and including Stage V by the end of 1965.

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 III 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	,,	(Broken Hill)
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.

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 specialised 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 has departments both in Newcastle and 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, 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.

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

Structures, Water Engineering, Public Health Engineering, Engineering Construction (offered by the School of Civil Engineering); Electrical Engineering; Traffic Engineering; Highway Engineering; Nuclear Engineering; Machine Design, 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 postgraduate study in the University Calendar.

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 1964 are published separately.

REQUIREMENTS FOR ADMISSION

Candidates may qualify for entry to undergraduate courses by complying with the matriculation requirements set out below at the Leaving Certificate Examination held by the Department of Education or the Matriculation Examination conducted by the University of Sydney.

The 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.

The following matriculation requirements operate from 1st January, 1961, but candidates will be permitted to qualify for entry under the requirements which were current in 1960 until March, 1964; these requirements are set out below the new requirements.

Matriculation Requirements

(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 on the payment of the prescribed matriculation fee be provided with a statement to that effect.

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.

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* 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.

† See footnote to next page.

(ii) In order to satisfy the conditions for admission to under-graduate 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;

   and—
II. (a) neither Physics nor Chemistry is offered with the combined subject 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 nor 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;

† *Provisional* matriculation status may be granted to candidates seeking admission in 1964 who passed in General Mathematics at the 1962 Leaving Certificate Examination, the subject General Mathematics in this case being regarded as a Group C subject. This is a special concession and will not apply in 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 or University of Sydney Matriculation Examination.

Old Requirements

(Current to March, 1964)

Compliance with these requirements will qualify for entry to the University until March, 1964.

I. Applicants for entry to undergraduate courses leading to a degree may satisfy entrance requirements by passing the New South Wales Leaving Certificate Examination or the University of Sydney Matriculation Examination in at least five subjects at one examination*, of which one must be English and one other must be Mathematics I, or Mathematics II, or Mathematics III**, three other subjects being chosen from the following groups, at least one of the three being from Group A:—

Group A.—Latin, French, Greek, German, Italian, Hebrew, Chinese, Japanese, Russian, Dutch, Geology, Geography, Agriculture, Economics, Modern History, Ancient History, Combined Physics and Chemistry, Physics, Chemistry, Physiology, Biology, Botany or Zoology.

**Group B.—Applied Mathematics, Music, Theory and Practice of Music, General Mathematics, Mathematics I, Mathematics II, Mathematics III, or Descriptive Geometry and Drawing.

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* 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.
** *Provisional* matriculation status may be granted to candidates seeking admission in 1964 who passed in General Mathematics at the 1962 Leaving Certificate Examination, in lieu of Mathematics I, II or III. This is a special concession and will not apply in subsequent years.

II. Candidates who have presented themselves for the Leaving Certificate Examination or the University of Sydney Matriculation Examination in five or six subjects selected in accordance with the requirements prescribed in I and who have passed in English and a Mathematics and two other of the subjects may be granted admission provided that they have been awarded A passes or passes with Honours in at least three of these four subjects.

The other provisions set out in the new requirements above also apply.

ENROLMENT PROCEDURE FOR UNDERGRADUATE COURSES

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

First Enrolment — Students seeking to enrol in 1964 with the University for the first time should note the following:—

1. Preliminary applications for enrolment must be made where possible in person to the Student Enrolment Bureau, 1st Floor, Building F, Kensington, as soon as the results of the Leaving Certificate Examination are published, but not later than January 22nd. Country residents should write to the Registrar, P.O. Box 1, Kensington, for a form on which to make their preliminary application. This form should be returned not later than January 22nd.

2. *First Year repeats:* First Year students who failed in all subjects at the 1963 Annual Examinations, who were not given any deferred examinations and who are not liable to be excluded, must attend the Student Enrolment Bureau between the date of publication of the Leaving Certificate results and January 22nd if they wish to re-enrol.

3. Enrolment Week for new students begins February 17th. Each applicant will be given an appointment for a time in that week, when he will report to the Enrolment Bureau to complete his enrolment*.

4. *Late Enrolments:* In special circumstances the University may accept late enrolments made before March 31st. Late application should be made in person to the Admissions Office, Main Building, Kensington, as early in the first term as possible. Students enrolling late will normally be required to pay late fees in accordance with the details set out in the section on fees.

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* Applicants who cannot keep their appointment should attend at the Enrolment Bureau on Thursday, 27th February, between 10 a.m. and noon, 2 p.m. and 5 p.m. or 6 p.m. and 8 p.m. Students enrolling on this Thursday will incur a late fee of £1.

5. Fees should be paid on the enrolment day, as new students will not be issued with a timetable (which is their authority to attend classes) until fees have been paid.

Complete details of the enrolment requirements are contained in the booklet "Enrolment Procedure for New Students" which may be obtained at the Enrolment Bureau when making application to enrol.

Re-enrolment Procedure — Students re-enrolling in courses in the Faculty of Engineering should do so through the appropriate School. Each School will advise its students of the procedure to be followed. Re-enrolment arrangements must be completed during the prescribed enrolment week, immediately prior to the beginning of first term, in accordance with the timetable set out in the booklet "Enrolment Procedure for Students Re-enrolling". Enrolment forms for students re-enrolling will be available at the enrolment centre during enrolment week.

Conversion Course Enrolments — Enrolment in conversion courses must commence with an application to the Registrar for admission, and the applicant will be notified of the subsequent procedure.

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.

While course details must be completed during Enrolment Week, fees may be paid without penalty by re-enrolling students up to the end of the second week of term. For details of fee requirements, including late fee provisions, see under Fees.

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

Student Registration Card

When enrolment forms have been submitted to the University Cashier he will return to the student a Registration Card. Students are required to carry this card with them as evidence that they are entitled to the rights and privileges afforded by the University.

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, Applied Science, 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.

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. 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.

    (i) As from January 1st, 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.)

    (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 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.

(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.

(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 any particular course 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.

FEES FOR UNDERGRADUATE COURSES*

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.

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

For the purpose of fee determination for courses in the Faculty of Engineering assessment is on a term basis. A full-time course fee will be charged for any term where more than 15 hours per week instruction, etc., is involved.

    (i) Full-time Course Fees (more than 15 hours' attendance per week)—£48 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. The fee for this short term is £24.)

    (ii) Part-time Course Fee—over four hours and up to 15 hours' attendance per week—£24 per term.

    (iii) Part-time Course Fee (four hours or less per week attendance) — £12 per term.

    (iv) Thesis Fee—Students who have completed the final examinations, but have a thesis still outstanding, are required to pay £10 per annum (no term payment).

Other Fees

In addition to the above course fees, all registered undergraduates are required to pay:

Matriculation Fee — £3 — payable at the beginning of first year.

Library Fee—£5—payable yearly.

University of New South Wales Students' Union—£2—payable yearly.

University of New South Wales Sports Association — £1 — payable yearly.

University Union — £6 — payable yearly.

Graduation Fee — £3 — payable at the completion of course.

Thesis Fee—£10—payable yearly by students who have completed the final examinations but still have a thesis outstanding (no term payment).

Chemistry Kit Deposit—£4 per kit.

Special Examination Fees

Deferred examination — £2 for each subject.

Examinations conducted under special circumstances — £3 for each subject.

Review of examination results—£3 for each subject.

Completion of Enrolment

All students are required to complete enrolment during the prescribed enrolment period.* Failure to do so will incur a late fee of £1.

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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."

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.

Fees should be paid during the prescribed enrolment period but will be accepted without payment of a late fee during the first two weeks of first term. Fees paid between the beginning of the third week of term and the 31st March are subject to a late fee of £3. *Fees will not be accepted (i.e. enrolment cannot be completed) after 31st March except with the express approval of the Registrar which will be given in exceptional circumstances only. Where this approval is given a late fee of £5 applies.*

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 course fees. These fees must be paid within the first two weeks of each term: otherwise a late fee is incurred — £3 on fees paid in the third or fourth weeks of term and £5 on fees paid in the fifth or sixth weeks.

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 by paying their own fees. A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

Extension of Time

Any student who is unable to pay fees by the due date may apply in writing to the Registrar for an extension of time. Such application must state year or stage, whether full-time or part-time and the course in which the applicant wishes to enrol, and must also state clearly and fully the reasons why payment cannot be made and the extension sought. This application 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.

SCHOLARSHIPS AND CADETSHIPS

Students undertaking courses in the Faculty of Engineering are eligible to apply for the following scholarships or cadetships.

Commonwealth Scholarships

Benefits include payment of all tuition fees and other compulsory fees, and living allowances (these latter being subject to a means test). The closing date for applications is 30th November in the year immediately preceding that for which the scholarship is desired. Full particulars and application forms may be obtained from the Officer-in-Charge, University Branch Office, Department of Education, University Grounds, University of Sydney (Telephone: 68-2911).

University Scholarships

The University annually awards up to fifteen scholarships tenable in degree courses to students who have matriculated at the Leaving Certificate Examination; ten scholarships to students who have completed Trade Courses (Department of Technical Education); and ten scholarships to part-time students who have taken the Qualifying and Matriculation course of the Department of Technical Education. Scholarships will be awarded in order of merit on Leaving Certificate Examination results, and only to persons who do not hold another award. Holders are exempt from course fees during the currency of the scholarship. 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, 1964.

State Bursaries and Exhibitions

A number of exhibitions and bursaries are awarded by the New South Wales Government on the results of the Leaving Certificate Examination. The award of an exhibition exempts the student from payment of fees. Bursaries are awarded subject to applicants holding an exhibition and satisfying a means test. They are tenable for the duration of one first degree course, and provide a living allowance of £104 per annum (£130 per annum if the student is living away from home), and a book allowance of £10 per annum. Bursary holders are allowed to engage in employment only when it is associated with the course, and the income from such employment must not exceed £300 per annum. Further information can be obtained from the Bursary Endowment Board, c/- Department of Education, Box 498, P.O., North Sydney.

Joint Coal Board and Australian Coal Association (Research) Limited Scholarships

The Joint Coal Board and the Australian Coal Association (Research) 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 £350 to £600 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 publication of Leaving Certificate results.

Raymond E. Purves — Clyde Industries Engineering Scholarship

Clyde Industries Limited provides one scholarship annually for:—

(a) holders of the Associateship of the Sydney Technical College or the B.Sc. (Tech.) of the University of New South Wales in Mechanical Engineering or Industrial Engineering who wish to complete a one year full-time course leading to the B.E. degree with Honours. Students who obtain this degree may apply for a renewal for a further year to allow them to work for a Master's degree. This scholarship provides a living allowance of £800-£1,000 per annum to make possible full-time attendance at the University.

or for

(b) graduates in Mechanical or Industrial Engineering who wish to undertake full-time study or research leading to the award of the degree of Master of Technology or Master of Engineering. Students whose post-graduate course is of longer duration than one year may apply for an extension of the scholarship for a second year. This scholarship is valued at £1050-£1200 per annum, from which University fees are deducted.

Only one scholarship is available at any time. Application forms are available from the Registrar, and should be lodged with him, duly completed, by 30th November.

The John Heine Memorial Scholarship

This scholarship is awarded annually at the discretion of the Directors of the John Heine Memorial Foundation. It is designed to assist the recipient to undertake the final two years of the degree course in Mechanical, Electrical or Chemical Engineering, Applied Chemistry or Metallurgy, or to assist a student who has qualified for the A.S.T.C. diploma to complete the requirements for the B.E. or B.Sc. degree in these courses in two years of part-time study (three years in the case of Electrical Engineering) or in one year of full-time study. The applicant must be an employee of a member of the Metal Trades Employers' Association. The scholarship has a total value of £250, a maximum of £150 being payable to any student

completing the requirements for a degree in one year of part-time study only.

