Postal Address:

THE UNIVERSITY OF NEWCASTLE, NEW SOUTH WALES

Telephone Numbers:

SHORTLAND CAMPUS  68 0401

Administration
Faculties of:
  Arts
  Economics and Commerce
  Science (Departments of Geology, Mathematics and Physics)
Library

TIGHE'S HILL CAMPUS  61 0461

Faculties of:
  Applied Science
  Architecture
  Engineering
  Science (Department of Chemistry)
Library

Consult the Calendar for:—

  Academic Dress
  University of Newcastle Act, 1964
  By-laws
  The Council
  The Senate
  Officers and Former Officers of the University
  Prizes and Scholarships
  University Medallists
  Lists of Graduates and Diplomates
  Publications and Research Interests
# PRINCIPAL DATES — 1967

**First Term**
- Lectures: February 27th to May 13th.
- Vacation: May 15th to June 3rd.

**Second Term**
- Lectures: June 5th to August 12th.
- Vacation: August 14th to September 2nd.

**Third Term**
- Lectures: September 4th to November 3rd.
- Annual Examination: November 4th to November 25th.
- Vacation: Commences November 27th.

**JANUARY**
- Deferred Examinations: All courses Monday, 23rd to Saturday, 4th February.
- Monday, 30th: Australia Day — Public Holiday.

**FEBRUARY**
- Friday, 10th: Last day for lodgement of all enrolment applications.
- Wednesday, 22nd: Orientation commences.
- Monday, 27th: First Term Lectures begin.

**MARCH**
- Friday, 24th to Tuesday, 28th: Easter Vacation.

**APRIL**
- Tuesday, 25th: Anzac Day — Public Holiday.

**MAY**
- Monday, 13th to Saturday, June 3rd: Vacation (3 weeks).

**JUNE**
- Monday, 5th: Second Term Lectures begin.
- Monday, 12th: Public Holiday.
- Thursday, 29th: Last day for acceptance of applications for examinations — 24 week courses.

**AUGUST**
- Friday, 11th: Last day for acceptance of applications for examinations — 30 week courses.
- Monday, 14th to Saturday, September 2nd: Vacation (3 weeks).

**SEPTEMBER**
- Monday, 4th: Third Term Lectures begin.

**OCTOBER**
- Monday, 2nd: Public Holiday.

## NOVEMBER
- Friday, 3rd: Annual Examinations begin — 30 week courses.
- Saturday, 4th: Annual Examinations end.
- Saturday, 25th: Annual Examinations end.

## 1968

**JANUARY**
- Monday, 28th to Saturday, 4th February: Deferred examinations — all courses.

**FEBRUARY**
- To be advised: Closing date for lodgement of all enrolment applications.
- Monday, 26th: First Term Lectures begin.

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*Note: Hours not specified in the document.*
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THE ENGINEERING PROFESSION

Engineering is concerned with the economic application of science to the growing needs of society. It therefore provides essential bridge-work between scientific principles and human affairs; between Nature and Mankind. Research and discovery create new materials and processes, presenting a continual challenge to the Engineer to exploit and apply the new knowledge as widely and effectively as possible. This is the stimulus of Engineering, and the reason for the thoroughness of engineering education.

The engineering profession provides rewarding experience for those suited and qualified to pursue it. It requires attention to detail as well as broad awareness. It demands an initial capital outlay of time, concentration and self-discipline to follow a formal course of study leading to a recognised award. The result is enduring interest in chosen specialities, and the real sense of achievement that follows study in depth.

A course in professional engineering aims to provide a sound basis of science and technology rounded off with the development of judgement and skill in its application. The parent branches of engineering, namely, Civil, Electrical and Mechanical Engineering, are represented by the Departments in the Faculty of Engineering at Newcastle, and these provide the basic training for a variety of more specialised fields of engineering. The fundamental knowledge of engineering science is common to all branches, and is given special emphasis at Newcastle.

It is appropriate that Newcastle, which has been described as the industrial capital of Australia, should play a key role in the education of professional engineers.

H. R. VALLENTINE,
Dean of the Faculty of Engineering.
FACULTY OF ENGINEERING

Dean
Professor H. R. Vallentine

Sub-Dean
Associate Professor A. Herzog

Civil Engineering

Professor
H. R. Vallentine, B.E.(Syd.), M.S.(Iowa), A.S.T.C.
M.I.E.Aust., M.ASCE.
Professor of Civil Engineering (Head of Department)

Associate Professor
A. Herzog, Dipl.Eng.(Bud.), Ph.D.(N.S.W.), M.I.E.Aust.,
M.ASCE.

Senior Lecturers
P. W. Kleeman, B.E.(Adel.), F.S.A.S.M.
N.O. Betts, B.Sc.(S.A.), B.Sc.(Eng.) (Capetown),
M.Tech.(N.S.W.), A.M.I.C.E., A.M.I.E.Aust.,
A.M.(S.A.)I.C.E.

Lecturers
L. A. White, B.Sc.(Eng.) (Rand.), L.S.A., M.I.L.S.

Senior Tutor
R. J. Wilson, B.E.(N.S.W.), Grad.I.E.Aust., A.M. ASCE.

Professional Officer
M. G. Van Santen, M.T.S.Dip.(Utrecht)

Electrical Engineering

Professor
B. D. O. Anderson, B.Sc., B.E.(Syd.), Ph.D.(Stanford),
Professor of Electrical Engineering (Head of Department)

Senior Lecturer
J. G. Alva, B.Sc.(Dunelm), M.Sc.(Lond.), A.M.I.E.E.

Lecturers
J. H. Caldwell, B.Sc., B.E.(Syd.)

Senior Tutor

Mechanical Engineering

Professor
Appointment pending

Associate Professor
A. K. Johnston, B.E.(Syd.), M.S.(Iowa), Ph.D.(N.S.W.)

Senior Lecturer
E. Betz, M.E., Ph.D.(N.S.W.), A.S.T.C., A.M.I.E.Aust.

Lecturers
L. W. B. Browne, B.E.(Syd.)
G. D. Butler, B.E.(N.S.W.), D.A.E.(Cranfield), A.S.T.C.,
A.I.M.E.Aust., A.M.O.R.S.
M. J. Hallinan, A.S.T.C.
K. L. Hitz, B.E.(N.S.W.), Grad. I.E.Aust.

Professional Officers
R. D. Bourne, H.N.C.
D. B. Stewart, B.E.(N.S.W.), A.S.T.C.
H. A. Willems, B.E.(N.S.W.), Dipl. Naval Arch. M.T.S.
Dordrecht, A.S.T.C.
ADMINISTRATIVE STAFF

Vice-Chancellor and Principal

Vice-Principal
Professor B. Newton-John, M.A.(Cantab.)

Senior Student Counsellor
S. G. Alley, B.A.(Syd.), A.S.T.C., M.A.Ps.S.

Student Counsellor
P. M. Whyte, B.A.(Melb.), M.A.Ps.S.

Bursar
L. W. Harris, A.A.S.A., A.C.A.A., A.B.I.A.

Deputy Bursar
M. G. Talty, B.Com.(N.S.W.), A.A.S.A.

Accountant
G. W. Walker, A.A.S.A.

Secretary
P. D. Alexander, B.A., Dip.Ed.(Syd.)

Graduate Assistants
Joan Bale, B.A.(N.S.W.)
Nell Emauel, B.A.(N.S.W.)
H. Floyer, B.Ec.(Syd.)
Glennie Jones, B.A.(N.S.W.)

University Planner
Associate Professor E. C. Parker, A.S.T.C., F.R.A.I.A.

THE LIBRARY STAFF

University Librarian
E. Flowers, M.A.(Syd.), A.L.A.A.

Head Cataloguer
Elizabeth Guilford, B.A.(N.E.), A.L.A.A.

Reader Services Librarian
Joan E. Murray, B.A.(N.E.), A.L.A.A.

Assistant Librarians
Marianne E. Flood, B.A.(Syd.), Dip.Lib.(N.S.W.)
Two appointments pending

Library Assistants
B. Mitcheson, A.L.A.A.
Winifred Murdoch, B.Sc.(N.E.)
L. Faidigo
P. Davies
M. Swerus
Two appointments pending

Librarian's Secretary
Marcia C. Meyjes

Typists
Joyce Kiefer
Colleen Flynn

Attendants
P. Moroney
J. Vanson
UNIVERSITY OF NEWCASTLE

The University of Newcastle has existed in its own right for two years, yet it is not the youngest of the Australian Universities, for there are three universities junior to it. This expansion of higher education in Australia is due to the somewhat belated recognition that if this country is to maintain its place in the modern world, let alone progress, it will need many more scientists, teachers, architects, engineers, administrators, economists, linguists, and specialists and technologists of all kinds. To supply these, and above all to produce a thoughtful educated society, is a function of the Universities.

The University began in 1952, modestly, on the site of the Newcastle Technical College, as a College of the New South Wales University of Technology. Of the first enrolment of 370, only five students were starting degree courses—the others were seeking a diploma or were converting their diplomas into degrees. The courses offered were those given in the University of Technology, but public pressure soon brought about the introduction of Arts courses, in which 95 students enrolled in 1954. Since the University of Technology had no Faculty of Arts, the supervision of these courses was entrusted to the University of New England and a happy relationship was established which lasted until 1959, by which time the University of Technology had become the University of New South Wales.

Student numbers have grown steadily from the original band of 370 to 1726 in 1965, the year in which autonomy was granted and 2,023 in 1966. Academic staffing has kept pace numerically with this expansion, but it was only very recently that any significant increase in the number of professors took place. In the year in which autonomy was granted and 2,023 in 1966, the number of professors was increased to 1726 in 1966; the number of students is expected that this physical growth will be accompanied by an increasing emphasis on honours and post-graduate studies.

THE ORGANISATION OF THE UNIVERSITY

The governing body of the University is the Council, which has the responsibility for making all major decisions on policy. The Council consists of 23 members including representatives of the undergraduates, the graduates, the non-academic and the academic staff of the University and Convocation. Its Chairman is the Chancellor of the University, Senator The Honourable Sir Alister McMullin, K.C.M.G.

The Chief Executive Officer of the Council is the Vice-Chancellor and Principal, Professor J. J. Auchmuty, M.A., Ph.D., M.R.I.A., F.R.Hist.S., F.I.A.L., who sees to the implementation of the Council decisions and has the general oversight of the administration of the University. In this work he is assisted by Professor B. Newton-John, M.A., the Vice-Principal.

The Chief Academic Body in the University is the Senate, which is composed of the professors and one non-professorial representative from each faculty. It meets under the Chairmanship of the Vice-Chancellor and presents to Council the results of its deliberations on all matters affecting the academic life of the University—matriculation requirements, course structures, the appointment of examiners, the conditions for the award of post-graduate degrees and diplomas and similar matters. The Senate has inter alia a Personnel and Finance Committee which is an advisory committee to the Vice-Chancellor, and an Admissions Committee, which deals with all applications for entry which do not satisfy formal matriculation requirements.

The other major academic bodies are the Faculty Boards of which we have six (Applied Science, Architecture, Arts, Economics and Commerce, Engineering, Science). Each Faculty Board consists of all the tenured academic staff of the Departments composing the Faculty together with representatives of other Faculties and is chaired by the Dean of the Faculty, a professor elected by the Faculty Members. It is the Faculty Board that is responsible for the teaching, research activities and examinations within the Faculty. Once courses have been approved by the Board, it is the business of the individual Departments to teach and examine them.

Most Departments invite an External Examiner, usually a Professor from another University, to co-operate in the assessment of examination results, particularly those of honour candidates, thus ensuring that this University's standards are known in the other Australian Universities.

THE FACULTIES

Courses are offered in six Faculties, each of which is composed of one or more departments.

FACULTY OF APPLIED SCIENCE

Dean: Professor I. McC. Stewart

Chemical Engineering and Industrial Chemistry


Metallurgy


FACULTY OF ARCHITECTURE

Dean: Professor F. Romberg

Professor F. Romberg, Dipl.Arch.(E.T.H. Zurich), F.R.A.I.A.
FACULTY OF ARTS
Dean: Professor J. A. Keats

Classics
Professor
R. G. Tanner, M.A. (Melb. and Cantab.)

Education
Head of Department
G. H. Duncan, M.A. (Syd.), B.Ed. (Melb.), M.A.C.E.

English
Professor
K. G. W. Cross, M.A., Ph.D. (Dub.)

French
Professor
K. H. Hartley, M.A. (Syd.), D. de l'U (Paris)

Geography
Professor
A. D. Tweedie, M.A. (N.Z.)

German
Professor
D. G. Mowatt, B.A., Ph.D. (Lond.)

History
Professor
G. A. Cranfield, B.A., Ph.D. (Cantab.)

Philosophy
Professor
A. M. Ritchie, M.A. (Syd.), Ph.D. (Lond.)

Psychology
Professor

FACULTY OF ENGINEERING
Dean: Professor H. R. Vallentine

Civil Engineering
Professor

Electrical Engineering
Professor
B. D. O. Anderson, B.Sc., B.E. (Syd.), Ph.D. (Stanford)

Mechanical Engineering
Professor
Appointment pending.

FACULTY OF SCIENCE
Dean: Professor C. D. Ellyett

Chemistry
Professor
J. A. Allen, M.Sc. (Q'ld.), Ph.D. (Bristol), F.R.A.C.I.

Geology
Professor
Beryl Nashar, B.Sc., Dip.Ed. (Syd.), Ph.D. (Tas.)

Mathematics
Professor
I. D. Macdonald, M.A. (Aberd.), Ph.D. (Manc.)

Physics
Professor

FACULTY OF ECONOMICS AND COMMERCE
Dean: Professor W. P. Hogan

Commerce
Professor
M. O. Jager, B.Com. (Melb.), A.A.S.A., A.C.A.A.

Economics
Professor
W. P. Hogan, M.A. (N.Z.), Ph.D. (A.N.U.)
REQUIREMENTS FOR ADMISSION

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

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

The Matriculation Examination is held in February and applications must be lodged at the University of Sydney during the first ten days of January except by candidates who have taken the Leaving Certificate Examination in the previous November. The closing date for such candidates will be announced when the Leaving Certificate results are published.

MATRICULATION REQUIREMENTS

(To operate from 1st January, 1961, to 31st March, 1967.)

1. (i) A candidate for any first degree of the University shall satisfy the conditions for admission set out in section 2 (ii) below before entering upon any course for such degree.
   Compliance with these conditions does not in itself entitle a student to enter upon a course.

(ii) A person who has satisfied the conditions for admission may on the payment of such fees as may be determined by the Council from time to time 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.
   E. Accountancy, Art, Descriptive Geometry and Drawing, Music, Theory, and Practice of Music.

(ii) The conditions for admission to any undergraduate course leading to a degree are that a candidate must have passed 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:
   (1) either (a) the five subjects include English and at least one subject from each of the Groups B and C but include not 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 include not more than one subject from Group E, 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; and
   (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.

3. The Council may, with the advice of the Senate, admit as a matriculated student, under such conditions and with such standing as it may determine, any person who has satisfied the Council that he has reached a standard of education sufficient to enable him to pursue his proposed course.

4. The Council may, with the advice of the Dean of the Faculty concerned permit any person to enrol in a subject or subjects on payment of such fees as may be determined from time to time by the Council. Such a person shall not have the privileges of a matriculated student and shall not be eligible to proceed to a degree.
### FULL-TIME COURSES

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>COURSE</th>
<th>DEGREE</th>
<th>DURATION — YEARS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>Applied Science</td>
<td>Chemical Engineering</td>
<td>B.E.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Industrial Chemistry</td>
<td>B.Sc.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Metallurgy</td>
<td>B.Sc.</td>
<td>4</td>
</tr>
<tr>
<td>Architecture</td>
<td>Architecture</td>
<td>B.Arch.</td>
<td>5</td>
</tr>
<tr>
<td>Arts</td>
<td>Arts</td>
<td>B.A.</td>
<td>3</td>
</tr>
<tr>
<td>Economics and Commerce</td>
<td>Commerce</td>
<td>B.Com.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>B.Com.</td>
<td>3</td>
</tr>
<tr>
<td>Engineering</td>
<td>Civil Engineering</td>
<td>B.E.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Civil Engineering</td>
<td>B.E./B.Sc.</td>
<td>5</td>
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<tr>
<td></td>
<td>Electrical Engineering</td>
<td>B.E.</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering</td>
<td>B.E./B.Sc.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
<td>B.E.</td>
<td>4</td>
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<tr>
<td></td>
<td>Mechanical Engineering</td>
<td>B.E./B.Sc.</td>
<td>5</td>
</tr>
<tr>
<td>Science</td>
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<td>B.Sc.</td>
<td>3</td>
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</table>

### PART-TIME COURSES

<table>
<thead>
<tr>
<th>FACULTY</th>
<th>COURSE</th>
<th>DEGREE</th>
<th>DURATION — YEARS</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td></td>
<td>Pass</td>
</tr>
<tr>
<td>Applied Science</td>
<td>Chemical Engineering</td>
<td>B.Sc. (Tech.)</td>
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<td></td>
<td>Industrial Chemistry</td>
<td>B.Sc. (Tech.)</td>
<td>6</td>
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<tr>
<td></td>
<td>Metallurgy</td>
<td>B.Sc. (Tech.)</td>
<td>6</td>
</tr>
<tr>
<td>Architecture</td>
<td>Architecture</td>
<td>B.Arch.</td>
<td>6</td>
</tr>
<tr>
<td>Arts</td>
<td>Arts</td>
<td>B.A.</td>
<td>5-6+</td>
</tr>
<tr>
<td>Economics and Commerce</td>
<td>Commerce</td>
<td>B.Com.</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Economics</td>
<td>B.Com.</td>
<td>5</td>
</tr>
<tr>
<td>Engineering</td>
<td>Civil Engineering</td>
<td>B.Sc. (Tech.)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Electrical Engineering</td>
<td>B.Sc. (Tech.)</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Mechanical Engineering</td>
<td>B.Sc. (Tech.)</td>
<td>6</td>
</tr>
<tr>
<td>Science</td>
<td>Science</td>
<td>B.Sc.</td>
<td>5-7+</td>
</tr>
</tbody>
</table>

* All students must enrol initially in the Full-Time course and on completion of the first year may apply to transfer to the Part-Time Course.
+ Progression is by subject; duration of course is dependent on choice of subjects.
POST GRADUATE AWARDS

It is well to consider at the outset of your University career the desirability of undertaking an honours course.

A good honours degree, valuable in itself and a most useful qualification in any professional field, is essential to gain a post-graduate award which will enable the recipient to read for a higher degree.

Particulars of post-graduate awards available at the University are published in the Calendar.

PROCEDURES

HOW TO ENROL

All documents relating to enrolment are obtainable from the Student Records Office, Room No. 158, Building “A”, Shortland site.

1. (i) PERSONS ENROLLING IN AN UNDERGRADUATE COURSE AT THE UNIVERSITY OF NEWCASTLE FOR THE FIRST TIME.

Two forms, as under, are required to be completed by each intending student and lodged with the Student Records Office before the 10th February, 1967.

(a) Application for Admission.

(b) Enrolment Application.

(ii) PERSONS RE-ENROLLING IN UNDERGRADUATE COURSES.

Undergraduates re-enrolling will be required to complete an Enrolment Application and lodge it with the Student Records Office before the 10th February, 1967.

A student in this category whose Enrolment Application is not received by the Student Records Office before 5.00 p.m. on Friday, 10th February, 1967, will become liable to pay a late fee.

(iii) CANDIDATES FOR POST-GRADUATE DIPLOMA COURSES

(a) Candidates for the Diploma in Education.

These people should complete the Post-Graduate Diploma Application Form and lodge it with The Principal, Newcastle Teachers’ College, before the 10th February, 1967.

(b) Candidates for the Post-Graduate Diploma in Industrial Engineering.

These people should complete the Post-Graduate Diploma Application Form and lodge it with the Student Records Office before the 10th February, 1967.

(iv) CANDIDATES FOR THE DEGREE OF MASTER OR DOCTOR OF PHILOSOPHY.

Candidates re-enrolling.

These persons will be required to complete the Higher Degree Enrolment Form and lodge it with the Student Records Office before the 10th February, 1967.

Candidates Registering for the first time.

These persons should complete an “Application for Registration as a Candidate for a Higher Degree” and lodge it with the Student Records Office.

(v) CANDIDATES FOR QUALIFYING COURSES FOR HIGHER DEGREES.

Graduates intending to pursue qualifying studies for admission as a candidate for the degree of Master or Doctor of Philosophy should complete the special form for this purpose and lodge it with the Student Records Office, preferably before 10th February, 1967.

2. NOTIFICATION OF ACCEPTANCE.

(i) All Undergraduates.

Each student will be required to call at Room No. 150, Building “A”, Shortland site, to collect his/her approved Enrolment Application.

The approved Enrolment Applications will be available for collection on and after Wednesday, 22nd February, 1967.

Wednesday, 22nd February, 1967, is the Opening Day of Orientation Week.

(ii) All Post-Graduate Candidates.

The approved Enrolment Application will be posted to the address nominated by the candidate on his Enrolment Form.

3. NOTIFICATION OF AMENDMENT, CALL FOR INTERVIEW OR REJECTION.

In cases where an enrolment may be authorised subject to certain amendments, the student concerned may be advised by post or may be requested to call for an interview.

Where it is considered desirable or where the student has so requested, an appointment will be made for the student to discuss his enrolment application.

The student whose enrolment cannot be accepted will be notified in writing.

4. STUDENTS NEEDING ACADEMIC ADVICE BEFORE ENROLLING.

If the student who is uncertain which subjects he should read, after referring to the information available in the appropriate Faculty Handbook, should consult the Dean of the Faculty during the period 8th—10th February, 1967. An appointment may be made by phoning the Dean’s secretary.

The Deans of various faculties are listed on page 47.

5. LATE ENROLMENTS.

(i) Students who are unable to lodge their Application for Enrolment by the prescribed date, shall make written application to the Vice-Principal for an extension of time. This application must be received by the Vice-Principal on or before 10th February, 1967, otherwise the University reserves the right not to accept the student’s application.

(ii) No enrolments will be accepted after 31st March of each academic year without the approval of the Vice-Principal which shall be given only in exceptional circumstances.

(iii) Deferred Examinations.

A student who has taken a deferred examination will be required to lodge an Enrolment Application with the Student Records Office after the publication of the examination results and before Thursday, 23rd February, 1967.

(iv) Show Cause Students.

A student given permission to re-enrol will be required to lodge, with the Student Records Office, an Enrolment Application within seven (7) calendar days of the despatch to him of a letter advising permission to re-enrol.

(v) Sydney University Matriculation Examination.

Students relying on this examination for matriculation will be required to lodge an Application for Admission and an Enrolment
6. **INTERSTATE AND OVERSEAS STUDENTS.**

Students relying for matriculation on examinations taken outside New South Wales will be required to produce evidence of matriculation to their local university or some other recognised university, for example, The University of London. These students should lodge with this University, before 1st December, 1966, an Application for Admission and an Enrolment Application, supported by a statement as above and documentary evidence of their educational qualifications.

7. **PRECAUTIONS WHEN COMPLETING ENROLMENT DOCUMENTS.**

(i) Students should answer all questions unless otherwise instructed.

(ii) The description of subjects should correspond exactly with the information shown in the Faculty Handbooks.

(iii) The student should ensure that he has inserted his standing in the course in accordance with the instructions set out in the Faculty Handbook, e.g. Year II, Stage 4.

(iv) The student should check the timetable for the courses selected to ensure that there are no clashes.

(v) It is important that the student check his proposed programme to ensure that he has:

   (a) completed pre-requisite subjects,
   (b) satisfied the sequence requirements.

(vi) **Amendments to Enrolments.**

All amendments to enrolments must be completed by lodging, before 31st March, 1967, with the Dean of the Faculty, a Variation Form indicating the change required. Changes are not automatically approved; the reasons therefore must be given.

8. **AMENDMENTS.**

The following matters are regarded as amendments to course programmes and require documentation.

(i) To change from one course to another.

(ii) To substitute one subject for another.

(iii) A change in the method of completion of course, e.g. full-time to part-time.

(iv) Permission to include five first year subjects in Arts Degree course.

(v) Approval to withdraw from a subject or course.

(vi) Leave of absence from course.

(vii) Any other course change.

9. **ENROLMENT IN CORRECT SUBJECTS.**

Considerable inconvenience is caused to the University and to the student if he reads a subject in which he has not enrolled.

It is essential for the student to determine before submitting his Enrolment Application, the subjects he will read for the year. Particular attention should be made to the inclusion of the Honours segments where these are taken.

10. **WITHDRAWAL FROM COURSE REGARDED AS FAILURE.**

Approval to withdraw from a course is not automatic. It should be noted that a student is regarded as having failed in a course if he enrols in it and does not pass the annual examinations—i.e., not sitting for the examination (unless withdrawal has been approved) is regarded as not passing the examinations.

After the sixth Monday of Second Term a student will not be allowed to withdraw without penalty unless, in the opinion of the Dean of the Faculty, there is good reason why he should be permitted to do so.

**PAYMENT OF FEES**

**Completion of Enrolment.**

Enrolment is completed by the payment of fees. Fees should be paid before or during the first two weeks of First Term. After that, a late fee is incurred (see below). Fees will not be accepted after the 31st March except with the written approval of the Secretary, which will be given only in exceptional circumstances.