Application 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 scholarship is £90, payable in three equal amounts of £30 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.

Mining and Metallurgical Bursaries Fund

Mining and Metallurgical Bursaries at the University of New South Wales, valued at £50 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 two years 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. Candidates must lodge their applications with the Registrar on or before 31st December each year.

South Sydney Junior Rugby League
Club Ltd. Scholarships

Two scholarships, each valued at £75, 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.

In addition to these scholarships made available by the University and other bodies, a number of industrial organisations and Government Departments sponsor students at the University. Such students generally have their University fees paid by the employers and are employed at cadet rates of pay during their course.

Outlines of Undergraduate Courses

SCHOOL OF CIVIL ENGINEERING

Civil engineering is broad in its scope, utilizing other specialised 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 specialised research and investigations, through routine design and construction work to higher positions which are often largely managerial and organisational 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 (pass or honours), 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. In addition the School offers a full-time and a part-time course in Surveying leading to the degree of Bachelor of Surveying (pass or honours), details of which are set out below the outlines of the Civil Engineering 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.

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		3 — 3
5.001	Engineering I		3 — 3
10.001	Mathematics I		4 — 2
			13 —11

SECOND YEAR*
(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
1.212S	Physics II(T)	2 — 2½
5.301S	Engineering Mechanics	1½— 1
5.701S	Thermodynamics	1 — 1½
8.112S	Materials and Structures	2 — 2
8.421S	Engineering Surveying†	1½— 1½
10.022S	Mathematics	4 — 1
25.531S	Geology**	2 — 1
50.011	(1964) English Literature *or* ⎱ ‡....	1½— 0
57.011	An Introduction to Modern Drama ⎰	
		15½—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
51.011S	History *or* ⎱ §...	1½— 0
52.011S	Philosophy ⎰	
	Social Science Elective§	1½— 0
		15¾—10¾

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

		Hours per week for 24 weeks lec. lab./tut.
8.132S	Structures	2 — 3
8.142S	Engineering Computations	1 — 1
8.223S	Engineering Materials	3 — 2½
8.522S	Hydraulics	1½— 1½
8.613S	Civil Engineering	4½— 0
8.011S	Minor Thesis	3 — 0
	Humanities, Advanced Elective§	3 — 0
		18 — 8

* Lectures cease at end of 3rd week of third term.
** Two one-day Geology excursions are an essential part of the course.
† A one-week survey camp must be attended in sixth week of third term.
‡ It is expected that these courses will involve an additional 30 hours of reading and assignment work.
§ Terms 1 and 2 only.

FOURTH YEAR—HONOURS COURSE
(30 weeks day course)

		Hours per week for 24 weeks* lec. lab./tut.
8.132S	Structures	2 — 3
8.142S	Engineering Computations	1 — 1
8.522S	Hydraulics	1½— 1½
8.613S	Civil Engineering	4½— 0
8.223S	Engineering Materials	3 — 2½
8.021	Thesis	2 — 0
10.371S	Statistics	2 — 0
	Humanities, Advanced Elective **	3 — 0
	Three Honours subjects are to be chosen from 8.134 Structures 8.224 Materials 8.424 Surveying 8.524 Hydraulics	3 — 0
		20— 8

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

Full-time students in Civil Engineering may qualify for the double degree of Bachelor of Science, Bachelor of Engineering by completing the following course of study over five years.

First Year — Normal first year programme for full-time Civil Engineering as set out above.

Second Year — As set out below.

		Terms 1 & 2 Weeks 1-3	Term 3 Weeks 1-3	Weeks 4-9
1.112	Physics	8	8	8
5.301	Engineering Mechanics	2	2	2
5.701	Thermodynamics	2	2	2
8.112	Materials and Structures	3	3	3
8.421S	Engineering Surveying	3	3	0
10.111	Pure Mathematics II†	5	5	5
25.531S	Geology‡	3	3	0
50.011	(1964) English Literature or	§ 1½	0	0
57.011	An Introduction to Modern Drama			
		27½	26	20

Third Year — Two appropriate third year Science subjects (see Science course regulations in the University Calendar) plus 51.011 History or 52.011 Philosophy and a Social Science Elective. In the long vacation following this year students are required to undertake a nine-week period of industrial training.

Fourth Year — Normal third year of the Civil Engineering course (less the Humanities taken in the special third year).

Fifth Year — Normal fourth year of the Civil Engineering course.

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* In the last 6 weeks of third term 18 hours per week will be devoted to work on the thesis. In addition students will be required to attend for nine hours per week such course work as may be prescribed.

** Terms 1 and 2 only.

† 10.211 Applied Mathematics II may be substituted (7 hours per week for three terms).

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

§ It is expected that these courses will involve an additional 30 hours of reading and assignment work.

CIVIL ENGINEERING—PART-TIME COURSE

FIRST STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.001/1	Physics I, Part I	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
5.001/1	Engineering I, Part I	1 — 2*
10.001/1	Mathematics I, Part I	2 — 1
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
5.001/2	Engineering I, Part II	2 — 1
10.001/2	Mathematics I, Part II	2 — 1
		7 — 5

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— ¾
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics II, Part I	1 — 1
		5½— 4¾

Part-time students in 1964 will not be required to take a first Humanities course but will take an equivalent course in 1965.

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— ¾
50.011/2	English	1 — 0
		7 — 4

* Terms 1 and 2 only: Term 3 — 3 hours per week of lab./tut.
† Two one-day Geology excursions are an essential part of the course.
‡ Saturday fieldwork additional. Also, a one-week survey camp must be attended in seventh week of third term.

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
51.011	History *or* }	
52.011	Philosophy }	1 — 0

7½— 5

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
	Social Science Elective	1 — 0

9 — 3

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

The Civil 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 Civil Engineering).

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

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

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

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

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

STAGE 5A
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
8.131	Structures	2 — 2
8.141	Engineering Computations	1 — 0
8.222	Engineering Materials	1 — 1
8.521	Hydraulics	1 — 1
8.612	Civil Engineering	1 — 0
		6 — 4

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 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 2	$1\frac{1}{2}$— $1\frac{1}{2}$
2.001/2	Chemistry I, Part 2	$1\frac{1}{2}$— $1\frac{1}{2}$
5.301	Engineering Mechanics	$1\frac{1}{2}$— $\frac{1}{2}$
10.022/2	Mathematics	$1\frac{1}{2}$— $\frac{1}{2}$
	Social Science Elective	1 — 0
		$6\frac{3}{4}$— $4\frac{1}{4}$

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.212	Physics II(T)	$1\frac{1}{2}$— $1\frac{1}{2}$
8.131	Structures	2 — 2
8.141	Engineering Computations	1 — 0
8.222	Engineering Materials (Soil Mechanics)*	2 — 0
8.521	Hydraulics	1 — 1
		$7\frac{1}{2}$— $4\frac{1}{2}$

* First term only.

A.S.T.C. diplomates who completed their course in Civil Engineering in 1961 or later years and who wish to qualify for the degree of Bachelor of Engineering by full-time study may do so by completing the subjects of Stages 6 and 7 of the existing part-time Bachelor of Engineering degree course, or their equivalent, in one year.

Department of Surveying

The Department of Surveying of the School of Civil Engineering offers a full-time course, a part-time course and a special six-year trainee course leading to the degree of Bachelor of Surveying (pass and honours). Suitably qualified candidates may also register for the degree of Master of Surveying. Since 1961 the University Degree in Surveying has been the only route by which the registration of the Surveyors Registration Board of N.S.W. may be obtained. Students who are registered surveyors are granted certain exemptions, particulars of which are given below.

SURVEYING—FULL-TIME COURSE

FIRST YEAR
(30 weeks day course)

		Hours per week for 30 weeks lec. lab./tut.
1.001	Physics I	3 — 3
2.001	Chemistry I	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		13 —11

SECOND YEAR*
(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
1.212S	Physics II(T)	2 — 2½
8.421S	Engineering Surveying**	1½— 1½
8.811S	Surveying**	1 — 1
8.841S	Surveying Computations	1 — 1
8.861S	Cartography	1 — 1½
8.871S	Land Utilisation	1½— ½
10.022S	Mathematics	4 — 1
10.361S	Statistics	1½— 0
25.531S	Geology†	2 — 1
50.011	(1964) English Literature *or* ‡	1½— 0
57.011	An Introduction to Modern Drama	
		17 —10

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* Lectures cease at end of 3rd week of 3rd term.
** A two-week survey camp must be attended in third term.
† Two one-day Geology excursions are an essential part of the course.
‡ It is expected that these courses will involve an additional 30 hours of reading and assignment work.

THIRD YEAR*
(24 weeks day course)

		Hours per week for—	
		10 weeks lec. lab./tut.	14 weeks lec. lab./tut.
5.501S	Fluid Mechanics	1 — 1½	1 — 1½
8.812S	Surveying	1 — 2	1 — 0
8.241S	Soil Mechanics	1 — 1½	1 — 1½
8.821S	Geodesy**	2 — 3	1 — 3
8.831S	Astronomy**	2 — 0	2 — 2
8.842S	Surveying Computations	1½— 1½	1 — 0
8.851S	Photogrammetry	1 — 1½	2 — 3
8.611S	Civil Engineering	3 — 0	3 — 0
8.891S	Theory of Instruments	1 — 0	1 — 0
51.011S 52.011S	History *or* { † Philosophy {	1½— 0	1½— 0
	Social Science Elective†	1½— 0	1½— 0
		16½—10¾	16 —10¾

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

		Hours per week for 24 weeks lec. lab./tut.
8.613S	Civil Engineering	4½— 0
8.822S	Geodesy	1 — 1
8.832S	Astronomy	1½— ¾
8.852S	Photogrammetry	1 — 1½
8.862S	Cartography	2 — 0
8.872S	Land Valuation	1 — 0
8.881S	Survey Laws and Regulations	1½— 0
11.411	Town Planning†	1 — 1
8.011S	Minor Thesis	3 — 0
25.533	Geophysics‡	2½— 0
	Humanities, Advanced Elective†	3 — 0
		21¾— 4¼

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

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

† Terms 1 and 2 only.

‡ Four short Geophysical excursions are an essential part of the course.

FOURTH YEAR—HONOURS COURSE
(30 weeks day course)

SURVEYING—PART-TIME COURSE
FIRST STAGE
(30 weeks part-time course)

SECOND STAGE
(30 weeks part-time course)

* In the last 6 weeks of third term 18 hours per week will be devoted to work on the thesis. In addition students will be required to attend nine hours per week such course work as may be prescribed.

** Four short Geophysical excursions are an essential part of the course.

† Terms 1 and 2 (20 weeks) only.