**IT IS RECOMMENDED** that wherever possible payment of fees be made through the post, by cheque, money order, or postal note. (Money orders should be made payable at Newcastle University Post Office). Payment in person may be made to the Cashier who is located opposite the Student Records Office in Building "A" Shortland Site. The cashier's ordinary hours of opening are as follows:—

Monday to Friday .... .... .... 9.00 a.m. to 11.00 a.m.

              .... .... 1.00 p.m. to 4.30 p.m.

During enrolment periods the Cashier's office will be open for additional hours, which will be published on the notice boards.

**Payment of Fees by Term.**

A student may pay course fees by the term, in which case payment must be made within the first two weeks of each term.

**Scholarship Holders and Sponsored Students.**

The student whose fees are met from a scholarship or some other form of financial assistance is required to submit an authorised enrolment application together with a voucher or other documentary evidence from the sponsor accepting liability for his fees, together with payment of fees not included in such authority, to the Cashier by the due date. Where such documentary evidence is not available, the student is expected to make payment by the due date and to apply for a refund of fees paid when he is in a position to lodge such document.

**Extension of Time.**

The student who is unable to pay fees by the prescribed date may apply in writing to the Secretary for an extension of time. This application must state fully the reasons why fees cannot be paid and must be lodged before the date on which the late fee becomes payable.

**Failure to Pay Fees.**

Any student who is indebted to the University and who fails to make a satisfactory settlement of his indebtedness upon receipt of notice ceases to be entitled to membership and privileges of the University. Such a student is not permitted to register for a further term, to attend classes or examinations, or to be granted any official credentials. The student is not eligible to attend the annual examinations in any subject where any portion of his course fees for the year is outstanding by the end of the third week of Third Term.

In very special cases the Vice-Principal may grant exemption from the disqualification referred to in the two preceding paragraphs upon receipt of a written statement setting out all relevant circumstances.
DATES FOR PAYMENT OF FEES IN 1967.

First Term.
Fees due: Monday, 27th February to Friday, 10th March.
Late fee of $6 applicable: Monday, 13th March to Friday, 31st March.
Late fee of $10 applicable, if permission given by the Secretary for the enrolment to be accepted after 31st March.

Second Term.
Fees due: Monday, 5th June to Friday, 16th June.
Late fee of $6 applicable: Monday, 19th June to Friday, 30th June.
Late fee of $10 applicable, if permission given by the Secretary for fees to be accepted after 1st July.

Third Term.
Fees due: Monday, 4th September to Friday, 15th September.
Late fee of $6 applicable: Monday, 18th September to Friday, 22nd September.
Late fee of $10 applicable, if permission given by the Secretary for fees to be accepted after September 22nd.

EXTENSION OF TIME TO PAY FEES
A student whose written application for an extension of time in which to pay fees has been approved by the Secretary (see above) may be granted a maximum period of ONE MONTH after the closing date for payment of fees. The closing dates are:

First Term: Friday, 10th March.
Second Term: Friday, 16th June.
Third Term: Friday, 15th September.

UNDERGRADUATE COURSE FEES
The fees quoted below are current at the time of publication and may be varied by the Council without notice.

Full-time registered students in the Faculties of Arts, Economics and Commerce $276 per annum
Full-time registered students in all other Faculties $330 per annum
Part-time registered students in all Faculties $165 per annum

Notes (a) A full-time student is a student who enrolls in more than half the subjects of a normal first year course and such a student remains classified as a full-time student except on the written approval of the Dean of his Faculty that he be reclassified as a part-time student — this re-classification would be exceptional.

(b) A part-time student is either one who enrolls in half or less than half the subjects of a normal first year course or one who enrolls in a part-time course. In subsequent years the enrolment as a part-time student requires the approval of the Dean of the Faculty.

‘Non-degree’ Students. (Fee under review).
‘Non-degree’ students, are those permitted to read one or more subjects in a first degree course without counting them as qualifying for a degree. Such students, whether enrolling for the first time or re-enrolling are required to pay a course fee of $90 p.a. for each subject.

The General Services Fee.
From 1966 onwards all registered students will pay a combined General Services Fee of $42 p.a. payable in First Term with the Course Fees. In addition students joining the University Union for the first time will be required to pay an entrance fee of $12.

HIGHER DEGREE FEES
(Under review)

Master’s Degree.
Course and Supervision Fee (Full-Time) $96 per annum
Course and Supervision Fee (Part-Time) $48 per annum
General Services Fee, which includes an annual contribution of $10 to the University Library $36 per annum

Doctor of Philosophy.
Qualifying Examination Fee (if applicable) $10 per annum
Course and Supervision Fee $96 per annum
General Services Fee, which includes an annual contribution of $10 to the University Library $36 per annum

Note:
The above fees will apply to candidates who registered for the first time in 1965 or who register in later years. Fees for candidates who were enrolled in 1965 will be as set out on page 38 of the 1965 Handbook.

Other fees.
1. Where an application to sit for examinations is accepted after the closing date $4
2. Deferred examinations, per subject $4
3. Examination under special supervision, per paper $6
4. Review of Examination result, per subject $6

Adjustment of Fees.
Should an application to withdraw from a course or subject be approved, an adjustment of fees may be made, relative to the date on which the application was submitted. Up to that date, fees accrued. Where notification of withdrawal from a course is received by the Dean of the Faculty before the first day of First Term, a refund will be made of all Course Fees. Where a student for acceptable reasons notifies the termination of a course before the end of the fifth week of term, one half of the course fees for the term may be refunded. If the student notifies termination of a course after the end of the fifth week, no refund will be made.

IN RESPECT OF APPLICATIONS TO WITHDRAW FROM A COURSE OR SUBJECT WHICH ARE RECEIVED IN THE EARLY PART OF FIRST TERM, THE UNIVERSITY RESERVES THE RIGHT NOT TO MAKE ANY REFUND OF MONEYS UNTIL AFTER THE END OF THE SIXTH WEEK OF TERM.

EXAMINATIONS

General.
Examinations and other exercises may be held in any subject and at any time at the discretion of the lecturer or other competent authority, and the results of such examinations may be incorporated with those of the annual examinations in such subjects.

A student desiring to sit for an annual examination must lodge an application with the Secretary on the appropriate form by the prescribed date.

The annual examinations take place in November-December for students in 30 week courses, and in September for students in 24
week courses. Time-tables showing time and place at which individual examinations will be held are posted on the central notice boards. Misreading of the time-table will not under any circumstances be an acceptable excuse for failure to attend an examination. Examination results are published in the daily Press. No results will be given by telephone.

Examination results may be reviewed for a fee of $6 a subject, which is refundable in the event of an error being discovered. Applications for review must be submitted on the appropriate form together with the necessary fee by the date notified in the Press publication.

In the assessment of a student's progress in University courses, consideration is given to work in laboratory and class exercises and to any term or other tests given throughout the year, as well as to the annual examination results.

Students should also note that an examiner may call them in after completion of the written papers in the annual examination to complete further written, practical or oral tests as part of the annual examination. It is therefore important that the Examinations Branch be advised of any change in address from the one given on the Application for Admission to Examinations.

The prescribed dates by which applications to sit for examinations are to be lodged are:

(a) Annual examinations for 24-week courses—30th June.
(b) Annual examinations for 30-week courses—11th August.
(c) Annual examinations for other courses—14 weeks prior to date of first examination.

No student is eligible to attend the annual examination in any subject if any portion of fees due by the student is outstanding by the end of the third week of Third Term.

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

Special Examinations.

Special Examinations may be awarded under certain conditions. The relevant sections of the University's By-laws are set out below.

**By-law 5.9.3**

5. When a candidate is prevented by illness or by other serious cause from presenting himself for the annual examination the appropriate Faculty Board may order a special examination for that candidate in the subject or subjects in which he was unable to present himself. The result of a special examination may be graded.

6. When a candidate's studies during the academic year have been gravely hampered by illness or other serious cause, the appropriate Faculty Board upon application being made to the Secretary to the University within three days after such examination or within such further period as the Vice-Chancellor may consider reasonable in the circumstances supported by medical or other proper evidence, may direct the examiners in that subject to take the circumstances into account if the candidate does not pass therein in determining whether or not a special examination or test should be provided for him: Provided that no such application shall be considered unless the candidate either during or immediately after such examination reports to the supervisor in charge the circumstances relied on in the application.

**Deferred Examinations**

Deferred examinations may be granted to help resolve a doubt as to whether a student has reached the required standard in a subject.

Examinations are conducted in accordance with the following rules and procedure:

(a) Candidates are required to obey any instruction given by a proctor for the proper conduct of the examination.
(b) Candidates are expected to be in their places in the examination room not less than ten minutes before the time for commencement.
(c) No bag, writing paper, blotting paper, manuscript or book, other than a specified aid, is to be brought into the examination room.
(d) No candidate shall be admitted to an examination after thirty minutes from the time of the beginning of the examination.
(e) No candidate shall be permitted to leave the examination room before the expiry of thirty minutes from the time the examination begins.
(f) No candidate shall be re-admitted to the examination room after he has left it unless during the full period of his absence he has been under approved supervision.
(g) A candidate shall not by any improper means obtain or endeavour to obtain assistance in his work, give or endeavour to give assistance to any other candidate, or commit any breach of good order.
(h) Smoking is not permitted during the course of examinations.
(i) A candidate who commits any infringement of the rules governing examinations is liable to disqualification at the particular examination, and if detected at the time, to immediate expulsion from the examination room, and is liable to such further penalty as may be determined.

**GENERAL REQUIREMENTS**

The University tries to function with a minimum of formal regulations; it has, for instance, drawn up no code of conduct for students, beyond forbidding gambling in the precincts and smoking in lectures, examinations and the Library.

It is obvious however that there must be standard practice throughout the University in such diverse matters as examination procedures and car parking and an acceptance of certain requirements which are described in the following pages.

**Academic Requirements.**

The student is responsible for informing himself as to, and for complying with, University requirements, especially the requirements relating to admission and to the award of the degree for which he is reading.
NOTICES.

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

ATTENDANCE AT CLASSES.

Students are expected to be regular and punctual in attendance at all classes in the course or subject in which they are enrolled. All applications for exemption from attendance at lectures or practical classes must be made in writing to the Head of the appropriate Department. If term examinations have been missed this fact should be noted in the application.

In the case of illness or of absence for some other unavoidable cause a student may be excused by the Head of the appropriate Department for non-attendance at classes for a period of not more than one month, or on the recommendation of the Head of the appropriate Department for any longer period.

Applications for exemption from attendance at classes, either for lectures or practical work, may only be approved on the recommendation of the Head of the appropriate Department. The granting of an exemption from attendance does not carry with it exemption from payment of fees. Where a student has attended less than 80% of the possible classes, he may be refused permission to sit for the examination in that subject.

OWNERSHIP OF STUDENTS' WORK.

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

STUDENT IDENTIFICATION.

Students are expected to carry their receipt for First Term enrolment as evidence that they are entitled to the rights and privileges afforded by the University.

Students desiring certification of documents for obtaining travel and other concessions should present such documents to the Student Records Section.

CHANGE OF ADDRESS.

Students are responsible for notifying Student Records Office in writing of any change in their address as soon as possible. Failure to do so could lead to important correspondence or course information not reaching the student. The University cannot accept responsibility if official communications fail to reach a student who has not notified Student Records Office of a change of address.

GENERAL CONDUCT.

Acceptance as a member of the University implies an undertaking on the part of the student to observe the by-laws and other requirements of the University.

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

Members of the academic staff of the University, senior administrative officers, and other persons authorised for the purpose have authority, and it is their duty, to check and report on disorderly or improper conduct occurring in the University.

PARKING OF CARS.

On the Tighe's Hill Site the authorities of the Newcastle Technical College are responsible for traffic control and parking, and their regulations, traffic signs, etc., must be obeyed.

At Shortland, all vehicles must be parked in a car park.

PROGRESS IN THE COURSE AND EXAMINATION FAILURE

The University is vitally concerned to see that all students take full advantage of the opportunities that they receive as persons privileged to attend a University.

However, to assist those students who may be unsuited to University study or whose circumstances jeopardise success at study and to deal with those students whose lack of success has a detrimental effect on the work of the course, certain By-laws have been enacted to give guidance to and deal with these students. They are:

By-law 5.4.1—Unsatisfactory Progress.

1. The Head of a Department in any Faculty may determine that a student taking a subject or course offered by the Department shall be excluded from any examination for which the Department is responsible for any or all of the following reasons:
   (a) unsatisfactory attendance at lectures;
   (b) failure to complete laboratory work;
   (c) failure to complete written work or other assignments; or
   (d) failure to complete field work.

2. The Faculty Board may review the academic progress of any student enrolled in the Faculty concerned who fails in, or is absent from, or is excluded under section 1 of this By-law from any examination and may determine:

   (a) that the student be excluded from any further study in a subject;
   (b) that the student may enrol in that Faculty only in such subject or subjects as the Faculty Board shall specify; or
   (c) that the case be referred to the Admissions Committee if, in the opinion of the Faculty Board, the student should be excluded from a degree course, from the Faculty or from the University.

3. The Admissions Committee, in considering a referral under subsection (c) of section 2 and after giving the student an opportunity to be heard, may determine:

   (a) that the student be excluded from a degree course or from the Faculty;
   (b) that the student shall be permitted to continue his course, subject to such conditions as the Admissions Committee may determine; or
   (c) that the case be referred to the Vice-Chancellor with the recommendation that the student be excluded from the University.

4. The Vice-Chancellor may, on the recommendation of the Admissions Committee exclude from the University any student whose academic record in the opinion of the Vice-Chancellor and the Admissions Committee demonstrates the student's lack of fitness to pursue University studies.

* See also 'Withdrawal from Course Regarded as Failure'—Page 26.

By-law 5.4.2—Show Cause.

1. 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 the annual examination counts for the purposes of this By-law as one examination.
2. (1) A full-time student shall show cause why he should be allowed to continue a course if all subjects of the first year of his course are not completed by the end of his second year of attendance.

(2) A part-time student shall show cause why he should be allowed to continue a course if all subjects of the first two stages of his course are not completed by the end of his fourth year of attendance.

3. (1) A student who has a record of failure at another University shall show cause why he should be admitted to the University.

(2) A student admitted to a course at the University following a record of failure at another University shall show cause, notwithstanding any other provision in this By-law, why he should be allowed to continue in that course if he is unsuccessful in the annual examinations in his first year of attendance at the University.

4. A student required to show cause shall have his application considered by the Admissions Committee which shall determine whether the cause shown is adequate to justify the student’s being permitted to continue his course or to re-enrol as the case may be.

By-law 5.4.3—Re-enrolment.

1. Any student who has been excluded from a Faculty shall not be allowed to enrol in another Faculty without the permission of the Faculty Board concerned.

2. Any student excluded from a degree course or from a Faculty or from the University may apply after two academic years to the Admissions Committee for re-admission to any such Faculty or to the University. If the Admissions Committee is satisfied that the condition or circumstances of any such student have so changed that there is a reasonable probability that he will make satisfactory progress in his studies it may authorise the re-admission of that student under such conditions as it may determine.

By-law 5.4.4—Appeal Against Exclusion.

1. A student who is refused permission to enrol under the provisions of section 1 of By-law 5.4.3 may appeal to the Senate.

2. A student who has been excluded from any degree course or from a Faculty or from the University may appeal to the Council.

UNIVERSITY SERVICES

CHAPLAINCY SERVICE

A Chaplaincy Service within the University of Newcastle for the benefit of students and members of staff is provided by the Christian Churches of Newcastle.

The service offers personal counselling and guidance, and also assistance in biblical and doctrinal studies. Opportunities for liturgical worship are also provided.

The Chaplains’ office is situated on the Ground Floor of the Main Administration Building at Shortland.

The Chaplains are in regular attendance at the University but they may also be contacted at their private addresses.

NAMES AND ADDRESSES OF CHAPLAINS

<table>
<thead>
<tr>
<th>Presbyterian</th>
<th>The Reverend H. Barratt, B.A.,</th>
<th>St. Philip’s Manse,</th>
<th>NEWCASTLE. Tel. 2379.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Catholic</td>
<td>The Reverend Father T. Warren, B.A.,</td>
<td>Redemptorist Monastery,</td>
<td>MAYFIELD. Tel. 68 2347.</td>
</tr>
<tr>
<td>Anglican</td>
<td>The Reverend Canon E. H. V. Pitcher, M.A., Th.Schol.,</td>
<td>83 Queen’s Road,</td>
<td>NEW LAMBTON. Tel. 57 1875.</td>
</tr>
<tr>
<td>Methodist</td>
<td>The Reverend M. B. Coleman, B.E., B.D.,</td>
<td>The Parsonage,</td>
<td>SHORTLAND. Tel. 55 8390.</td>
</tr>
</tbody>
</table>

COUNSELLING SERVICE

The Counselling Service assists students, prospective and enrolled, in a variety of ways. Most students, whatever their academic achievements, at one time or another need help in dealing with difficulties which arise during the course of their University lives. Although a somewhat new service in Universities, its existence is justified by the fact that at this University about one third of all students utilise it. Whether or not students do use the counselling service is entirely a matter for their own decision.

Students who have problems about their choice of course, or a change in their career plans, students who are worried about inadequate study methods or who are perturbed by personal difficulties, by nervous states and anxiety are invited to arrange an appointment with a Student Counsellor.

On request the Counsellors will conduct courses for the improvement of reading skills and tests of ability and personality.

“Study at the Tertiary Level”—the Counselling Department has produced a booklet specifically for students of this University, and this will be on sale at a nominal cost early in 1967.

Student Counsellors—S. G. Alley, B.A.(Syd.), A.S.T.C., M.A.Ps.S. (Top floor of Main Building at Shortland).

Tighe’s Hill: One of the Student Counsellors will be available for interviews in the Main Building (1st floor) on Thursday, 2 p.m.—8 p.m.

THE LIBRARY

The Library exists to acquire, preserve and make available for use books and other materials needed by the staff and students of the University. The Library will be housed ultimately, when the whole of the University has been transferred to the Shortland site, in a separate building being built next to the Union. Now, totalling approximately 110,000 volumes and made up of monographs, pamphlets, serials and microform sets, it is accommodated in temporary quarters at both Shortland and Tighe’s Hill. Facilities for the reproduction of articles or sections of books are available as are microcard and microfilm readers.

In both libraries there is an almost complete freedom of access to the collections and students are encouraged and aided to learn how to use, as soon as possible, the library and its contents. On registering as a reader the student is provided with a pamphlet outlining the resources of the library and procedure for borrowing.
The Shortland Library occupies the lower two floors of the northern end of the Arts-Administration Building. Hours of opening are:

- Monday — Friday: 8.30 a.m. to 9.30 p.m. (long vacation excepted)
- Saturday: 9.30 a.m. to 12.30 p.m. (all vacations excepted)

Long vacation: Monday, Wednesday, Friday: 9.00 a.m. to 5.00 p.m.
Tuesday and Thursday: 9.00 a.m. to 7.00 p.m.

The Library will be closed on public holidays.

The Tighes Hill library is located with the Technical College library on the first floor of the Clegg Building.

Hours of opening are:

- Monday — Friday: 9.00 a.m. to 9.30 p.m. (all vacations excepted)
- Vacations: Monday, Wednesday, Friday: 9.00 a.m. to 5.00 p.m.
- Tuesday and Thursday: 9.00 a.m. to 7.00 p.m.

The Library is closed on public holidays.

TRAVEL CONCESSIONS

The various transport authorities provide fare concessions for certain classes of students.

Application forms for these concessions may be obtained at the Students' Records Section, Main Building, Shortland.

Omnibus — Concessions are available to:

(a) students under 18 years of age irrespective of whether they are employed or receive income or remuneration,
(b) students between 18 and 30 years of age who are not in employment nor in receipt of any income or remuneration.

Note: Income or remuneration includes allowances paid to Colombo Plan students, Public Service trainees, etc., but does not include allowances paid to holders of Commonwealth Scholarships or Scholarships granted by the State Bursary Endowment Board.

Train —

(a) Periodical tickets are available during term time to full-time students not in employment nor in receipt of any remuneration.
(b) Daily concession fare tickets are available to part-time students, whether employed or otherwise, for the purpose of travelling to and from class held in connection with their course of instruction.
(c) Vacation travel concessions are available to students qualifying under (a) above.

Aircraft —

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

THE UNIVERSITY OF NEWCASTLE COMPANY

The University of Newcastle Company is the Citizen Military Force's Unit affiliated with your University. The Company was formed in 1957 as a Sub-Unit of the University of Technology Regiment which is now called the University of N.S.W. Regiment. The current strength of the Company is 100 and is rising.

The function of the Company is to train graduates and undergraduates for commissioned rank in the C.M.F. and the training is designed with this in view.

The training is done on an Infantry basis and consists of:

(a) An Annual Camp for three weeks in February.
(b) An optional camp of ten days in May.
(c) An optional camp of two weeks in December.
(d) Five weekend bivouacs a year.
(e) Parades on Friday nights of two and a half hours duration.

The training programme is designed to fit in with vacations, examinations, and deferred examinations and there is practically no commitment in the third term. Leave is available from activities where a good reason exists.

Enlistment in the Company is voluntary and is open to all graduates or undergraduates who are 17 years of age or over.

As a member of the University of Newcastle Company you are eligible for the following benefits:

- An opportunity to reach commissioned rank in 2-3 years.
- Tax-free pay for all training undertaken.
- Travelling expenses refunded.
- An alternative to 2 years full-time National Service.
- Opportunities for attendance at Regular Army courses and short time attachments to Army units in Malaysia, New Guinea or Vietnam.
- Free meals and accommodation at camps and bivouacs.
- Free Uniforms.

Enquiries regarding conditions of service, and enlistment procedure should be made at the Training Depot which is in King Street, Newcastle West, (opposite Birdwood Park). Phone No. 61 2121.

Officers and Staff:

- Officer Commanding: Capt. J. G. Raymond
- Second in Command: Lt. J. G. Digby
- Officers:
  - Capt. N. R. Watkins
  - Capt. M. J. Hough
  - Lt. F. S. O'Toole
  - Lt. R. McGregor
  - Lt. A. J. Shaw
  - Lt. T. R. O'Brien
  - Lt. B. G. Jordan
- Company Sergeant-Major: W02 N. G. Platts
- Full-time Staff: Sgt. K. B. Carmichael

THE UNIVERSITY OF NEWCASTLE SPORTS UNION

The Sports Union is the student organization responsible for promotion and control of sporting activities within the University. As a student you are automatically a member of the Sports Union. There are eighteen affiliated clubs — Athletics, Badminton, Men's Basketball, Women's Basketball, Boat, Cricket, Golf, Women's Gymnastics, Men's Hockey, Women's Hockey, Women's Rowing, Rugby, Sailing, Ski-ing, Soccer, Squash, Tennis, Weightlifting, most of which participate in local competitions and send teams to Inter-Varsity contests each year. Each club has a student representative on the Sports Union Committee, which meets monthly. The Executive Committee consists of the President, Vice-President, Secretary, Treasurer, a representative of the University Council, and the Amenities Officer. The Sports Union's annual income is derived from portion of your General Services Fee, to meet the cost of equipment, affiliation fees, Inter-Varsity trips, etc.

For outstanding individual performance in sport, the Sports Union awards "Blues" each year at the Annual "Blues" Dinner.
The number of constituent clubs is increasing continually, and you are urged to contact our Amenities Officer, Mr. Bradford, or one of the Executives for further information.

THE UNIVERSITY OF NEWCASTLE STUDENTS' ASSOCIATION

Included in the General Services Fee of the University is an amount payable to the Students' Association, a body to which all undergraduate members of the University must belong. Each year the governing body, known as the Students' Representative Council (SRC), is elected by the Association. Its functions are many and varied.

The SRC serves as the main liaison body between the students and the University and, as such, has a number of offices and committees in existence. Complaints and requests from members may be handled by the Library Office, the Welfare and Education Office or the Council as a whole. The committee with which most students come in contact is the Welfare and Education branch. Welfare work ranges over such topics as accommodation agencies, employment service (both vacation and other temporary work) and it is hoped that, in the near future, a health service will be established. Soon to come into operation is the second-hand book service. The Education branch conducts an education campaign (e.g. Newcastle seminars on education in 1966) and attempts, insofar as its resources allow, to study the local and national needs of education and participate in NUAUS activities in this regard.

The Papua-New Guinea committee is engaged in liaison work with a tertiary establishment in New Guinea and organises, on a local level, participants for work camps held in the territory over the long vacation.

One of the major ways in which the $6.00 membership fee is spent is in grants to affiliated clubs and societies, both of a cultural and social nature. To this end the Vice-President of the Association acts as Clubs and Societies Liaison Officer and, with his assistant, gives such assistance to affiliates within the competence of his office as they may from time to time require.

The SRC is also responsible for publishing the newspaper "OPUS" and the literary magazine "NIMROD" both of which will be seen around the campus at their time of publication.

The Association is a constituent member of the National Union of Australian University Students (NUAUS) and participates in conferences of this organisation and other activities such as the work camps, overseas student travel, education campaigns and the like.

Each year the SRC organises Autonomy Day—of this nothing need be said other than it is our equivalent of Commemoration or Foundation Day.

Every student is urged to take an active part in the functioning of the Association and enquiries may be made at the UNSA office, basement floor of the University Union.