THIRD STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. — lab./tut.
1.212	Physics II(T)	1½ — 1½
8.421	Engineering Surveying*	¾ — ¾
8.841	Surveying Computations	¾ — ¾
8.861	Cartography	¾ — 1¼
10.022/1	Mathematics II, Part I	1½ — ½
		5½ — 4⅔

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

FOURTH STAGE
(30 weeks part-time course)

		Hours per week for 30 weeks lec. — lab./tut.
5.501	Fluid Mechanics	1 — 1
8.811	Surveying†	¾ — ¾
8.871	Land Utilisation	1 — ½
10.022/2	Mathematics II, Part II	1½ — 1
10.361	Statistics	1 — 0
25.531	Geology‡	1½ — ¾
50.011/2	English	1 — 0
51.011	History *or* ⎫	1 — 0
52.011	Philosophy ⎭	
		8½ — 4

FIFTH STAGE
(30 weeks part-time course)

		Hours per week for— 20 weeks lec. lab./tut.	10 weeks lec. lab./tut.
8.241	Soil Mechanics	1 — 1	1 — 1
8.821	Geodesy	1½ — 2¼	1½ — 2¼
8.842	Surveying Computations†	1 — ½	1 — ½
8.862	Cartography	2 — 0	1 — 0
8.891	Theory of Instruments	1 — 0	0 — 0
	Social Science Elective	1 — 0	1 — 0
		7½ — 3¾	5½ — 3¾

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* Saturday fieldwork additional. A survey camp of one week must be attended in the third term.
† A Survey camp of one week must be attended in third term.
‡ Two one-day Geology excursions are an essential part of the course.

(30 weeks part-time course)

		Hours per week for— 20 weeks lec. lab./tut.	10 weeks lec. lab./tut.
8.611	Civil Engineering	2 — 0	2 — 0
8.812	Surveying*	1 — 1	1 — 0
8.831	Astronomy	1½— ½	1½— 1½
8.851	Photogrammetry	1½— 1¾	1½— 1¾
25.533	Geophysics	2 — 0	2 — 0
	Humanities Advanced Elective	2 — 0	2 — 0
		9¾— 3¼	9¾— 3¼

SEVENTH STAGE
(30 weeks part-time course)

		Hours per week for— 20 weeks lec. lab./tut.	10 weeks lec. lab./tut.
8.613	Civil Engineering	3½— 0	3½— 0
8.822	Geodesy	1½— 0	1½— 0
8.832	Astronomy	1½— ½	0 — 1½
8.852	Photogrammetry	1 — 1	½— 1½
8.872	Land Valuation	1 — 0	0 — 0
8.881	Survey Laws and Regulations	1 — 0	2 — 0
11.411	Town Planning	2 — 0**	0 — 0
		11½— 1½	7½— 3

Note.—Part-time students are not required to complete a thesis since their professional experience is taken into consideration.

Honours are not awarded in the part-time course. To qualify for honours a part-time student must transfer to the full-time course and complete, at his first attempt, the fourth year of the full-time Honours course.

TRAINEE SURVEYING DEGREE COURSE
(6 years with day release)

The first two years of this course are identical with the first two years of the part-time Surveying Degree Course. In later years individual timetables must be arranged at the time of enrolment, to accord with timetables for subjects offered in the full-time and part-time courses.

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

** One term of lectures and one term of studio work.

FIRST YEAR
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.001/1	Physics I, Part I	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
5.001/1	Engineering I, Part I	1½— 1½
10.001/1	Mathematics I, Part I	2 — 1
		6½— 5½

SECOND YEAR
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
5.001/2	Engineering I, Part II	1½— 1½
10.001/2	Mathematics I, Part II	2 — 1
		6½— 5½

THIRD YEAR
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
1.212	Physics II(T)	1½— 1½
8.421	Engineering Surveying*	¾— ¾
8.841	Surveying Computations	¾— ¾
8.861	Cartography	¾— 1½
10.022/1	Mathematics II, Part I	1 — 1
10.361	Statistics	1 — 0
		5¾— 5¾

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

FOURTH YEAR
(30 weeks part-time course)

		Hours per week for 30 weeks lec. lab./tut.
5.501	Fluid Mechanics	1 — 1
8.811	Surveying*	¾— ¾
8.842	Surveying Computations	1 — ¾
8.862	Cartography	1½— 0
8.871	Land Utilisation	1 — ¾
10.022/2	Mathematics II, Part II	1 — 1
25.531	Geology	1½— ¾
50.011/2	English	1 — 0
51.011	History *or* ⎰	1 — 0
52.011	Philosophy ⎱	
		9½— 4½

* Saturday fieldwork additional. A survey camp of one week must be attended in the third term.

(30 weeks part-time course)

Hours per week
for 30 weeks
lec. lab./tut.

	Subject	lec.	lab./tut.
8.241	Soil Mechanics	1	1
8.611	Civil Engineering	2	0
8.812	Surveying*	1½	0
8.821	Geodesy	1½	2½
8.831	Astronomy	2	½
8.851	Photogrammetry	1½	1½
8.891	Theory of Instruments	½	0
	Social Science Elective	1	0
		10½	5½

SIXTH YEAR
(30 weeks part-time course)

Hours per week
for 30 weeks
lec. lab./tut.

	Subject	lec.	lab./tut.
8.613	Civil Engineering	3½	0
8.822	Geodesy	1½	0
8.832	Astronomy	1½	½
8.852	Photogrammetry	1	1
8.872	Land Valuation	½	0
8.881	Survey Laws and Regulations	1½	0
11.411	Town Planning	1½	0
25.533	Geophysics	2	0
	Advanced Elective	2	0
		14½	1½

Note—Trainee students are not required to complete a thesis since their professional experience is taken into consideration.

For an Honours degree, a part-time student must transfer to and complete the 4th Year of the full-time course.

EXEMPTIONS

The following exemptions are granted to registered surveyors and persons who have completed subjects in the Surveying Certificate Course of the N.S.W. Department of Technical Education, viz:—

(a) Exemptions for Licensed Surveyors.

(i) The following exemptions in the Surveying Degree Course will be granted to Registered Surveyors who have passed the examination of the Surveyors' Registration Board.

	Subject	*Equivalent Subject Passed*
8.421	Engineering Surveying	Engineering Surveying A
8.841	Surveying Computations	Computations A
8.861	Cartography	Field Practice
8.881	Survey Laws and Regulations	Laws and Regulations affecting Surveys

* A survey camp of two weeks must be attended in the third term.

Registered Surveyors who have passed the examinations of the Surveyors' Registration Board will be granted admission to examinations in the following subjects of the Surveying Degree Course without attendance at classes.

Subject		Registration Board Subject Passed
8.811	Surveying	Engineering Surveying A and B
8.821	Geodesy	Geodesy
8.831	Astronomy	Astronomy
8.871	Land Utilisation	Land Classification and Utilisation
8.872	Land Valuation	Principles and Practice of Land Valuation

(b) Persons who have completed individual subjects, etc.

The following exemptions in the Surveying Degree Course will be granted to persons who have passed the following equivalent individual subjects in the Surveying Certificate Course:—

Subject Exempt		Surveying Certificate Equivalent
8.411	Engineering Surveying	Engineering Surveying I
8.841	Surveying Computations	Surveying Computation II
8.861	Cartography	Plotting and Plan Drawing
8.871	Land Utilisation	Land Classification and Utilisation
8.872	Land Valuation	Land Surveying II (Land Valuation)
	Town Planning	Town Planning

SCHOOL OF ELECTRICAL ENGINEERING

In preparation for a career in any branch of electrical engineering the student must acquire a knowledge of the basic sciences of mathematics and physics. Students should realise 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.

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 advanced years students will elect, with the approval of the Head of the School, to study in one of the specialised fields of electrical engineering (referred to as options), at the same time taking the common subjects of (i) electrical engineering, which includes topics such as electrical measurements and circuit and field theory, and (ii) electronics.

In 1965 a revised fourth year will be introduced in the full-time

B.E. course (pass and honours) which will provide for specialisation in one or other of the following options:

(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.

In the past the content of these two fields has been offered in three options, *viz.* power apparatus and systems, utilization and control, and communications. These three options will be offered to full-time students for the last time in 1964. The details of the 1964 fourth year and of the revised fourth year to be introduced in 1965 are given in the course outlined below.

Each student 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	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		13 —11

(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
50.011 57.011	(1964) English Literature *or* An Introduction to Modern Drama ⎫⎬⎭ **......	1 — 0
		13½—12

THIRD YEAR—PASS COURSE

(30 weeks day course)

		Hours per week for 30 weeks lec. lab./tut.
5.304S	Theory of Machines†	1 — 1
5.501 10.351	Fluid Mechanics *or* Statistics	1 — 1
6.102	Electric Circuit Theory	3 — 3
6.201	Electric Power Engineering	2 — 3
6.301	Electronics	3 — 3
10.033	Mathematics‡	2 — 0
51.011S 52.011S	History *or* ⎫⎬⎭ § Philosophy	1½— 0
	Social Science Elective§	1½— 0
		15 —11

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* This year also meets the requirements of the Second Year of the Science course for the degree of Bachelor of Science.

** It is expected that these courses will involve an additional 30 hours of reading and assignment work.

† Lectures cease at the end of the 3rd week of third term.

‡ 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.

FOURTH YEAR*—PASS COURSE
1964 only
(30 weeks day course)

		Hours per week for 21 weeks lec. lab./tut.
6.001S	Electrical Engineering	5 — 5
	Advanced Elective, Humanities	3 — 0
6.911	Thesis**	0 — 2

Plus one of the following options:—

Option I—

Power Apparatus and Systems—

6.202S	Power Systems	3 — 4
6.212S	Electrical Machines	3 — 4

Option II—

Utilisation and Control—

6.401S	Utilisation and Control of Electrical Plant	3 — 4
6.322S	Applied Electronics	3 — 4

Option III—

Communications—

6.302S	Communications	3 — 4
6.312S	Communications	3 — 4
		14 —15

FOURTH YEAR*—PASS COURSE
1965 and subsequently
(30 weeks day course)

		Hours per week for 21 weeks lec. lab./tut.
6.001S	Electrical Engineering	4 — 1
6.322S	Electronics	2 — 3
6.911	Thesis**	0 — 2
	Advanced Elective, Humanities	3 — 0

Plus one of the following options:—

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 —12

* Lectures cease at the end of second term.
** Full-time in third term.

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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 30th November.

A course of specialist lectures, including engineering economics, is given by senior engineers from government departments and industry on problems met in practice. These are designed to acquaint the student with current projects and practical problems in industry and essential electrical services.

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 twenty-one 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 51.011 History or 52.011 Philosophy plus a Social Science Elective. 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.
1.001/1	Physics I, Part I	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
5.001/1	Engineering I, Part I	1*— 2*
10.001/1	Mathematics I, Part I	2 — 1
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
5.001/2	Engineering I, Part II	2 — 1
10.001/2	Mathematics I, Part II	2 — 1
		7 — 5

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
6.101	Electric Circuit Theory	1 — 2
8.112	Materials and Structures	1½— 1½
10.111/1	Pure Mathematics II, Part I	1½— ½
		6 — 6

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

* Hours for Terms 1 and 2 only; in Term 3, the three hours per week are devoted to drawing office work in Engineering Drawing.

FOURTH STAGE
(30 weeks part-time course)

Hours per week
for 3 terms
lec. lab./tut.

		lec. lab./tut.
1.112/2	Physics II, Part II	2 — 2
4.921	Materials Science	1 — $\frac{1}{2}$
6.152	Electric Circuit Theory	2 — 2
10.111/2	Pure Mathematics II, Part II	2 — 1
52.011/2	English	1 — 0
		8 — 5$\frac{1}{2}$

FIFTH STAGE
(30 weeks part-time course)

Hours per week
for 3 terms
lec. lab./tut.

		lec. lab./tut.
5.301	Engineering Mechanics	1$\frac{1}{2}$— $\frac{1}{2}$
5.701	Thermodynamics	1 — 1
6.251	Electric Power Engineering	1$\frac{1}{2}$— 2
6.351	Electronics	1$\frac{1}{2}$— 2
51.011	History *or*	1 — 0
52.011	Philosophy	
		6$\frac{1}{2}$— 5$\frac{1}{2}$

SIXTH STAGE
(30 weeks part-time course)

Hours per week
for 3 terms
lec. lab./tut.

		lec. lab./tut.
6.051	Electrical Engineering	3 — 0
	Social Science Elective	1 — 0

Plus one of the following options:—

Option I—

Power Apparatus and Systems—

6.252	Power Systems	1$\frac{1}{2}$— 2$\frac{1}{2}$
6.262	Electrical Machines	1$\frac{1}{2}$— 2$\frac{1}{2}$

Option II—

Utilisation and Control—

6.451	Utilisation and Control of Electrical Plant .	1$\frac{1}{2}$— 2$\frac{1}{2}$
6.372	Applied Electronics	1$\frac{1}{2}$— 2$\frac{1}{2}$

Option III—

Communications—

6.352	Communications	1$\frac{1}{2}$— 2$\frac{1}{2}$
6.362	Communications	1$\frac{1}{2}$— 2$\frac{1}{2}$
		7 — 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.
6.05₁	Electrical Engineering	3 — 0
Plus one of the following options:—		
Option I—		
	Power Apparatus and Systems—	
6.252	Power Systems	1½— 2½
6.262	Electrical Machines	1½— 2½
Option II—		
	Utilisation and Control—	
6.451	Utilisation and Control of Electrical Plant	1½— 2½
6.372	Applied Electronics	1½— 2½
Option III—		
	Communications—	
6.352	Communications	1½— 2½
6.362	Communications	1½— 2½
		6 — 5

CONVERSION COURSES—ELECTRICAL ENGINEERING
(From A.S.T.C. Diploma in Electrical or Radio Engineering 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 prerequisite 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. Humanities 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 course; full-time students must complete two five-month 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 course in mechanical engineering of four years duration leads to the degree of Bachelor of Engineering (pass or honours), with additional work being taken in the third and fourth years for the honours degree.

Part-time courses of six years duration leading to the degree of Bachelor of Science (Technology) are offered in mechanical engineering, aeronautical engineering, and naval architecture. The Department of Industrial Engineering also offers a full-time and a part-time course, details of which are given below. 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.

A student who has successfully completed the first four stages of the part-time B.Sc. (Tech.) courses in industrial or mechanical engineering may transfer to third year of the corresponding full-time 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.

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	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		13 —11

SECOND YEAR*
(24 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
1.212S	Physics II	2 — 2½
4.911S	Materials Science	1½— 1½
5.202S	Mechanical Technology	2 — 0
5.301S	Engineering Mechanics	1½— 1
5.501S	Fluid Mechanics	1 — 1½
5.701S	Thermodynamics	1 — 1½
8.112S	Materials and Structures	2 — 2
10.022S	Mathematics	4 — 1
50.011	(1964) English Literature *or* ⎱ **	1½— 0
57.011	An Introduction to Modern Drama ⎰	
		16¼—11¼

* Lectures cease at the end of the 3rd week of third term.
** It is expected that these courses will involve an additional 30 hours of reading and assignment work.

(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 Analysis	1 — ½
5.502S	Fluid Mechanics	1½— 1½
5.702S	Thermodynamics	1 — 2
6.801S	Electrical Engineering	1½— 2½
8.133S	Structures	1½— 1½
51.011S	History *or* ⎱ **	1½— 0
52.011S	Philosophy ⎰	
	Social Science Elective**	1½— 0
		13 —14½

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

		Hours per week for 24 weeks lec. lab./tut.
5.103S	Mechanical Engineering Design	0 — 3
5.321S	Automatic Control Engineering	1 — ½
5.304S	Theory of Machines	1 — 1
5.503S	Fluid Mechanics	1 — 1
5.703S	Thermodynamics	1 — 1
6.802S	Electrical Engineering	1½— 1½
18.121S	Engineering Administration	3 — 0
5.021S	Seminar	0 — 1½
5.031S	Minor Thesis	0 — 4
	Humanities, Advanced Elective**	3 — 0
		11½—13½

ADDITIONAL FOR HONOURS
THIRD YEAR* — HONOURS COURSE
(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 Analysis	1 — ½
5.502S	Fluid Mechanics	1½— 1½
5.702S	Thermodynamics	1 — 2
6.801S	Electrical Engineering	1½— 2½
8.133S	Structures	1½— 1½
10.023S	Engineering Mathematics	1 — ½
51.011S	History *or* ⎱ **	1½— 0
52.011S	Philosophy ⎰	
	Social Science Elective**	1½— 0
		14 —15

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* Lectures cease at the end of the 3rd week of third term.
** Terms 1 and 2 only.

(30 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.103S	Mechanical Engineering Design	0 — 3
5.322S	Automatic Control Engineering	2¼— ¾
5.305S	Theory of Machines	1¼— 1¼
5.601S	Mechanical Engineering	4¼— 1¼
6.802S	Electrical Engineering	1¼— 1¼
10.371S	Statistics	1 — 1
5.021S	Seminar	0 — 1¼
5.041	Thesis*	0 — 4
	Humanities, Advanced Elective**	3 — 0
		14 —14¼

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

Full-time students in Mechanical Engineering may qualify for the double degree of Bachelor of Science, Bachelor of Engineering by completing the following course of study over five years.

First Year—Normal First Year programme for full-time Mechanical Engineering as set out above.

Second Year—As set out below.

		Terms 1 & 2	Term 3 Weeks 1-3	Weeks 6-9
1.112	Physics II	8	8	8
4.911S	Materials Science	2½	2½	0
5.202S	Mechanical Technology	2	2	0
5.301	Engineering Mechanics	2	2	2
5.501	Fluid Mechanics	2	2	2
5.701	Thermodynamics	2	2	2
8.112	Materials and Structures	3	3	3
10.111	Pure Mathematics II†	5	5	5
50.111	(1964) English Literature or	‡ 1½	–	–
57.011	An Introduction to Modern Drama			
		28	26½	22

Third Year — Two appropriate Third Year Science subjects (see Science course regulations in the University Calendar), plus 51.011 History or 52.011 Philosophy and a Social Science Elective. In the long vacation following this year, students are required to undertake a nine-week period of industrial training.

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* 28 hours per week for the final six weeks of third term are occupied in work for Thesis.

** Terms 1 and 2 only.

† 10.211 Applied Mathematics II may be substituted by selected students (7 hours per week for three terms).

‡ It is expected that these courses will involve an additional 30 hours of reading and assignment work.

Fourth Year — Normal Third Year of the Mechanical Engineering course less the Humanities taken in the special Third Year.

Fifth Year — Normal Fourth Year of the Mechanical Engineering course.

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.
1.001/1	Physics I, Part I	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
5.001/1	Engineering I, Part I	1*— 2*
10.001/1	Mathematics I, Part I	2 — 1
		6 — 6

SECOND STAGE

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
5.001/2	Engineering I, Part II	2 — 1
10.001/2	Mathematics I, Part II	2 — 1
		7 — 5

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— ¾
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics	1½— ¾
		6¾— 4½

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

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* Hours for Terms 1 and 2 only; in Term 3 the three hours per week are devoted to drawing office work in Engineering Drawing.

(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	¾— 1½
5.701	Thermodynamics	¾— 1½
10.022/2	Mathematics	1½— ½
50.011/2	English	1 — 0
		6 — 7

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
6.801	Electrical Engineering	1 — 2
8.133	Structures	1 — 1
5.023	Seminar**	0 — 1½
51.011	History or ⎱	1 — 0
52.011	Philosophy ⎰	
		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
	Social Science 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).

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

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).

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 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
2.001/2	Chemistry I, Part II	1½— 1½
10.022/2	Mathematics	2 — 0
52.011	Philosophy	1 — 0
		7½— 4½

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.304	Theory of Machines**	1 — 1
5.503	Fluid Mechanics**	1 — 1
5.321	Automatic Control Engineering	1 — 0
	Social Science Elective	1 — 0
		4 — 2

* Term 1 only.
** 24 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— ¾
8.112	Materials and Structures	1½— 1½
10.022/1	Mathematics	1½— ½
		6¾— 5¼

FOURTH STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.501	Fluid Mechanics	¾— 1½
5.701	Thermodynamics	¾— 1½
5.821	Aircraft Strength of Materials	1½— ¾
6.801	Electrical Engineering	1 — 2
10.022/2	Mathematics	1½— ½
		5¼— 5¼

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

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— ¾
50.011/2	English	1 — 0
51.011 52.011	History or } Philosophy }	1 — 0
		7¾— 4¼

(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
	Social Science 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	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		13 —11

STAGE 2(A)**
(24 weeks full-time course)

		Hours per week for 24 weeks lec. lab./tut.
1.212S	Physics	2 — 2½
4.911S	Materials Science	1½— 1½
5.202S	Mechanical Technology	2 — 0
5.301S	Engineering Mechanics	1½— 1
5.501S	Fluid Mechanics	1 — 1½
5.701S	Thermodynamics	1 — 1½
8.112S	Materials & Structures	2 — 2
10.022S	Mathematics	4 — 1
50.011	(1964) English Literature *or* ⎱ †....	1½— 0
57.011	An Introduction to Modern Drama ⎰	
		16½—10½

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* Terms 1 and 2 only (2½ — 4½ hours per week for third term).

** Stage 2(A) is the same as the second year of the full-time Mechanical Engineering course.

† It is expected that these courses will involve an additional 30 hours of reading and assignment work.

(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
5.821	Aircraft Strength of Materials	1½— ¾
6.801	Electrical Engineering	1 — 2
		4¾— 5¼

STAGE 4(A)

(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
5.304S	Theory of Machines*	1 — 1
5.811	Aerodynamics	2 — 1
5.822	Aircraft Strength of Materials	1½— ¾
51.011 52.011	History *or* Philosophy	1 — 0
	Social Science Elective	1 — 0
		6½— 2¾

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.

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* 24 weeks only.

† Terms 1 and 2 only. (2½—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
	Social Science 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.

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

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	½— 1½
5.902	Naval Architecture	2½— 2½
10.022/2	Mathematics	1 — 1
		5½— 5¾

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

* 4 hours per week in third term.

FIFTH STAGE

(30 weeks part-time course)

Hours per week
for 3 terms
lec. lab./tut.

5.502	Fluid Mechanics	1 — 1½
5.701	Thermodynamics	¾ — 1¼
5.903	Naval Architecture	3 — 3
50.011/2	English	1 — 0
51.011	History *or* ⎫	1 — 0
52.011	Philosophy ⎭	

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
	Social Science 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 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	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2

13 —11

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
50.011	(1964) English Literature *or* ⎰ **	1½— 0
57.011	An Introduction to Modern Drama ⎱	
		15½—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	½— 1½
5.902	Naval Architecture	2½— 2½
51.011	History *or* ⎰	1 — 0
52.011	Philosophy ⎱	
		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

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

		Hours per week for 3 terms lec. lab./tut.
5.904	Naval Architecture	3 — 5
	Social Science Elective	1 — 0
		4 — 5

* 30 weeks course.