NEWCASTLE UNIVERSITY UNION

The objects of the Union are to provide a common meeting ground and social centre for men and women who are members of the University; to promote the education and the intellectual culture of its members by debates and otherwise and, generally, to secure the co-operation of University men and women in furthering the interests of the University.

The Union maintains a fine building at Shortland which provides common room facilities for its members; a cafeteria; a coffee room; a meeting room; a reading room; a stationery shop catering for all members academic needs; the University Co-operative Bookshop and a Barber's Shop for men's and women's haircutting. The offices of the Students' Representative Council, Sports Union and the Students Counsellor are contained in the basement of the building. A common room is provided in the Main University building at Tighe's Hill and members are eligible to use the catering facilities of the Technical College Union.

Membership of the Union, obligatory for all registered students, is open to graduates, members of the University Council and the permanent staff of the University.

The conduct of the affairs of the Union is vested in the Board of Management composed of two members appointed by the University Council, two members elected by the graduates, six members elected by the Union members, two members appointed by the Students' Representative Council, two members elected by the Senior Common Room, and the Secretary/Manager. Elections for the Board of Management are held in April.

BOARD OF MANAGEMENT—1966/67

Mr. J. R. Crittenden: President
Mr. D. T. Kennedy: Vice-President
Mr. L. W. Harris: Hon. Treasurer
Mr. I. H. S. Irwin: Secretary/Manager
Mr. C. B. Belcher
Mr. K. G. Booth
Mr. W. G. Derkenne
Dr. L. K. Dyall
Miss N. Gollan
Mr. B. C. Humphries
Mr. J. A. Lambert
Mr. D. L. Marchoni
Mr. A. A. Morris
Mr. T. J. Smith
REGULATIONS

DEGREE OF BACHELOR OF ENGINEERING

1. A candidate for the degree of Bachelor of Engineering shall —
   (i) Comply with the requirements of admission.
   (ii) Follow the prescribed course of study in the appropriate Department and satisfy the examiners in the necessary subjects.
   (iii) Complete an approved programme of industrial training of not less than twenty-six weeks in the case of Civil, Mechanical and Industrial Engineering students and twenty weeks in the case of Electrical Engineering students. In general this training must be completed before 31st January in the year in which the degree is to be awarded.

2. During each year a student shall perform laboratory, drawing office and field work, attend demonstrations and excursions to such an extent and in such a manner as is prescribed from time to time by the Senate on the recommendation of the Faculty.

3. A student shall be required to complete the first year of the course in not more than two years. Re-enrolment thereafter will be governed by the general regulations of the Senate.

4. A student may be granted advanced standing by the Senate on the recommendation of the Faculty, but in each case a student must follow an approved course of study in this University for at least two years.

5. The degree shall be awarded in the pass or honours grade. Candidates for honours must take any extra subjects prescribed for the third year of the course and must obtain the permission of the Head of their Department before enrolling in the special course prescribed for honours students in the fourth year. Honours may be awarded in the following categories:
   - Honours Class I
   - Honours Class II
   - Honours Class III

   A student enrolled in the honours course who fails to reach the standard required for the award of Honours Class III may be awarded the degree of Bachelor of Engineering.

DEGREE OF BACHELOR OF SCIENCE (TECHNOLOGY)

The course leading to the award of the degree of Bachelor of Science (Technology) is normally programmed over six years of part-time study in the University whilst the student is employed in industry. The regulations governing the award of this degree are as follows:

1. A candidate for the degree of Bachelor of Science (Technology) shall —
   (i) comply with the requirements for admission.
   (ii) follow the prescribed course of study in the appropriate Department and pass the necessary examinations.
   (iii) complete an approved programme of industrial training over a period of not less than three years concurrently with attendance in the course.

2. During each year a student shall perform laboratory, drawing office and field work, attend demonstrations and excursions to such an extent and in such a manner as is prescribed from time to time by the Senate on the recommendation of the Academic Board of Studies and in addition undertake industrial training as approved by the Head of the Department.

3. A student shall be required to conform with the general rules relating to progression in University courses.

4. A student may be granted advanced standing by the Senate on the recommendation of the Admissions' Committee but in each case a student must follow an approved course for at least three years with a concurrent approved industrial training before being eligible for admission to the degree.

5. The degree of Bachelor of Science (Technology) shall not be awarded with honours, but may be awarded with merit.

6. Students enrolling in courses leading to the degree of Bachelor of Science (Technology) may be permitted to reduce the length of the course provided that —
   (i) they comply with the requirements of clause 1 (iii) of the regulations (completion of an approved programme of industrial training over a period of not less than three years concurrent with attendance in the course).
   (ii) they complete such additional academic work as may be prescribed by the Senate.

Note: Students who wish to take advantage of Clause (6) are advised that current University regulations allow a course pattern of two years part-time study followed by two years of full-time study, and then a final year part-time.

DEGREE OF MASTER OF ENGINEERING

1. An application to register as a candidate for the degree of Master of Engineering shall be made on the prescribed form which shall be lodged with the Dean of the Faculty, at least one full calendar month before the commencement of the term in which the candidate desires to register.

2. An applicant for registration for the degree of Master shall have been admitted to a Bachelor's degree in Engineering in the University of Newcastle or other approved University in the appropriate Department.

3. (i) In exceptional cases persons may be permitted to register as candidates for the degree of Master if they submit evidence of such academic and professional attainments as may be approved by the Senate.
   (ii) The registration of diplomates of the New South Wales Department of Technical Education as candidates for the degree of Master of Engineering shall be determined in each case by the Senate. Normally, such applicants shall be required to produce evidence of academic and professional progress over a period of five years from the time of gaining the diploma.

4. Notwithstanding any other provisions of these regulations the Senate may require an applicant to demonstrate his fitness for registration by carrying out such work and sitting for such examinations as the Senate may determine.

5. In every case, before permitting an applicant to register as a candidate, the Senate shall be satisfied that adequate supervision and facilities are available.
6. An applicant approved by the Senate shall register in one of the following categories:
   (i) Student in full-time attendance at the University.
   (ii) Student in part-time attendance at the University.
   (iii) Student working externally to the University.

7. An approved applicant shall be required to pay the undermentioned fees:
   (i) registration fee of $4.
   (ii) course and supervision fee (full-time) $96, (part-time) $48.
   (iii) general services fee (which includes an annual contribution to the University Library of $10) — $42.
   (iv) Union membership fee — $12.
   (v) final examination fee — $30.
   Fees shall be paid in advance.

8. (i) Every candidate for the degree shall be required to carry out a programme of advanced study, to take such examinations and to perform such other work as may be prescribed by the Senate. The programme shall include the preparation and submission of a thesis embodying the results of an original investigation or design. The candidate may submit also for examination any work he has published, whether or not such work is related to the thesis.
   (ii) The investigation or design and other work as provided in paragraph 8(i) shall be conducted under the direction of a supervisor appointed by the Senate or under such conditions as the Senate may determine.
   (iii) Every candidate shall submit three copies of the thesis as provided under paragraph 8(i). All copies of the thesis shall be in double-spaced typescript, shall include a summary of approximately 200 words, and a certificate signed by the candidate to the effect that the work has not been submitted for a higher degree to any other university or institution. The original copy of the thesis for deposit in the Library shall be prepared and bound in a form approved by the University. The other two copies of the thesis shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement.
   (iv) It shall be understood that the University retains the three copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copy-right Act (1912-1950) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

9. No candidate shall be considered for the award of the degree until the lapse of six complete terms from the date from which the registration becomes effective, save that in the case of a full-time candidate who has obtained the degree of Bachelor with Honours or may have had previous research experience, this period may, with the approval of the Senate be reduced by not more than three terms. For each candidate there shall be two examiners appointed by the Senate, one of whom shall, if possible, be an external examiner.

DEGREE OF DOCTOR OF PHILOSOPHY

1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Senate to a candidate who has made an important contribution to knowledge and who has satisfied the following By-laws and Regulations made in accordance with these By-laws.

Qualifications

2. A candidate for registration for the degree of Ph.D. shall:
   (i) hold an honours degree from the University of Newcastle; or
   (ii) hold an honours degree of equivalent standing from any other approved university; or
   (iii) if he holds a degree without honours from the University of Newcastle or an approved university, have achieved by subsequent work and study a standard recognised by the Senate as equivalent to honours; or
   (iv) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Senate.

3. When the Senate is not satisfied with the qualifications submitted by a candidate, the Senate may require him, before he is permitted to register, to undergo such examination or carry out such work as the Senate may prescribe.

Registration

4. A candidate for registration for a course of study leading to the degree of Ph.D. shall—
   (i) apply to the Dean of the Faculty on the prescribed form at least one calendar month before the commencement of the term in which he desires to register; and
   (ii) submit with his application a certificate from the Head of the Department in which he proposes to study stating that the candidate is a fit person to undertake a course of study or research leading to the Ph.D. degree and that the Department is willing to undertake the responsibility of supervising the work of the candidate and of reporting to the Senate at the end of the course on the merits of the candidate's performance in the prescribed course of study.

Course of Study

5. Subsequent to registration the candidate shall pursue a course of advanced study and research for at least nine academic terms, save that —
   (i) a candidate who is not fully engaged in research work for his degree will be required to satisfy the Senate on the amount of time he can devote to research work for the degree; and he may not proceed to the degree before the expiration of ten academic terms from the date of registration as a candidate;
   (ii) any candidate who before registration was engaged upon research to the satisfaction of the Senate, may be exempted from three academic terms.

6. A candidate shall present himself for examination not later than fifteen academic terms from the date of his registration, unless special permission for an extension of time be granted by the Senate.

7. The course, other than field work, must be carried out in a Faculty of the University, under the direction of a supervisor appointed by the Senate, or under such conditions as the Senate may determine, save that a candidate may be granted special permission by the Senate to spend a period of not more than three academic terms in research at another institution approved by the Senate.

8. Not later than three academic terms after registration the candidate shall submit the subject of his thesis for approval by the Senate. After the subject has been approved it may not be changed except with the permission of the Senate.

9. A candidate may be required to attend a formal course of study appropriate to his work.
Thesis

10. On completing his course of study every candidate must submit a thesis which complies with the following requirements —
   (i) the greater proportion of the work described must have been completed subsequent to registration for the Ph.D. degree.
   (ii) It must be a distinct contribution to the knowledge of the subject.
   (iii) It must be written in English and reach a satisfactory standard of literary presentation.

11. The thesis must consist of the candidate's own account of his research. In special cases work done conjointly with other persons may be accepted, provided the Senate is satisfied on the candidate's part in the joint research.

12. Every candidate shall be required to submit with his thesis a short abstract of the thesis comprising not more than 300 words.

13. A candidate may not submit as the main content of his thesis any work or material which he has previously submitted for a university degree or other similar award.

14. It shall be understood that the University retains the four copies of the thesis and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act (1912-1950) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

Entry for Examination

15. The candidate shall give in writing two months' notice of his intention to submit his thesis and such notice shall be accompanied by the appropriate fee.

16. Four copies of the thesis shall be submitted together with a certificate from the supervisor that the candidate has completed the course of study prescribed in his case.

17. The thesis shall be in double-spaced typescript. The original copy for deposit in the Library shall be prepared and bound in a form approved by the University. The other three copies shall be bound in such manner as allows their transmission to the examiners without possibility of disarrangement.

18. The candidate may also submit as separate supporting documents any work he has published, whether or not it bears on the subject of the thesis.

19. The Senate shall appoint the examiners, one of whom shall normally be an external examiner.

20. After the examiners have read the thesis they may —
   (i) without further test recommend the candidate for rejection;
   (ii) request additional work on the thesis before proceeding further with the examination.

21. If the thesis reaches the required standard, the examiners shall arrange for the candidate to be examined orally, and, at their discretion, by written papers and/or practical examinations on the subject of the thesis and/or subjects relevant thereto.

22. If the thesis is adequate but the candidate fails to satisfy the examiners at the oral or other examinations, the examiners may recommend the University to permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

23. At the conclusion of the examination, the examiners will submit to the Senate a concise report on the merits of the thesis and on the examination results.

Fees

24. The fee payable for an examination qualifying for registration shall be $10.

25. An approved candidate shall pay —
   (i) a registration fee of $4.
   (ii) a supervision fee of $96 per annum.
   (iii) general services fee which includes an annual contribution of $10 to the University Library — $42.
   (iv) Union membership fee — $12.
   (v) final examination and graduation fee — $42.

26. Fee shall be paid in advance.
Civil Engineering is the application of science to the improvement of the community's environment. It is concerned with the design and construction of water supply and conservation projects, hydro-electric development, roads, railways, bridges, tunnels, large buildings, 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 includes the study of science and 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 largely managerial and organisational in their nature.