** It is expected that these courses will involve an additional 30 hours of reading and assignment work.

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	$1\frac{1}{2}$— $1\frac{1}{2}$
1.212	Physics II(T)	$1\frac{1}{2}$— $1\frac{1}{2}$
2.001/1	Chemistry I, Part I	$1\frac{1}{2}$— $1\frac{1}{2}$
2.001/2	Chemistry I, Part II	$1\frac{1}{2}$— $1\frac{1}{2}$
		6 — 6

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
4.911	Materials Science	1 — 1
5.021	Mechanical Technology	1 — 0
10.022/1	Mathematics	1 — 1
10.022/2	Mathematics	$1\frac{1}{2}$— $\frac{1}{2}$
	Social Science Elective	1 — 0
		$5\frac{1}{2}$— $2\frac{1}{2}$

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 course is accepted by the Institution of Mechanical Engineers, London, in lieu of all 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.

Two-year courses leading to the degree of Master of Technology and a graduate diploma are also offered to graduates in engineering and related sciences. Details of these courses can be found in Section III of the University Calendar.

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 co-ordination 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 specialisation 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	3 — 3
5.001	Engineering I	3 — 3
10.001	Mathematics I	4 — 2
		13 —11

Hours per week
for 24 weeks
lec. lab./tut.

1.212S	Physics	2 — 2½
4.911S	Materials Science	1¼— 1¼
5.202S	Mechanical Technology	2 — 0
5.301S	Engineering Mechanics	1½— 1
5.501S	Fluid Mechanics	1 — 1½
5.701S	Thermodynamics	1 — 1½
8.112S	Materials and Structures	2 — 2
10.022S	Mathematics	2½— 2½
50.011	(1964) English Literature *or* ⎱ **	1½— 0
57.011	An Introduction to Modern Drama ⎰	

14¾—12¼

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	1½— 2½
10.381S	Statistics	1 — 1
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
51.011S	History *or* ⎱ †	1½— 0
52.011S	Philosophy ⎰	
	Social Science Elective†	1½— 0

16¾—10¾

Hours per week
for 24 weeks
lec. lab./tut.

5.304S	Theory of Machines	1 — 1
5.321S	Automatic Control Engineering	1 — ½
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
18.031S	Minor Thesis	0 — 3
	Humanities — Advanced Elective†	3 — 0

14½—10

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* Lectures cease at the end of the 3rd week of third term.
** It is expected that these courses will involve an additional 30 hours of reading and assignment work.
† Terms 1 and 2 only.

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	1¾— 1¼
6.801S	Electrical Engineering	1¼— 2¼
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 — 2
51.011S	History *or* ⎰ **	1½— 0
52.011S	Philosophy ⎱	
	Social Science Elective**	1½— 0
		19¾—11¾

FOURTH YEAR†—HONOURS COURSE

(30 weeks day course)

		Hours per week for 24 weeks lec. lab./tut.
5.304S	Theory of Machines	1 — 1
5.322S	Automatic Control Engineering	2½— ¾
6.802S	Electrical Engineering	1½— 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
18.291S	Professional Elective	3 — 0
18.041	Thesis and Project†	0 — 1
	Humanities—Advanced Elective**	3 — 0
		19¾— 8¼

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

Full-time students in industrial engineering may qualify for the double degree of Bachelor of Science, Bachelor of Engineering by completing the following course of study over five years.

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* 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.

First Year — Normal first year programme for full-time Industrial Engineering as set out above.

Second Year — As set out below.

		Terms 1 & 2	Term 3	
			Weeks 1-3	Weeks 4-9
1.112	Physics II	8	8	8
4.911S	Materials Science	2½	2½	0
5.202S	Mechanical Technology	2	2	0
5.301	Engineering Mechanics ..	2	2	2
5.501	Fluid Mechanics	2	2	2
5.701	Thermodynamics	2	2	2
8.112	Materials and Structures	3	3	3
10.111	Pure Mathematics II* ..	5	5	5
50.011	(1964) English Literature *or*	** 1½	0	0
57.011	An Introduction to Modern Drama			
		28	26½	22

Third Year — Two appropriate third year Science subjects (see Science course regulations in the University Calendar), plus 51.011 History or 52.011 Philosophy and a Social Science Elective. In the long vacation following this year students are required to undertake a nine-week period of industrial training.

Fourth Year — Normal third year of the Industrial Engineering course less the Humanities taken in the special third year.

Fifth Year — Normal fourth year of the Industrial Engineering course.

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.
1.001/1	Physics I, Part I	1½— 1½
2.001/1	Chemistry I, Part I	1½— 1½
5.001/1	Engineering I, Part I†	1 — 2
10.001/1	Mathematics I, Part I	2 — 1
		6 — 6

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* 10.211 Applied Mathematics II may be substituted (7 hours per week for three terms).

** It is expected that these courses will involve an additional 30 hours of reading and assignment work.

† Hours for Terms 1 and 2 only; in Term 3 the three hours per week are devoted to drawing office work in Engineering Drawing.

SECOND STAGE
(30 weeks part-time course)

		Hours per week for 3 terms lec. lab./tut.
1.001/2	Physics I, Part II	1½— 1½
2.001/2	Chemistry I, Part II	1½— 1½
5.001/2	Engineering I, Part II	2 — 1
10.001/2	Mathematics I, Part II	2 — 1
		7 — 5

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
		6¾— 4¼

Part-time students in 1964 will not be required to take a first Humanities course, but will take an equivalent course in 1965.

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
50.011/2	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
51.011	History or ⎫	1 — 0	1 — 0
52.011	Philosophy ⎭		
		8 — 4	9½— 5

* 24 weeks only.

(30 weeks part-time course)

		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
	Social Science Elective	1 — 0	1 — 0
		8 — 4	8 — 4

(Hours per week for—)

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).

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)

		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

(Hours per week for—)

Text and Reference Books, 1964

SCHOOL OF CIVIL ENGINEERING

5.001 Engineering I

Parts A, B and C

See School of Mechanical Engineering.

D. Engineering Mechanics

Text Books

Hall: *Construction of Graphs and Charts.*
Hall and Archer: *Engineering Mechanics Lecture Notes.*

Reference Books

Rule and Watts: *Engineering Mechanics.*
Timoshenko and Young: *Engineering Mechanics.*

8.112 Materials and Structures

Reference Books

Timoshenko & MacCulloch: *Elements of Strength of Materials.*
Shanley: *Strength of Materials.*
Timoshenko: *Strength of Materials.* Vol. 1.
Davis, Troxell and Wiskocil: *Testing & Inspection of Engineering Materials.*
Salmon: *Materials & Structures.* Vol. 1.
Stanford: *The Creep of Metals and Alloys.*
Jastrzeleski: *Nature and Properties of Engineering Materials.*
Marin: *Mechanical Behaviour of Engineering Materials.*

8.121 and 8.122 Structures

Text Books

S.A.A. Interim Code Nos. 350, 351, 352.
S.A.A. Code CA2—1958.

Reference Books

Stewart: *Practical Design of Simple Steel Structures.* Vols. I and II.
Grinter: *Design of Modern Steel Structures.*
Grinter: *Elementary Structural Analysis & Design.*
Gray & Others: *Steel Designer's Manual.*
Wilbur & Norris: *Elementary Structural Analysis*
Pippard & Baker: *Analysis of Engineering Structures*
Sutherland & Rees: *Introduction to Reinforced Concrete Design.*
Peabody: *The Design of Reinforced Concrete Structures.*
Fisher-Cassie: *Structural Analysis.*
Ferguson: *Reinforced Concrete Fundamentals.*

8.123 Structures

Text Books

S.A.A. Interim Code Nos. 350, 351, 352.

Reference Books

Stewart: *Practical Design of Simple Steel Structures.* Vols. I and II.
Grinter: *Design of Modern Steel Structures.*
Grinter: *Elementary Structural Analysis & Design.*
Gray & Others: *Steel Designer's Manual.*
Wilbur & Norris: *Elementary Structural Analysis.*

8.131 and 8.132 Structures

Reference Books

Hoff: *The Analysis of Structures.*
Lin: *Design of Pre-Stressed Concrete Structures.*
Pearson & Others: *Timber Engineering Design Handbook.*
Timoshenko & Young: *Theory of Structures.*
Parcel & Norman: *Analysis of Statically Indeterminate Structures.*
Ferguson: *Reinforced Concrete Fundamentals.*

8.141 and 8.142 Engineering Computations

Reference Books

Salvadori & Baron: *Numerical Methods in Engineering.*
Hall: *Construction of Graphs and Charts.*
Hartree: *Numerical Analysis.*
Shaw: *Relaxation Methods.*

8.211 Materials for Architects

Text Book

A.C.I. Manual of Concrete Inspection.

Reference Books

Davis, Troxell & Wiskocil: *Testing and Inspection of Engineering Materials.*
Withey and Washa: *Materials of Construction.*
British Standards Handbook No. 2846: *Reduction Presentation of Experimental Results.*
U.S. Bureau of Reclamation: *Concrete Manual.*
Murdock: *Concrete Materials and Practice.*

8.221 Engineering Materials

Text Books

Troxell and Davis: *Composition and Properties of Concrete;* and
Scott: *Principles of Soil Mechanics,* or
Terzaghi and Peck: *Soil Mechanics in Engineering Practice.*

Reference Books

Terzaghi: *Theoretical Soil Mechanics.*
U.S. Bureau of Reclamation: *Concrete Manual.*
Murdock: *Concrete Materials and Practice.*
Lea: *The Chemistry of Cement and Concrete.*
H.M.S.O. Publication: *Soil Mechanics for Road Engineers.*
Bishop & Henkel: *Triaxial Testing of Soils.*
Ackroyd: *Concrete, Properties and Manufacture.*
Fulton: *Concrete Technology.*

8.222 and 8.223 Engineering Materials

Text Books

Troxell & Davis: *Composition & Properties of Concrete.*
Terzaghi and Peck: *Soil Mechanics in Engineering Practice.*

Reference Books

U.S. Bureau of Reclamation: *Concrete Manual.*
Houwink: *Elasticity, Plasticity and Structure of Matter.*
Terzaghi: *Theoretical Soil Mechanics.*
Murdock: *Concrete Materials and Practice.*
H.M.S.O. Publication: *Soil Mechanics for Road Engineers.*
Bishop & Henkel: *Triaxial Testing of Soils.*
U.S. Bureau of Reclamation: *Earth Manual,* 1960.
Hetenyi: *Handbook of Experimental Stress Analysis.*
Jessop & Harris: *Photo-Elasticity—Principles and Practice.*
Charlton: *Model Analysis of Structures.*
Mills, Haywood & Radar: *Materials of Construction.*
Wallis: *Australian Timber Handbook.*
Ford: *Advanced Strength of Materials.*
Scott: *Principles of Soil Mechanics.*
Ackroyd: *Concrete, Properties and Manufacture.*
Fulton: *Concrete Technology.*

8.224 Materials—Honours

Hill: *Mathematical Theory of Plasticity.*
Marin: *Mechanical Behaviour of Engineering Materials.*
Pipes: *Matrix Methods for Engineering.*
Scott: *Principles of Soils Mechanics.*

8.241 Soil Mechanics

Text Books

Taylor: *Fundamentals of Soil Mechanics,* or
Terzaghi and Peck: *Soil Mechanics in Engineering Practice.*

Reference Books

Terzaghi: *Theoretical Soil Mechanics.*
H.M.S.O. Publication: *Soil Mechanics for Road Engineers.*
Bishop & Henkel: *Triaxial Testing of Soils.*

8.251 Properties of Materials

Reference Books

Salmon: *Materials and Structures.* Vol. I.
Beaumont: *Mechanical Testing of Metallic Materials.*
Williams: *Hardness and Hardness Measurements.*
Gilkey, Murphy & Bergman: *Materials Testing.*
Stanford: *The Creep of Metals and Alloys.*
Jastrzeleski: *Nature and Properties of Engineering Materials.*

8.411 Surveying

Text Book

Glendenning: *Principles of Surveying.*

Reference Book

Clarke: *Plane and Geodetic Surveying.*

8.421 Surveying

Text Book

Clarke: *Plane and Geodetic Surveying.* Vol. I.

Reference Book

Kissam: *Surveying for Civil Engineers.*

8.422 and 8.423 Surveying

Text Books

Clarke: *Plane and Geodetic Surveying.*
Bertil Hallert: *Photogrammetry.*

Reference Books

Bannister and Raymond: *Surveying.*
Sandover: *Plane Surveying.*
Kissam: *Surveying for Civil Engineers.*
Chapman: *Astronomy for Surveyors.*
Schwidefski: *Outline of Photogrammetry.*
Hart: *Air Photography Applied to Surveying.*
U.S. Manual of Photogrammetry.

8.521 and 8.522 Hydraulics

Text Books

Rouse: *Elementary Mechanics of Fluids.*
Vennard: *Elementary Fluid Mechanics.*

Reference Books

Rouse: *Engineering Hydraulics.*
Addison: *Hydraulic Measurements.*
Dodge & Thompson: *Fluid Mechanics.*
Barna: *Fluid Mechanics for Engineers.*
Vallentine: *Applied Hydro-Dynamics.*
Streeter: *Fluid Dynamics.*
Davis: *Handbook of Applied Hydraulics.*

8.611 Civil Engineering

Text Books

Fair & Geyer: *Water Supply and Waste-Water Disposal;* and
Linsley, Kohler and Paulhus: *Hydrology for Engineers;* or
Wisler and Brater: *Hydrology.*

Reference Books

Steel: *Water Supply & Sewerage.*
Babbitt and Doland: *Water Supply Engineering.*
Phelps: *Public Health Engineering.*
Imhoff & Fair: *Sewage Treatment.*
Imhoff, Muller & Thistlethwaite: *Disposal of Sewage and Other Water Borne Wastes.*
Francis: *Sewage Treatment.*
Phelps: *Stream Sanitation.*
Timm: *An Introduction to Chemistry.*
Linsley, Kohler & Paulhus: *Applied Hydrology.*
Linsley, Kohler & Paulhus: *Hydrology for Engineers.*
Wisler & Brater: *Hydrology.*
Patterson: *Meteorology.*
Haurwitz: *Meteorology.*
Haurwitz: *Climatology.*
Griffith Taylor: *Australia.*
Johnstone & Cross: *Elements of Applied Hydrology.*
Butler: *Engineering Hydrology.*
Commonwealth Bureau of Meteorology—Bulletin No. 1:—*The Climate and Meteorology of Australia.*
Commonwealth Dept. of Civil Aviation: *Manual of Meteorology.*
American Society of Civil Engineers: *Hydrology Handbook.*

8.612 and 8.613 Civil Engineering

Text Books

Antill & Ryan: *Civil Engineering Construction.*
Ryan: *Engineering Administration.*

Reference Books

Creager, Justin & Hynes: *Engineering for Dams.*
Ackerman & Locker: *Construction Planning and Equipment.*
Houk: *Irrigation Engineering.*
Goldman: *Financial Engineering.*

8.613S Civil Engineering

Text Books

Antill & Ryan: *Civil Engineering Construction.*
Ryan: *Engineering Administration.*

Reference Books

Du Platt Taylor: *Docks, Wharves & Piers.*
Webb: *Railroad Constructions.*
Houk: *Irrigation Engineering.*
Creager, Justin & Hynes: *Engineering for Dams.*
Ackerman & Locker: *Construction Planning and Equipment.*
Creager & Justin: *Hydro-Electric Handbook.*
Fair & Geyer: *Water Supply & Waste Water Disposal.*

8.63A and 8.66A Engineering Construction

Text Book

Antill & Ryan: *Civil Engineering Construction.*

Reference Books

Ryan: *Engineering Administration.*
Ackerman & Locker: *Construction Planning and Equipment.*
Creager, Justin & Hynes: *Engineering for Dams.*

8.66B Engineering Administration

Text Book

Ryan: *Engineering Administration.*

Reference Books

Goldman: *Financial Engineering.*
Antill & Ryan: *Civil Engineering Construction.*

8.63B Hydrology

Reference Books

Linsley, Kohler & Paulhus: *Applied Hydrology.*
Linsley, Kohler & Paulhus: *Hydrology for Engineers.*
Wisler & Brater: *Hydrology.*
Johnstone & Cross: *Elements of Applied Hydrology.*
Butler: *Engineering Hydrology.*
Commonwealth Bureau of Meteorology—Bulletin No. 1:—*The Climate and Meteorology of Australia.*
Commonwealth Dept. of Civil Aviation: *Manual of Meteorology.*

8.811 and 8.812 Surveying

Text Book
Clarke: *Plane and Geodetic Surveying,* Vols. I and II.

8.821 and 8.822 Geodesy

Text Books

Bomford: *Geodesy.*
Clarke: *Plane & Geodetic Surveying.* Vol. II.
Rainsford: *Survey Adjustments and Least Squares.*

Reference Books

Tienstra: *Theory of Adjustment of Normally Distributed Observations.*
Weatherburn: *Differential Geometry.* Vols. I and II.
Whittaker & Robinson: *Calculus of Observations.*

8.831 and 8.832 Astronomy

Text Books

Rocklofs: *Astronomy Applied to Land Surveying.*
Shortride: *Tables of Logarithms of Sines and Tangents.*
Current Edition of *Star Almanac for Land Surveyors.*

Reference Book

Current edition of *Table of Fundamental Stars.*

8.841 and 8.842 Surveying Computations

A table of six-figure natural values of sines, cosines, tangents, etc. for every 10 seconds of arc.

8.851 and 8.852 Photogrammetry

Text Book

Hallert: *Photogrammetry.*

Reference Books

Manual of Photogrammetry.
Schwidefsky: *Photogrammetry.*
Von Gruber: *Photogrammetry.*

8.872 Land Utilisation

Text Book

Murray: *Principles and Practice of Land Valuation.*

8.881 Survey Laws and Regulations

Text Book

Willis: *Survey Investigations.*

Reference Books

Helmore: *Millard's Law of Real Property in N.S.W.*
Baalman & Wells: *Land Titles Office Practice.*

SCHOOL OF ELECTRICAL ENGINEERING

6.101 Electric Circuit Theory

Text Books

Timbie and Bush: *Principles of Electrical Engineering* (4th ed. Wiley); and
C.R.C. Standard Mathematical Tables (Chemical Rubber Publishing Company); or
Mathematical Tables and Formulas. Compiled by H. S. Burington (McGraw-Hill).

Reference Books

Frank: *Electrical Measurement Analysis* (McGraw-Hill).
Scott: *Linear Circuits Part I—Time Domain Analysis* (Addison Wesley).
Middendorf: *Analysis of Electric Circuits* (Wiley).
McGreevy: *The M.K.S. System of Units* (Pitman).
M.I.T.: *Electric Circuits* (Wiley).
Corcoran and Reed: *Introducing Electrical Engineering* (Wiley).
Winch: *Electricity and Magnetism* (Prentice Hall).
Clement and Johnson: *Electrical Engineering Science* (McGraw-Hill).

6.102S and 6.152 Electric Circuit Theory

Text Books

C.R.C. Standard Mathematical Tables (Chemical Rubber Publishing Company); or
Mathematical Tables and Formulas. Compiled by H. S. Burington (McGraw-Hill).

Reference Books

Ley, Lutz and Rehberg: *Linear Circuit Analysis* (McGraw-Hill).
Wilts: *Principles of Feedback Control* (Addison-Wesley).
Moore: *Travelling-Wave Engineering* (McGraw-Hill).
Kuo: *Automatic Control Systems* (Prentice-Hall).
Kerchner and Corcoran: *Alternating Current Circuits* (Wiley, 4th Ed.).
Prensky: *Electronic Instrumentation* (Prentice-Hall).

6.201S and 6.251 Electric Power Engineering

Text Book

Fitzgerald and Kingsley: *Electric Machinery* (McGraw-Hill).

Reference Books

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

6.301S and 6.351 Electronics

Text Books

Gray: *Applied Electronics* (Wiley) or
Ryder: *Engineering Electronics* (McGraw-Hill).
Joyce and Clarke: *Transistor Circuit Analysis* (Addison Wesley).

Reference Books

Shea: *Transistor Circuit Engineering* (Wiley).
Terman: *Electronic and Radio Engineering* (4th ed. McGraw-Hill).
RCA Electron Tube Handbook HB.3.
AWV Transistor Data Book.
RCA Semiconductor Products Handbook HB 10.
Miniwatt Technical Data Book (7th Ed.).
Mullard Receiver Manual Transistor Circuits.
U.S. Army — *Basic Theory and Application of Transistors.*
Hunter: *Handbook of Semiconductor Electronics* (McGraw-Hill) 1962.
Wolfendale: *The function Transistor and its Applications* (Heywood).

6.501 Electrical Engineering (Honours)

Text Books

No specified texts.

Reference Books

Soroka: *Analog Methods in Computation and Simulation* (McGraw-Hill).
Karplus: *Analog Simulation* (McGraw-Hill).

6.001S and 6.051 Electrical Engineering

Note: 6.051 includes only the sections marked*. .

CIRCUIT THEORY SECTION:—

Text Book

Van Valkenburg: *Introduction to Modern Network Synthesis* (Wiley).

Reference Books

Guillemin: *Synthesis of Passive Networks* (Wiley).
Truxal: *Control System Synthesis* (McGraw-Hill).
Tuttle: *Network Synthesis* (Wiley).

ELECTRONICS SECTION:—

Text Book

Kretzmann: *Industrial Electronics Handbook* (Philips Technical Library).

Reference Books

Westinghouse Electric Corp.: *Industrial Electronics Reference Book* (Chapman and Hall).
Milnes: *Transductors and Magnetic Amplifiers* (Macmillan).
Cockrell: *Industrial Electronics Handbook* (McGraw-Hill).

*CONTROL SYSTEMS SECTION:—

Text Book

Bower and Schultheiss: *Introduction to the Design of Servomechanisms* (Wiley).

Reference Books

Chestnut and Mayer: *Servomechanisms and Regulating System Design.* Vol. I (Wiley).
Brown and Campbell: *Principles of Servomechanisms* (Wiley).
Porter: *Introduction to Servomechanisms* (Methuen).
West: *Servomechanisms* (E.U.P.).

*PHYSICAL ELECTRONICS SECTION:—

Text Book

Van Der Ziel: *Solid State Physical Electronics* (Prentice Hall).

Reference Books

Valdes: *Physical Theory of Transistors* (McGraw-Hill).
Ridenour: *Modern Physics for the Engineer* (McGraw-Hill).
Dunlap and Crawford: *An Introduction to Semiconductors* (Wiley).
Middelbrook: *An Introduction to Junction Transistor Theory* (Wiley).
Hunter: *Handbook of Semiconductor Electronics* (McGraw-Hill, 1962).
Blakemore: *Semiconductor Statistics* (Pergamon).