The courses in Civil Engineering are arranged so that all students receive training in the basic principles of mathematics and science, and in the fundamentals of engineering applications of such work to surveying, hydraulics, foundation engineering, structural design, and constructional work in the field. Ancillary subjects from other branches of engineering are also included, such as electrical engineering and mechanical engineering.

During the course each full-time student is required to complete 26 weeks of industrial training, and to submit detailed reports on each training period. In the final year, the full-time student prepares a thesis covering some aspect of supervised research, and delivers a seminar paper on some selected topic. Additional study is prescribed in the fourth year for those students reading for the degree of Bachelor of Engineering with Honours.

### BACHELOR OF ENGINEERING

- **YEAR I**
  - (30 weeks full-time course)
  - **Hours per week**
    - **Term 1**
      - **Physics I**
        - 6
      - **Chemistry I**
        - 6
      - **Mathematics I**
        - 6
      - **Engineering I**
        - 6
    - **Term 2**
      - 24
    - **Term 3**
      - 24

- **YEAR II**
  - (30 weeks full-time course)
  - **Hours per week**
    - **Term 1**
      - **Physics III**
        - 4½
      - **Descriptive Geometry**
        - 2
      - **5.501: Fluid Mechanics**
        - 2
      - **5.701: Thermodynamics**
        - 2
      - **Geology II**
        - 3
      - **8.112: Materials and Structures**
        - 3
      - **8.421: Surveying**
        - 2½
    - **Term 2**
      - **Mathematics II**
        - 4
    - **Term 3**
      - 23
### YEAR III
(24 weeks full-time course)

#### Hours per week

<table>
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<td>8.611S: Civil Engineering</td>
<td>2½</td>
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<tr>
<td>6.801S: Electrical Engineering</td>
<td>4</td>
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<tr>
<td>8.122S: Structures</td>
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<tr>
<td>8.221S: Engineering Materials</td>
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<td>Seminar</td>
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#### YEAR IV
(24 weeks full-time course)

#### Hours per week

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<td>8.142S: Engineering Computations</td>
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#### Honours Additional.

#### Hours per week

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### BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING
COMBINED COURSE

#### YEAR I
(30 weeks full-time course)

#### Hours per week

<table>
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<tr>
<th>Course</th>
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#### YEAR II
(30 weeks full-time course)

#### Hours per week

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<td>Descriptive Geometry</td>
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<td>5.501 Fluid Mechanics</td>
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#### YEAR III
(30 weeks full-time course)

#### Hours per week

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### YEAR V
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<td>8.522S Hydraulics</td>
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Honours Additional:

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<th>Term 2</th>
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<tr>
<td>Mathematics</td>
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<tr>
<td>3 from Structures, Hydraulics, Surveying or Materials</td>
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### BACHELOR OF SCIENCE (TECHNOLOGY)

#### STAGE I
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Course</th>
<th>Term 1</th>
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<tr>
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#### STAGE II
(30 weeks part-time course)

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<td>Chemistry I</td>
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#### STAGE III
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<td>8.421: Surveying</td>
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<td>Mathematics II Part 1</td>
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#### STAGE IV
(30 weeks part-time course)

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**STAGE V**
(30 weeks part-time course)

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<tr>
<td>8.521: Hydraulics</td>
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<tr>
<td>8.131: Structures</td>
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<td>8.422: Surveying</td>
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**STAGE VI**
(30 weeks part-time course)

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<tbody>
<tr>
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<tr>
<td>6.801: Electrical Engineering</td>
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<tr>
<td>8.141: Engineering Computations</td>
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<tr>
<td>8.222: Engineering Materials</td>
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<tr>
<td>8.611: Civil Engineering</td>
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</tbody>
</table>

† Applies to students who have not done this subject in Stage IV.

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**BACHELOR OF SCIENCE (TECHNOLOGY)**

**ACCELERATED COURSE**

The student reading for the degree of B.Sc. (Tech.) in Civil Engineering may reduce the time required to complete the academic requirements by undertaking the following programme of combined part-time/full-time study.

Stage 1 — 30 weeks Part-time Course (as for Stage 1 B.Sc.(Tech.) Course above).

Stage 2 — 30 weeks Part-time Course (as for Stage 2 B.Sc.(Tech.) Course above).

Stage 3A — 30 weeks Full-time Course (as for Year II of full-time B.E. Course above).

Stage 4A — 24 weeks Full-time Course (as for Year III of full-time B.E. Course above).

Stage 5A — 30 weeks Part-time Course (as set out below).

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

<table>
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</tr>
<tr>
<td>8.131: Structures</td>
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<td>8.141: Engineering Computations</td>
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<td>8.521: Hydraulics</td>
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<td>8.612: Civil Engineering</td>
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<tr>
<td>8.131: Structures</td>
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<tr>
<td>8.141: Engineering Computations</td>
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<td>8.521: Hydraulics</td>
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† Applies to students who have not done this subject in Stage IV.
NORMAL PRE-REQUISITES

Below is set out the normal pattern of pre-requisites in B.Sc. (Tech.) course in Civil Engineering:

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<thead>
<tr>
<th>Stage</th>
<th>SUBJECT</th>
<th>PRE-REQUISITES</th>
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<tr>
<td>III</td>
<td>Physics IIT</td>
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<td>Mathematics I; Physics I; Engineering I</td>
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<td>8.421 Surveying</td>
<td>Mathematics I; Physics I</td>
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<tr>
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<td>5.701 Thermodynamics</td>
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<td>5.501 Fluid Mechanics</td>
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<td>6.801 Electrical Engineering</td>
<td>8.422 Surveying</td>
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SUBJECTS IN THE DEPARTMENT OF CIVIL ENGINEERING

8.112 AND 8.112S MATERIALS AND STRUCTURES

90 hours, comprising 45 hours' lectures, 45 hours' tutorial and laboratory.

Theory of Structures

Moduli of elasticity, simple stress and strain. Stresses in non-uniform bars, compound bars, temperature stresses. Thin shells.


Stresses due to axial force, bending moment (brief treatment of non-uniplanar bending), shear force, and torsion (circular sections only).

Deformation due to axial force, shear force (brief mention), bending moment and torsion. Relationship between bending moment, slope and deflection. Differential equations of simple beam theory. Area moment theorems. Fixed ended beams.

Strain energy due to axial force, shear force, bending moment and torsion. Deflections at a single load. Shock loads.

Theory of centrally loaded column (Euler's formula) and eccentrically loaded columns (secant formula).

Properties of Materials


Laboratory work including tension, compression, hardness and impact tests with metals, experiments in flexure and torsion.

Prescribed book:


Reference books:


8.121 STRUCTURES

90 hours, comprising 45 hours' lectures, 45 hours' tutorials.

Relation between design, analysis and proportioning. Brief review of design principles — dead and live loads; equivalent uniform loads, factors of safety; load factors. Structural hazards — excessive deflection, instability, fire resistance, corrosion, decay.
Factors affecting design — erection and transport, availability of material and plant.


**Prescribed books:**
- Ferguson, P. M., *Reinforced Concrete Fundamentals*. Wiley.
- Bresler, B. and Lin, T., *Design of Steel Structures*. Wiley.
- *Rolled Steel Sections — Properties and General Data* — B.H.P. Co. Ltd.

**Reference books:**
- Lothers, J. E., *Design in Structural Steel*. Prentice-Hall.

**8.122S STRUCTURES**

144 hours, comprising 72 hours' lectures, 72 hours' tutorials.

- Relation between design, analysis and proportioning. Brief review of design principles — dead and live loads, equivalent uniform loads, factors of safety; load factors.
- Design of columns and struts, plated I-section columns. Brief mention of Perry-Robertson and straight line formulae.
- Reinforced concrete design applied to statically determinate structures. Simple beams and slabs, tee-beams, doubly reinforced beams, concentrically and eccentrically loaded columns. Column footings.
- Introduction to three-dimensional statics. Composition and resolution of forces, moment of an oblique force about any axis, equations of equilibrium. Tension coefficients.
- Strain energy methods for the solution of one-fold statically indeterminate rigid frame and pin-jointed truss problems. Determination of deflections using unit load method; Castigliano's theorems. Williot-Mohr diagrams.

**Prescribed and Reference books:**
- As for 8.121 Structures, plus.

**8.131 STRUCTURES**

120 hours, comprising 60 hours of lectures, 60 hours of tutorials.

- Influence lines for statically determinate structures. Strain energy theory, application to solution of statically indeterminate structures, rigid frames and pin-jointed truss problems. Deflections by unit load method. Williot-Mohr diagram for deflections of trusses. Solution of rigid frames by slope deflection and moment distribution, including the problem of sidesway. Analysis of arches, three pinned, two pinned and fixed ended arches.

**Prescribed book and reference book:**
- As for 8.121 Structures, plus.

**8.132S STRUCTURES**

120 hours, comprising 48 hours of lectures, 72 hours of tutorials.

- Analysis of rigid frames by slope deflection and moment distribution. Treatment of sidesway.
- Analysis of arches.
- Non-uniplanar bending. Shear centre. Torsion of non-circular sections.
- Retaining walls and small dams.
- Design of continuous structures in reinforced concrete.
- Continuous beams and slabs, simple continuous frames.
- Introduction to model analysis. Muller-Breslau principle, spline models, Begg's apparatus.

**Prescribed books:**
- As for 8.131 Structures, plus.

**Reference books:**
8.133 AND 8.1335 STRUCTURES
(for Mechanical Engineers)
72 hours, comprising 36 hours' lectures and 36 hours' tutorials.
Prescribed and reference books:

8.141 ENGINEERING COMPUTATIONS
30 hours, comprising 20 hours' lectures, 10 hours' tutorials.
Construction of nomograms by determinants.
Introduction to FORTRAN programming.
Solution of linear algebraic equations by Gauss and Crout — reductions, iteration and relaxation.
Introduction to finite differences and their applications.
Numerical solution of ordinary differential equations — initial value, boundary value and characteristic value problems.
Prescribed book:
Reference books:

8.1425 ENGINEERING COMPUTATIONS
48 hours, comprising 24 hours' lectures, 24 hours tutorials.
Construction of nomograms by determinants.
FORTRAN programming, with applications to engineering calculations.
Solution of linear algebraic equations by Gauss and Crout — reductions, iteration and relaxation.
Introduction to finite differences and their applications. Difference equations.
Numerical solution of ordinary differential equations — initial value, boundary value and characteristic value problems.
Numerical solution of linear partial differential equations — boundary value and characteristic value problems.
Prescribed book:
Reference books:

8.211 MATERIALS FOR ARCHITECTS
(A materials technology course for students in Architecture comprising the syllabus for Building Science IIB)

Section 1. General Materials Technology
A course comprising 15 hours' lectures, 15 hours' laboratory work. An introductory course on the mechanics of materials. The load deformation behaviour of engineering materials is considered with reference to the use of materials in structures, and to materials laboratory practice. Special emphasis is made of the need for efficient utilisation of materials with reference to strength, durability, appearance and economy.

Section 2. Concrete Technology
This section consists of 10 hours of lectures and 20 hours of laboratory work serving as an introduction to Concrete Technology, as follows:
Principal types of cements, their properties and simple testing; cement handling and storage. Concrete aggregates, characteristics, grading and testing. Admixtures. Factors affecting concrete properties. Basic concrete mix requirements and mix design methods. The manufacture of concrete and job control.
Laboratory work includes the testing of cement, aggregate and concrete, and the examination of concrete mix design techniques, workability, yield, and air entrainment.

8.221 AND 8.2215 ENGINEERING MATERIALS
Total hours: 132 (approximately)
(a) Concrete Technology (48 hours, comprising 24 hours' lectures, 24 hours' laboratory).
Materials used in modern concretes, physical and chemical properties of cements; production, testing and selection of aggregates; pozzolans, admixtures. Workability, strength and other properties of concrete and factors affecting these. Target strengths and the design and proportioning of mixes.
Laboratory work — Cement and aggregate tests; examination of factors influencing workability and strength properties of concrete; mix design procedure.

**Prescribed book:**

**Reference books:**
Taylor, W. H., *Concrete Technology and Practice*. Angus and Robertson.
S.A.A. Codes A.2 (cement) A.77 (aggregates) A.100-110 (concrete) CA.2 (building code).

(b) **Soil Mechanics** (48 hours, comprising 24 hours' lectures, 24 hours' laboratory).

A course in theoretical soil mechanics covering mechanical and physical descriptions; permeability and capillarity; compressibility; shear strength; lateral pressure including design of retaining walls; stability of slopes; water content-density relationships.

Laboratory work — identification of soils and standard tests relating to the phenomena discussed in lectures.

**Prescribed book:**

**Reference books:**

**References:**

(c) **Metallurgy** (36 hours, comprising 30 hours' lectures, 6 hours' demonstrations).
The atomic structure of metals. The grain structure of metals; origin; effects of manufacturing processes. Structures of alloys — theory. Structure, properties and heat treatment of commercially important alloys, based on aluminium, copper and iron in particular. The selection and properties of structural steels. Corrosion.