*MEASUREMENTS SECTION:—

Text Book

Stout: *Basic Electrical Measurements* (Prentice Hall, 2nd Ed.).

Reference Books

Terman and Pettit: *Electronic Measurements* (McGraw-Hill).
Harris: *Electrical Measurements* (Wiley).
Golding: *Electrical Measurements and Measuring Instruments* (Pitman).

6.502 Electrical Engineering (Honours)

Text Books

No specified texts.

Reference Books

Cowling: *Magneto Hydrodynamics* (Interscience).
Spiegel: *Theory and Problems of Vector Analysis* (Interscience).
Marcus: *Switching Circuits for Engineers* (Prentice Hall).
Lee: *Statistical Theory of Communication* (Wiley).

6.202S and 6.252 Power Systems

Text Books

Starr: *Generation, Transmission and Utilisation of Electrical Power,* (Pitman).
Stevenson: *Elements of Power System Analysis* (McGraw-Hill, 2nd Ed., 1962).
M.I.T.: *Magnetic Circuits and Transformers* (Wiley).

Reference Books

Westinghouse Electric Corp. *Electrical Transmission and Distribution Reference Book.*
Kimbark: *Power System Stability.* Vols. I, II and III (Wiley).

6.212S and 6.262 Electrical Machines

Text Books

Fitzgerald and Kingsley: *Electric Machinery* (McGraw-Hill).
Draper: *Electrical Machines* (Longmans).

Reference Books

Wood: *Theory of Electrical Machines* (Butterworth).
Clayton: *Performance and Design of D.C. Machines* (Pitman).
Say: *Performance and Design of A.C. Machines* (Pitman).
Taylor: *Performance and Design of A.C. Commutator Motors* (Pitman).
Atkins: *The General Theory of Electrical Machines* (Chapman and Hall).

6.401S and 6.451 Utilisation and Control of Electric Plant

Text Book

Fitzgerald and Kingsley: *Electric Machinery* (McGraw-Hill).
6.451 only — Gibson and Tuteur: *Control System Components* (McGraw-Hill).

Reference Books

UTILISATION SECTION:—

Draper: *Electrical Machines* (Longmans).
Taylor: *Performance and Design of A.C. Commutator Motors* (Pitman).
White and Woodson: *Electromechanical Energy Conversion* (Wiley).
Kimbark: *Power System Stability.* Vol. III (Wiley).
Clarke: *Circuit Analysis of A.C. Power Systems.* Vol. I. (Wiley).
Tustin: *Direct Current Machines for Control Systems* (Sporn).
Veinott: *Theory and Design of Small Induction Motors* (McGraw-Hill).
CONTROL SECTION:—

Bower and Schultheiss: *Introduction to the Design of Servomechanisms.* (Wiley).

Chestnut and Mayer: *Servomechanisms and Regulating System Design.* Vol. I, 2nd Ed. & Vol. II (Wiley).
Warfield: *Introduction to Electronic Analog Computers* (Prentice Hall).
Wass: *An Introduction to Electronic Analogue Computers* (Pergamon).
Gille, Pelegrin and Decaulne: *Feedback Control Systems* (McGraw-Hill).
Truxall: *Control Engineering Handbook* (McGraw-Hill).
Jackson: *Analog Computation* (Wiley).

6.322S and 6.372 Applied Electronics

Text Books

Millman and Taub: *Pulse and Digital Circuits* (McGraw-Hill).
Joyce and Clarke: *Transistor Circuit Analysis* (Addison Wesley).

Reference Books

Arguimbau: *Vacuum Tube Circuits and Transistors* (Wiley).
Martin: *Electronic Circuits* (Prentice Hall).
Landee, Davis and Albrecht: *Electronic Designer's Handbook* (McGraw-Hill).
Shea: *Transistor Circuit Engineering* (Wiley).
Wolfendale: *The Junction Transistor and its Applications* (Heywood).
Hunter: *Handbook of Semiconductor Electronics* (McGraw-Hill, 1962).

6.302S Communications

Text Books

Joyce and Clarke: *Transistor Circuit Analysis* (Addison Wesley).
Terman: *Electronic and Radio Engineering* (4th Ed. McGraw-Hill).
Radiotron Designers Handbook (A.W.V. Co.).

Reference Books

Schwartz: *Information Transmission, Modulation and Noise* (McGraw-Hill).
Sturley: *Radio Receiver Design* (Chapman Hall).
R.C.A. Receiving and Transmitting Tube Handbook (H.B. 3).
S.T.C. Receiving and Transmitting Tube Handbook.
Philips Transistor Data.
Terman: *Radio Engineer's Handbook* (McGraw-Hill).
Fraser: *Telecommunications* (Macdonald).
Strauss: *Wave Generation and Shaping* (McGraw-Hill).
Millman and Taub: *Pulse and Digital Circuits* (McGraw-Hill).
Bevitt: *Transistor Handbook* (Prentice Hall).
Shea: *Principles of Transistor Circuits* (Wiley).
Shea: *Transistor Circuit Engineering* (Wiley).
Williams: *Antenna Theory and Design* (Pitman).
Arguimbau: *Vacuum Tube Circuits and Transistors* (Wiley).
Hunter: *Handbook of Semiconductor Electronics* (McGraw-Hill, 1962).
Jasik: *Antenna Engineering Handbook* (McGraw-Hill, 1961).
Wolfendale: *The Junction Transistor and its Applications* (Heywood).
Landee, Davis and Albrecht: *Electronic Designers' Handbook* (McGraw-Hill).
Berank: *Acoustics* (McGraw-Hill).
Zworykin and Morton: *Television* (Wiley, 2nd Ed.).
Kerkhof and Werner: *Television* (Philips).

6.312S Communications

Text Books

Starr: *Telecommunications* (Pitman).
Skilling: *Electric Transmission Lines* (McGraw-Hill).

Reference Books

Hancock: *An Introduction to the Principles of Communication Theory* (McGraw-Hill).
Fraser: *Telecommunications* (Macdonald).
Rogers: *The Theory of Networks* (Macdonald).
Moore: *Travelling Wave Engineering* (McGraw-Hill).
Kimbark: *Electrical Transmission of Power and Signals* (Wiley).
Lovering: *Radio Communication* (Longmans Green).
Glazier and Lament: *Transmission and Propagation* (Her Majesty's Stationery Office, London, 1958).
Jordan: *Electromagnetic Waves and Radiating Systems* (Constable).
I.T. and T.: *Reference Data for Radio Engineers,* 4th Ed., 1956.

6.352 Communications

As for 6.312S (Degree Course).

6.362 Communications

As for 6.312S (Degree Course).

DIPLOMA AND CONVERSION COURSES
6.101 Electric Circuit Theory

As for 6.101 (Degree Course).

6.152 and 6.13B Electric Circuit Theory

Text Book

Lepage and Seely: *General Network Analysis* (McGraw-Hill).

Reference Books

Cheng: *Analysis of Linear Systems* (Addison Wesley).
Scott: *Linear Circuits, Parts I and II* (Addison Wesley).
Fich and Potter: *Theory of A.C. Circuits* (Prentice Hall).
Ley, Lutz and Rehberg: *Linear Circuit Analysis* (McGraw-Hill).
Rogers: *The Theory of Networks* (Macdonald).

6.23B Electric Power Engineering

As for 6.201S-6.251 (Degree Course)

6.303 Electronics

As for 6.301S-6.351 (Degree Course).

6.354 Radio Engineering

As for 6.302S (Degree Course).

6.255 Power Systems

As for 6.202S-6.252 (Degree Course) with the following additions:—

Reference Books

Say: *Magnetic Amplifiers and Saturable Reactors* (Pitman).
Tustin: *D.C. Machines for Control Systems* (Sporn).
Blume: *Transformer Engineering* (Wiley).

6.265 Electric Machines

As for 6.212S-6.262 (Degree Course).

6.355 Radio Communications

As for 6.302S (Degree Course).

6.365 Pulse and High Frequency Techniques

Text Books

No specified texts.

Reference Books

Bronwell and Beam: *Theory and Application of Microwaves* (McGraw-Hill).
C.S.I.R.: *A Textbook of Radar* (Angus and Robertson).
Millman and Taub: *Pulse and Digital Circuits* (McGraw-Hill).
Chance et al.: *Waveforms* M.I.T. Series Vol. 19 (McGraw-Hill).
Fink: *Radar Engineering* (McGraw-Hill).
Harvard: *Very High Frequency Techniques*, Vols. I and II (McGraw-Hill).
M.I.T.: *Principles of Radar* (3rd Ed. McGraw-Hill).
Ramo and Whinnery: *Fields and Waves in Modern Radio* (Wiley).
Strauss: *Wave Generation and Shaping* (McGraw-Hill).

6.001A Electrical Engineering

As for 6.001S (Degree Course): *Electronics and Physical Electronics Sections only*.

6.001B Electrical Engineering

As for 6.001S (Degree Course): *Measurement Section only*.

6.001C Electrical Engineering

As for 6.001S (Degree Course): *Control Systems and Circuit Theory Sections only*.

SERVICING SUBJECTS

6.801 and 6.802 Electrical Engineering

Text Book

Fitzgerald and Higginbotham: *Basic Electrical Engineering* (McGraw-Hill, 2nd Ed.)

SCHOOL OF MECHANICAL ENGINEERING

5.001 Engineering I

A. Descriptive Geometry

Reference Book
  Abbott: *Practical Geometry and Engineering Graphics.*

B. Engineering Drawing

Text Books
  Union Store: *Exercises in Engineering Drawing,* 2nd Ed.
  Institution of Engineers, Australia: *Australian Standard Engineering Drawing Practice* (c.z.1).

C. Mechanical Technology

Text Book
  De Garmo: *Materials and Processes in Manufacturing* (Macmillan).

D. Engineering Mechanics

  See School of Civil Engineering.

MECHANICAL ENGINEERING DESIGN

5.101/1 Mechanical Engineering Design

Text Book
  Phelan: *Fundamentals of Mechanical Design.*
  Matousek: *Engineering Design.*

Reference Books
  Aust. Standard Engineering Drawing Practice, 1951.
  Faires: *Design of Machine Elements.*
  Marks: *Mechanical Engineer's Handbook.*
  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.*
  Hall, Holowenko, Laughlin: *Machine Design.*
  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 Ed.
  Laughner and Hargan, Editors: *Handbook of Fastening and Joining of Metal Parts.*
  Lyman and Gerlach, Editors: *Metals Handbook.*

5.101/2 Mechanical Engineering Design

Text Books

Phelan: *Fundamentals of Mechanical Design.*
A.S. No. CB.2: *1960, SAA Crane and Hoist Code.*
B.S. 436, 1940: *Machine Cut Helical and Spur Gears.*
Matousek: *Engineering Design.*

Reference Books

Faires: *Design of Machine Elements.*
Aust. Standard Engineering Drawing Practice, 1951.
Merritt: *Gears.*
Marks: *Mechanical Engineer's Handbook.*
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, 1937: *Machine Cut Gears — Worm Gearing.*
Regulations under Scaffolding and Lifts Act, 1912-1958.