Laboratory work — Experiments and demonstrations illustrating the lecture course.

**Prescribed book:**
Rollason, *Metallurgy for Engineers*.

**Reference book:**
Dlan, *Principles of Physical Metallurgy*.

### 8.222 ENGINEERING MATERIALS

**Total hours:** 60

(a) **Concrete Technology, etc.** (30 hours, comprising 20 hours' lectures, 10 hours' laboratory).

Significance and measurement of permeability, durability, elastic modulus, creep and other concrete properties; factors affecting these and concrete volume changes. Design and proportioning of special concretes. Manufacture and field control.

Wood technology: types, mechanical properties and structure of timber. Attack and preservation; manufactured units.

Laboratory work — Examination of special concretes.

**Prescribed and reference books:**
As for 8.221 and 8.221S Engineering Materials.

(b) **Soil Mechanics** (30 hours of lectures).

Studies of theoretical and applied sections of soil mechanics relating to foundations and earth dams.

**Prescribed and reference books:**
As for 8.223S Engineering Materials.

### 8.223S ENGINEERING MATERIALS

**Total hours:** 132

(a) **Concrete Technology, etc.** (44 hours, comprising 24 hours' lectures, 20 hours' laboratory).

Significance and measurement of permeability, durability, elastic modulus, creep and other concrete properties; factors affecting these and concrete volume change. Design and proportioning of special concretes, for high strength, mass and lightweight. Manufacture and field control.

Laboratory work — Examination of special concretes; design, manufacture and testing of reinforced concrete beams to meet particular requirements.

**Prescribed and reference books:**
As for 8.221 and 8.221S Engineering Materials.

(b) **Soil Mechanics** (44 hours, comprising 24 hours' lectures, 20 hours' laboratory).

A course in soil engineering comprising site investigation; site pre-loading; foundations; earth dams; soil technology; tunnels and arching; rock mechanics.

Laboratory work — Shear testing and other advanced testing. One field experiment.

**Prescribed book:**

**Reference books:**
*Geotechnique*, Institution of Civil Engineers (London).

(c) **Properties of Materials** (44 hours, comprising 24 hours' lectures, 20 hours' laboratory).

Elastic and inelastic behaviour of materials; theories of failure; design factors. Non-destructive test procedures. Experimental stress analysis methods.
Wood technology and miscellaneous materials; mechanical properties and structure of timber. Attack and preservation; manufactured units. Properties and use of structural aluminium alloys. Structural clay products; special laminates and plastics.

Laboratory work includes tests on timbers and wires, creep experiments and work with wire resistance strain gauges.

Prescribed book:

Reference book:
Hetenyi, M., Handbook of Experimental Stress Analysis. Wiley.


8.411 SURVEYING
(A course of 30 hours' lectures and field work for Architecture students)


Reference book:

8.421 ENGINEERING SURVEYING
72 hours, comprising 36 hours' lectures and 36 hours' field work.

History and development of surveying; types of survey; introduction to errors. Linear measurement, chaining and chainage corrections; accuracy. Chain surveys. Surveying instruments. The level, differential levelling; errors. Grading; volumes of earthworks; prismatical and mean end area formulae. Contouring; use of mass diagram. Traversing; the compass; the theodolite. Misclose, adjustment of traverses. Calculation of areas. Setting out; horizontal circular curves. Tacheometry; stadia theory and formulae. The plane table. Nature, causes and classes of errors of measurement, linear and angular.

A survey camp of one week in Third Term is part of this course.

Prescribed book:

Von Vega, Baron, G., Seven Place Logarithmic Tables of Numbers and Trigonometrical Functions. Hafner.

Reference book:
Clark, D., Plane and Geodetic Surveying. Vol. II. Constable.

8.422 ENGINEERING SURVEYING
30 hours of lectures and 15 hours of field work.


A survey camp of one week in Third Term is part of this course.

Prescribed book:

Reference books:

8.423S ENGINEERING SURVEYING
72 hours, comprising 36 hours' lectures and 36 hours of field work.

Geodetic surveying, implications and instruments used. Adjustments. Control surveys, horizontal control by triangulation, by baseline measurement or by traversing. Vertical control by differential levelling, trigonometric or barometric levelling. Spherical trigonometry. Elementary astronomy; solar and stellar observations; latitude, time and azimuth. Setting out of engineering works; curves; transition curves. Introduction of the theory of map projection.

Elements of photogrammetry; photo-interpretation.

Engineering computations; centre point quadrilateral, strength of figures. Adjustment of networks, baselines.

Outline of survey laws and regulations.

A survey camp of one week in Third Term is part of this course.

Prescribed books and reference books:
As for 8.422 Engineering Surveying.

8.521 HYDRAULICS
60 hours, comprising 30 hours' lectures, 30 hours' tutorial and laboratory.

Dimensional analysis, hydraulic model theory, surface resistance in flow in pipes and channels.

Pipe networks, waterhammer. Channel flow, steady non-uniform flow.

Flow measurement.

Hydraulic machinery, characteristic curves.

Graphical flow nets, percolation.

Prescribed books:
As for 5.501 Fluid Mechanics.


Reference books:
Rouse, H., Engineering Hydraulics. Wiley.

8.522S HYDRAULICS
72 hours, comprising 36 hours' lectures, 36 hours' tutorial and laboratory.

Dimensional analysis, hydraulic model theory, scale effect, distorted models. Fluid turbulence, velocity distribution, surface resistance, in flow past plane boundaries and in pipes and channels.

Hydraulic machinery, radial and axial flow, characteristic curves, cavitation.

Potential flow, flow nests, percolation.

Prescribed and reference books:
As for 8.521 Hydraulics.

8.611 AND 8.611S CIVIL ENGINEERING

(Total hours — 60)

(a) Public Health Engineering (24 hours of lectures).
Processes of decomposition and decay; chemical and biochemical measurement of degree of pollution; B.O.D.; rates of biochemical oxidation; basic principles of the treatment of polluted waters.

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

(b) Engineering Hydrology (36 hours of lectures).
A basic course in Engineering Hydrology dealing with principles and modern techniques. Topics covered are: Meteorology, climatology, evaporation, analysis of hydrologic data, stream gauging, the runoff process, infiltration, design storm synthesis, unitgraphs, synthetic unitgraphs, flood frequency studies, rational method, urban drainage design, streamflow routing, water balance, water losses, rainfall runoff relationships, stream flow correlations, storage determination, groundwater.

Prescribed books:
Australian Rainfall and Runoff. Institution of Engineers, Australia.

Reference books:

8.612 CIVIL ENGINEERING

Total Hours: 60

(a) Road Engineering (20 hours of lectures).
Road location and surveys under urban and rural conditions, road design standards, geometrical design, road alignment, design of curves and intersections; types of functions of pavements. Concrete, bituminous and stabilised construction; culverts, road plant. Pavement thickness. Road maintenance. Urban stormwater drainage. Economic analysis of routes and schemes.

(b) Engineering Construction and Administration (35 hours of lectures).
Construction plant and equipment; compressed air, drilling and tunnel equipment, earthmoving plant, hoisting and conveying equipment, pumping and pile-driving plant, workshop plant. Construction methods; earthworks, foundations, coffer-dams, caissons, piling, steel, timber, and concrete construction. Prestressed concrete, bridges, wharves, dams, pipelines and multi-storeyed buildings.

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

Prescribed books:
Ryan, P. W. S., Engineering Administration. Angus and Robertson.

Reference book:

(c) Irrigation Engineering (5 hours of lectures).
Natural and artificial irrigation; sources of water, water requirements, methods of application to land. Soil deterioration. Investigation and design of irrigation systems, water metering. Maintenance and operation of irrigation systems.

8.613 AND 8.613S CIVIL ENGINEERING

Total hours: 108

(a) Roads and Railway Engineering (30 hours of lectures).
Road location and surveys under urban and rural conditions. Road design standards, geometrical design, road alignment, design of curves and intersections; types and functions of pavements. Concrete, bituminous and stabilised construction; culverts, road plant. Pavement thickness. Road maintenance. Urban stormwater drainage. Economic analysis of routes and schemes.

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

(b) Irrigation, Hydro-electric, and Harbours and Rivers Engineering (30 hours of lectures).
Natural and artificial irrigation; sources of water, water requirements, methods of application to land. Soil deterioration. Investigation and design of irrigation systems, water metering. Maintenance and operation of irrigation systems.

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

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

(c) Engineering Construction and Administration (58 hours of lectures).

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

Prescribed and reference books:
As for 8.612 Civil Engineering (b) Engineering Construction and Administration.
Essentially the mechanical engineer is concerned with the creative use of materials, motion and energy. He is usually associated with some aspect of the production and use of machinery. The courses in mechanical engineering develop from basic subjects, through those of an applied nature to reach the professional level in such areas as design, thermodynamics, fluid mechanics and automatic control.

Course work is organised into lectures and tutorial classes, together with laboratory work to introduce students to the practical problems of equipment. Courses of study currently available in the Department are:

(i) BACHELOR OF ENGINEERING degree course comprising four years of full time study. In this course students are encouraged to gain as much industrial experience as possible by working in industry during all long vacations. There is a minimum requirement of 28 weeks of such experience, the first eight weeks (between second and third years) in engineering workshops, and the remaining twenty weeks (between third and fourth years) in an engineering drawing office.

The course is conducted on two levels — pass and honours. For those students reading for the B.E. with honours degree, additional and alternative studies are prescribed as detailed in the course outlines.

(ii) BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING degree course comprising five years of full-time study in order to qualify simultaneously for two degrees. Industrial experience requirement is the same as for (i) above, and the course is similar to (i) with additional Mathematics and Physics subjects.

(iii) BACHELOR OF SCIENCE (Tech.) degree course in Mechanical Engineering, comprising six years of part-time study, during the whole of which time the student is normally employed in suitable industry. A minimum of three years of suitable concurrent industrial experience is required. Generally the student attends University one full day per week and two or three evenings.

The early stages of this course are co-ordinated with the early years of the full-time course, so that students may apply to change from one course to the other.

(iv) BACHELOR OF SCIENCE (Tech.) degree course in Industrial Engineering, comprising six years of part-time study as in (iii) above. The first three stages, which are similar to those in the Mechanical Engineering course (iii) above are currently available. Students wishing to proceed to this degree should, preferably before commencing the third stage, enquire from the Head of Department regarding arrangements for completing the final stages of the course.

(v) POST GRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING. This is a two-year part-time course for graduates in any branch of engineering with appropriate experience or for persons otherwise acceptably qualified, leading to the award of a post-graduate diploma in Industrial Engineering.

Those wishing to enrol in this course should contact the Head of Department for further details.
### YEAR III
(24 weeks full-time course)

<table>
<thead>
<tr>
<th>Course</th>
<th>Term 1</th>
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<th>Term 3</th>
</tr>
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<tbody>
<tr>
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<td>5</td>
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<tr>
<td>Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.204S: Mechanical Technology</td>
<td>2</td>
<td>2</td>
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<tr>
<td>5.302S: Theory of Machines</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.502S: Fluid Mechanics</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.702S: Thermodynamics</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>6.801S: Electrical Engineering</td>
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<td>4</td>
</tr>
<tr>
<td>8.133S: Structures</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>8.142S: Engineering Computations</td>
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<td>2</td>
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<tr>
<td>Seminar</td>
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<td>Hours per week</td>
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Honours Additional:
Mathematics (Mechanical Engineering III) 2 2 2

### YEAR IV
(24 weeks full-time course)

<table>
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<tr>
<th>Course</th>
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<tbody>
<tr>
<td>5.102S: Mechanical Engineering</td>
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<td>Design</td>
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<td>5.201S: Auto Control</td>
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<td>5.304S: Theory of Machines</td>
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<td>1</td>
<td>1</td>
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<td>5.503S: Fluid Mechanics</td>
<td>2</td>
<td>2</td>
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<tr>
<td>5.703S: Thermodynamics</td>
<td></td>
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<tr>
<td>6.802S: Electrical Engineering</td>
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<tr>
<td>18.121S: Engineering Administration</td>
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Degree candidates only.

### YEAR V
(30 weeks full-time course)

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<th>Term 3</th>
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<td>Design</td>
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<tr>
<td>5.305S Theory of Machines</td>
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<td>5.322S Auto Control</td>
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<tr>
<td>5.601S Mechanical Engineering</td>
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<tr>
<td>(Mechanical Engineering IV)</td>
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<tr>
<td>6.802S Electrical Engineering</td>
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Degree with honour candidates only.