5.103/S Mechanical Engineering Design

Text Books

Shigley: *Machine Design.*
Matousek: *Engineering Design.*

Reference Books

Timoshenko and Goodier: *Theory of Elasticity.*
Timoshenko and Young: *Strength of Materials,* 4th Ed.
Wahl: *Mechanical Springs,* 2nd Ed.
Pippenger and Koff: *Fluid Power Controls.*
Lewis and Stern: *Design of Hydraulic Control Systems.*
Marks: *Mechanical Engineer's Handbook.*
Kent: *Mechanical Engineer's Handbook — Design and Production.*
Oberg and Jones: *Machinery's Handbook.*
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. 436, 1940: *Machine Cut Helical and Spur Gears.*
B.S. 721, 1937: *Machine Cut Gears — Worm Gearing.*
B.S. 482, 1958: *Wrought Iron and Mild Steel Hooks.*
B.S. 2917, 1957: *Graphical Symbols for Use in Diagrams for Fluid Power Transmission and Control Systems.*
A.S. No. CB2: *1960, SAA Crane and Hoist Code.*

5.102 Mechanical Engineering Design

Text Books

Purday: *Diesel Engine Designing* (Constable).

Reference Books

Shigley: *Machine Design,* 2nd Ed. (McGraw-Hill).
Taylor and Taylor: *The Internal Combustion Engine,* 2nd Ed. (International Text Book).
Mackerle: *Air Cooled Motor Engines* (Cleaver-Hume Press).
B.S. 649, 1958: *Diesel Engines for General Purposes.*

MECHANICAL TECHNOLOGY

5.201 and 5.202S Mechanical Technology

Text Books

De Garmo: *Materials and Processes in Manufacturing.*
For 5.202S only: Hodges and Ziegler: *Managing the Industrial Concern* (Houghton, Mifflin Co., Boston, 1963).

Reference Books

Wright-Baker: *Modern Workshop Technology.*
Town: *Machine Shop Technology.*

5.203 and 5.204S Mechanical Technology

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.*

5.203 Mechanical Technology (Old Course)

Text Book

Wright-Baker: *Modern Workshop Technology.*

Reference Book

Town: *Machine Shop Technology.*

APPLIED MECHANICS AND THEORY OF MACHINES

5.301 and 5.301S Engineering Mechanics

Text Book

Beer and Johnston: *Mechanics for Engineers.*

Reference Books

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

5.302 and 5.302S Theory of Machines

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

Text Book

Church: *Mechanical Vibrations.*

Reference Books

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

5.304S Theory of Machines

Text Book

Church: *Mechanical Vibrations.*

Reference Books

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

5.305S Theory of Machines

Text Books

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

Reference Books

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

AUTOMATIC CONTROL ENGINEERING

5.321 and 5.321S Automatic Control Engineering

Reference Books

Eckman: *Automatic Process Control.*
Raven: *Automatic Control Engineering.*

5.322S Automatic Control Engineering (Honours)

Text Book

Raven: *Automatic Control Engineering.*

Reference Books

Eckman: *Automatic Process Control.*
Chestnut and Mayer: *Servomechanisms and Regulating System Design,*
   Vol. I.
Nixon: *Principles of Automatic Control.*
Ahrendt and Taplin: *Automatic Feedback Control.*

NUMERICAL ANALYSIS

5.401S Numerical Analysis

Text Book

Redish: *An Introduction to Computation Methods.*

Reference Books

Mickley, Sherwood and Reed: *Applied Mathematics in Chemical*
   Engineering.
Hall: *The Construction of Graphs and Charts.*
Nielsen: *Methods in Numerical Analysis.*
Stanton: *Numerical Methods for Science and Engineering.*

FLUID MECHANICS

5.501 and 5.501S Fluid Mechanics

Text Books

Barna: *Fluid Mechanics for Engineers;* or
Streeter: *Fluid Mechanics,* 3rd Ed. or
Vennard: *Elementary Fluid Mechanics,* 4th Ed.

Reference Book

B.S. 1042: *Flow Measurement.*

5.502 Fluid Mechanics

Text Books

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

Reference Books

Shapiro: *Dynamics and Thermodynamics of Compressible Fluid Flow,*
Vol. I Parts 1 and 2, and
Addison: *Centrifugal and Axial Flow Pumps.*
Streeter: *Fluid Mechanics,* 3rd Ed.
Francis: *Fluid Mechanics.*
Zucrow: *Aircraft Propulsion, Vol. I.*

5.503 Fluid Mechanics

Reference Books

Barna: *Fluid Mechanics for Engineers.*
Binder: *Advanced Fluid Mechanics,* Vols. 1 and 2.
Brown: *Hydroelectric Practice,* Vol. 2.
Davis: *Handbook of Applied Hydraulics.*
Jaeger: *Engineering Fluid Mechanics.*
Rouse: *Engineering Hydraulics.*
Shapiro: *Dynamics and Thermodynamics of Compressible Fluid Flow,*
Vol. I, Parts 1 and 2.
Shepherd: *Introduction to the Gas Turbine.*
Cambel and Jennings: *Gas Dynamics.*
Zucrow: *Aircraft Propulsion,* Vol. 1.
Vallentine: *Applied Hydrodynamics.*
Nechleba: *Hydraulic Turbines.*

5.601S Mechanical Engineering

Reference Books

To be prescribed by the Lecturers.

THERMODYNAMICS

5.701 Thermodynamics

Text Book

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

Reference Books

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

5.702 Thermodynamics

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.*

5.703 Thermodynamics

Reference Books

Rogers and Mayhew: *Engineering Thermodynamics, Work and Heat Transfer.*
Gaffert: *Steam Power Stations.*
Stoecker: *Refrigeration and Air Conditioning.*
Cohen and Rogers: *Gas Turbine Theory.*
Threlkeld: *Thermal Environmental Engineering.*
Eckert and Drake: *Heat and Mass Transfer.*
Adams: *Elements of Internal Combustion Turbine Theory.*
Hall: *Reactor Heat Transfer.*
Wootton: *Steam Cycles for Nuclear Power Generation.*

AERONAUTICAL ENGINEERING

5.821 Aircraft Materials and Structures

Text Books

Pippard and Pritchard: *Aeroplane Structures;* or
Peery: *Aircraft Structures;* or
Niles and Newell: *Airplane Structures,* Vol. I.

Reference Book

Timoshenko: *Strength of Materials,* Vol. I.

5.822 Aircraft Materials and Structures

Text Book

Peery: *Aircraft Structures.*

Reference Book

Timoshenko: *Strength of Materials.* Vol. II.

5.823 Aircraft Materials and Structures

Text Books

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

Reference Books

Timoshenko and Goodier: *Theory of Elasticity.*
Bruhn: *Analysis and Design of Aircraft Structures.*
Royal Aeronautical Society: *Structures Data Sheets.*
Royal Aeronautical Society: *Handbooks of Aeronautics,* Nos. 1 and 2.
Williams: *Theory of Aircraft Structures.*

5.811 Aerodynamics

Text Books

Houghton and Brock: *Aerodynamics for Engineering Students,* or
Streeter: *Fluid Dynamics;* and
Toms: *Introduction to Aeronautics.*

Reference Books

Air Registration Board: *British Civil Airworthiness Requirements.*
Royal Aeronautical Society: *Aerodynamics and Performance Data Sheets.*
Vallentine: *Applied Hydraulics.*

5.812 Aerodynamics

Text Books

Perkins and Hage: *Aeroplane Performance Stability and Control.*
Bonney: *Engineering Supersonic Aerodynamics.*

Reference Books

Air Registration Board: *British Civil Airworthiness Requirements.*
Royal Aeronautical Society: *Aerodynamics and Performance Data Sheets.*

5.831 Aircraft Propulsion

Text Books

Liston: *Aircraft Engine Design.*
Zucrow: *Gas Turbines.*

Reference Book

Judge: *Aircraft Engines,* Vols. I and II.

NAVAL ARCHITECTURE

5.901 Naval Architecture

Text Book

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

Reference Books

De Rooij: *Practical Shipbuilding.*
Halliburton: *Mould Loft Work.*

5.902 Naval Architecture

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

Text Book

Robb: *Theory of Naval Architecture.*

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.*

5.904 Naval Architecture

Text Book

Manning: *The Theory and Technique of 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,* Vols. I and II.
Ministry of Transport: *Instructions as to the Tonnage Measurement of Ships.*
Ministry of Transport: *Measurements of Vessels for the Panama Canal.*

DEPARTMENT OF INDUSTRIAL ENGINEERING

18.111S and 18.111 Industrial Administration

Text Books

Buffa: *Modern Production Management* (John Wiley, 1961).
Factories, Shops and Industries Act 43 (Govt. Printing Office, 1962).

Reference Book

Carson: *Production Handbook* (Ronald Press, New York).

18.211S and 18.221 Production Control

Text Books

Moore: *Production Control* (McGraw-Hill).
Bowman and Fetter: *Analysis for Production Management* (Irwin, 1957).

18.311S and 18.321 Methods Engineering

Text Books

Barnes: *Motion and Time Study* (Wiley) 4th Ed. or
Niebel: *Motion and Time Study* (Irwin, Illinois), 3rd Ed.

Reference Books

Carson: *Production Handbook* (Ronald Press), 2nd Ed.
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 and 18.421 Design for Production I

Text Books

Niebel and Baldwin: *Designing for Production* (Irwin).
B.S. 308: *Engineering Drawing Practice*.
B.S. 1609: *1949 Press Tool Sets*.

Reference Books

Van Doren: *Industrial Design* (McGraw-Hill).
Knoblaugh: *Model Making for Industrial Design* (McGraw-Hill).
Begeman and Amstead: *Manufacturing Processes* (Wiley).

18.412S and 18.422 Design for Production II

Text Books

Parker: *Drawings and Dimension* (Pitman, 1956).
B.S. 1916 Parts 1 and 2: *Limits and Fits for Engineering*.
B.S. 308: *1953 Engineering Drawing Practice*.

Reference Books

Ministry of Supply: *Dimensional Analysis of Engineering Design*. (H.M.S.O., London, 1948).
Tary and Johnson: *Process Engineering for Manufacturing* (Prentice Hall).

18.511S and 18.521 Industrial Marketing

Text Book

Alexander, Cross and Cunningham: *Industrial Marketing* (Irwin).

Reference Books

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

18.611S Engineering Economic Analysis

Text Books

Barish: *Economic Analysis* (McGraw-Hill).
De Garmo: *Engineering Economy* (Macmillan, N.Y.).

Reference Books

Rautenstrauch and Villers: *The Economics of Industrial Management* (Funk and Wagnalls, N.Y., 1957) 2nd Ed.
Edwards and Townsend: *Business Enterprise* (Macmillan, 1958).
Dean: *Managerial Economics* (Prentice Hall, 1951).
Stigler: *The Theory of Price* (Macmillan, N.Y.) Revised Ed., 1952.
Sasyeni, Jaspan and Friedman: *Introduction to Operations Research* (Wiley).

18.621 Engineering Economics

Text Books

Barish: *Economic Analysis* (McGraw-Hill).
De Garmo: *Engineering Economy* (Macmillan, N.Y.).

Reference Books

Robnett, Hill and Beckett: *Accounting — A Management Approach* (Irwin).
Keller: *Management Accounting for Profit Control* (McGraw-Hill).
Stigler: *The Theory of Price* (Macmillan, 1952).
Dean: *Managerial Economics* (Prentice Hall, 1951).
Grant: *Engineering Economic Analysis* (McGraw-Hill).
Sasyeni, Jaspan and Friedman: *Introduction to Operations Research* (Wiley).