### YEAR VI
(30 weeks full-time course)

<table>
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<td>Physics II</td>
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<td>Pure Mathematics II</td>
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<td>Descriptive Geometry</td>
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<td>5.501 Mechanical Engineering</td>
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<td>5.701 Thermodynamics</td>
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YEAR IV
(24 weeks full-time course)

<table>
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<th>Term 3</th>
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<tbody>
<tr>
<td>5.101S Mechanical Engineering Design</td>
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</tr>
<tr>
<td>5.204S Mechanical Technology</td>
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<tr>
<td>5.302S Theory of Machines</td>
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<tr>
<td>5.502S Fluid Mechanics</td>
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</tr>
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<td>5.702S Thermodynamics</td>
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<td>3</td>
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</tr>
<tr>
<td>6.801S Electrical Engineering</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>8.133S Structures</td>
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<td>8.142S Engineering Computations</td>
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<tr>
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Honours Additional:

Mathematics
(Mechanical Engineering III) 2 2 2

YEAR V
(30 weeks full-time course)

Degree with Honours candidates only.

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<thead>
<tr>
<th>Course</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
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<tbody>
<tr>
<td>5.102S Mechanical Engineering Design</td>
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</tr>
<tr>
<td>5.305S Theory of Machines</td>
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</tr>
<tr>
<td>5.322S Auto Control</td>
<td>3</td>
<td>3</td>
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</tr>
<tr>
<td>5.601S Mechanical Engineering</td>
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<td>6</td>
</tr>
<tr>
<td>6.802S Electrical Engineering</td>
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</tr>
<tr>
<td>Honours Mathematics</td>
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<tr>
<td>(Mechanical Engineering IV)</td>
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<tr>
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<td><strong>Total</strong></td>
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YEAR V
(24 weeks full-time course)

Pass Degree candidates only.

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<tr>
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<tbody>
<tr>
<td>5.102S Mechanical Engineering Design</td>
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<td>3½</td>
<td>3½</td>
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<tr>
<td>5.321S Auto Control</td>
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<td>1½</td>
<td>1½</td>
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<tr>
<td>5.304S Theory of Machines</td>
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<td>1</td>
</tr>
<tr>
<td>5.503S Fluid Mechanics</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.703S Thermodynamics</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6.802S Electrical Engineering</td>
<td>3</td>
<td>3</td>
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</tr>
<tr>
<td>18.121S Engineering Administration</td>
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<tr>
<td>Mechanical Seminar</td>
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<td><strong>Total</strong></td>
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**BACHELOR OF SCIENCE (Technology)**

**STAGE I**  
(30 weeks part-time course)

<table>
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<tr>
<th>Course</th>
<th>Hours per week</th>
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<td><strong>Term 1</strong></td>
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<tr>
<td><strong>Term 2</strong></td>
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<tr>
<td><strong>Term 3</strong></td>
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**STAGE II**  
(30 weeks part-time course)

<table>
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<td><strong>Term 2</strong></td>
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<td><strong>Term 3</strong></td>
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**STAGE III**  
(30 weeks part-time course)

<table>
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<tr>
<td><strong>Chemistry I</strong></td>
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<tr>
<td><strong>Descriptive Geometry</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Materials and Structures</strong></td>
<td>3</td>
</tr>
<tr>
<td><strong>Materials Science</strong></td>
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<td><strong>Mathematics II Part I</strong></td>
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**STAGE IV**  
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td><strong>5.501: Fluid Mechanics</strong></td>
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<tr>
<td><strong>8.133: Structures</strong></td>
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<tr>
<td><strong>5.202: Mechanical Technology</strong></td>
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<td><strong>5.701: Thermodynamics</strong></td>
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<tr>
<td><strong>Mathematics II Part II</strong></td>
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<td><strong>Seminar</strong></td>
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**STAGE V**  
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<table>
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<tr>
<td><strong>5.101: Mechanical Engineering Design</strong></td>
<td>4</td>
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<tr>
<td><strong>5.302: Theory of Machines</strong></td>
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<td><strong>5.204: Mechanical Technology</strong></td>
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<td><strong>6.801: Electrical Engineering</strong></td>
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**STAGE VI**  
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td><strong>5.102: Mechanical Engineering Design</strong></td>
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<tr>
<td><strong>5.321: Auto Control</strong></td>
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<td><strong>5.502: Fluid Mechanics</strong></td>
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<tr>
<td><strong>5.702: Thermodynamics</strong></td>
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<td><strong>6.802: Electrical Engineering</strong></td>
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<tr>
<td><strong>5.304: Theory of Machines</strong></td>
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<tr>
<td><strong>Mechanical Seminar</strong></td>
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BACHELOR OF SCIENCE (Technology)

ACCELERATED COURSE

The student reading for the degree of B.Sc. (Tech.) in Mechanical Engineering may reduce the time required to complete the academic requirements by undertaking the following programme of combined part-time/full-time study.

Stage 1 — 30 weeks Part-time Course (as for Stage 1 B.Sc. (Tech.) Course above).
Stage 2 — 30 weeks Part-time Course (as for Stage 2 B.Sc. (Tech.) Course above).
Stage 3A—30 weeks Full-time Course (as for Year II of full-time B.E. Course above).
Stage 4A—24 weeks Full-time Course (as for Year III of full-time B.E. Course above).
Stage 5A—30 weeks Part-time Course (as set out below).

STAGE 5A*
30 WEEKS PART-TIME COURSE

<table>
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<th>Term 3</th>
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<tr>
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<td>5.321 Automatic Control Engineering</td>
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<td>6.802 Electrical Engineering</td>
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<td>Mechanical Seminar</td>
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<td><strong>8½</strong></td>
<td><strong>7¼</strong></td>
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* Students transferring to B.E. course at this stage take either the normal full-time final year of 22½ hours per week or the Honours full-time final year of 26 hours per week, together with the additional Honours Mathematics of two hours per week, if this has not been taken in the third B.E. year.

NORMAL PRE-REQUISITES

Below is set out the normal pattern of pre-requisites in B.Sc. (Tech.) Course in Mechanical Engineering:

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<tr>
<th>Stage</th>
<th>SUBJECT</th>
<th>PRE-REQUISITES</th>
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<tbody>
<tr>
<td>III</td>
<td>Physics III T</td>
<td>Physics I: Mathematics I</td>
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<tr>
<td></td>
<td>Mathematics II Part 1</td>
<td>Mathematics I</td>
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<tr>
<td></td>
<td>8.112 Materials &amp; Structures</td>
<td>Mathematics I; Physics I: Engineering I</td>
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GRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING

STAGE I (3 terms)

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SUBJECTS IN THE DEPARTMENT OF MECHANICAL ENGINEERING

ENGINEERING I

(Total 6 hours per week for 30 weeks)

Statistics:
- Analysis of forces under static conditions.
  - 3 hours per week for approximately 13 weeks.

Prescribed books:

Dynamics:
- A study of force and motion.
  - 3 hours per week for approximately 17 weeks.
- The forces involved in motion; gravity, dry friction, viscous friction, rolling friction. The “free body” and control volume techniques. Internal and external forces and equilibrium. Newtons laws of motion applied to point masses, rigid bodies and connected bodies moving in straight or curved paths, or in simple rotation. Reference frames and relative motion; inertial frames, accelerating frames, and rotating frames Coriolis acceleration with illustrations.
- Momentum and impulse, both linear and angular, related to point masses, rigid bodies and fluids.
- Energy and the conservation principle applied to mechanical work, strain energy, kinetic energy, potential energy and friction “losses”, in the context of point masses, rigid bodies and simple cases of fluid flow.

Prescribed book:
Meriam, J. L., Mechanics Part II — Dynamics. Wiley.

Graphics:
- A study of communication and analysis by pictorial means.
  - 2 hours per week for 30 weeks.
  - A. Graphical presentation and analysis of data.
    - Vector diagrams with simple applications to displacements, forces, velocities and accelerations.
    - Box charts, line graphs, adjacent scale diagrams, alignment charts.
    - Plotting and fitting curves to experimental data. Linearisation by log-log and semi-log plots.
  - Graphical differentiation and integration.
  - B. The background to design.
    - Projection:
      - (i) Freehand sketching.
      - (ii) Perspective projection.
      - (iii) Orthogonal projection of points, lines, planes and solid bodies. Lengths of lines, angles and intersections between lines, planes and contoured surfaces.
      - (iv) Special cases.
        - (a) isometric using grid-rulled paper.
        - (b) orthographic; dimensioning and sectioning.
5.101 MECHANICAL ENGINEERING DESIGN

Design procedures, loadings and factors of safety standards. Stresses in bolts. Design examples involving simple stresses. Design of shafts and bearings, belt drives and pulleys (leather, V-pivot drives), friction clutches, springs and screws (for power applications). Design of spur gear drives in accordance with BSS 436, introduction to worm gear drives in accordance with BSS 721. Design of band brakes (forces in bands, pressure distribution) and shoe brakes. Crane design, including working equipment and traversing gear.

Reference book:

5.204/5.2045 MECHANICAL TECHNOLOGY

(30/48 hours of lectures)

Prescribed book:
5.302/5.302S THEORY OF MACHINES
(75/72 hours of lectures and tutorials)
Kinematics of Simple Mechanisms.
Dynamics of Simple Mechanisms (inertia effects).
Cams (Synthesis, Analysis, Springs).
Kinematics of Toothed Gearing (Involuometry).
Prescribed book:
Reference books:
Holowenko, A. R. C., *Dynamics of Machinery.* Wiley.

5.304/5.304S THEORY OF MACHINES
(30/34 hours of lectures and tutorials)
Balancing of rotating and reciprocating masses.
Mechanical Vibrations:
- Free and forced vibrations of the single degree of freedom system.
- Applications to vibration isolation and vibration measuring instruments.
- Vibrations of the undamped two-degree-of-freedom system, dynamic vibration absorber.
- Whirling speeds of shafts.
- Torsional vibrations of multi-rotor shafts.
Prescribed book:
Church, A. H., *Mechanical Vibrations.* Wiley.
Reference books:
Seto. *Mechanical Vibrations.*

5.305S THEORY OF MACHINES
(72 hours of lectures and tutorials)
Balancing of rotating and reciprocating masses.
Mechanical Vibrations:
- Free and forced vibrations of the single degree of freedom system.
- Applications to vibration isolation and vibration measuring instruments.
- Vibrations of the undamped two-degree-of-freedom system, dynamic vibration absorber.
- Whirling speeds of shafts.
- Torsional vibrations of multi-rotor shafts.
Kinematic Analysis of Complex Mechanisms.
Dynamic Acceleration Analysis.
Advanced Kinematics of Plane Motion.
Prescribed books:
Church, A. H., *Mechanical Vibrations.* Wiley.
Reference books:
Seto. *Mechanical Vibrations.*

5.321/5.321S AUTOMATIC CONTROL ENGINEERING
(36 hours lectures, tutorials and laboratory work)
Description of control systems and components by differential equations.
Block diagrams and Laplace transform methods for system analysis.
Prescribed book:
Reference books:
Gibson and Tuteur. *Control System Components.*

5.322S AUTOMATIC CONTROL ENGINEERING
(72 hours lectures, tutorials and laboratory work)
Description of control systems and components by differential equations.
Block diagrams and Laplace transform methods for system analysis.
Study of control system elements and their applications.
Prescribed book:
Reference books:
Gibson and Tuteur. *Control System Components.*

5.501 FLUID MECHANICS
(60 hours lectures, tutorial and laboratory work)
Reference books:

5.502/5.502S FLUID MECHANICS
(72 hours lectures, tutorial and laboratory work)
Prescribed book:
5.503 Fluid Mechanics
(48 hours of lectures, tutorials and laboratory work)
The course is to consist of three of the following five topics plus
experimental projects:
(i) Elements of fluid dynamics. Euler equations. Momentum theorems.
Rotational motion. Potential flows, simple stream and potential
functions, elementary wing theory.
(ii) Hydraulic Turbines. Characteristic proportions. Selection of type
and speed for a new plant.
(iii) Surges and Water Hammer.
(iv) Turbulent flow in boundary layers and in closed conduits.
(v) One-dimensional gas dynamics. Isothermal, adiabatic and fric-
tional flows. Normal shock waves.
Reference book:

5.601 Mechanical Engineering
(144 hours of lectures, tutorials and laboratory work)
An integrated course in thermodynamics and fluid mechanics for
honours candidates in Mechanical Engineering.
Prescribed books:
McGraw-Hill.

5.701 Thermodynamics
(60 hours of lectures, tutorial and laboratory work)
Fundamental thermodynamic concepts. First and second laws and
corollaries. Reversibility. General thermodynamic relations. Properties of
a perfect gas, liquids and vapours. Non-flow and flow processes. Multi-
stream steady flow processes. Carnot cycle. Rankine cycle, re-heat and
regenerative feed heating.
Boilers and boiler auxiliaries. Otto, Diesel, and mixed cycles.
Cycles having Carnot efficiency.
Prescribed book:
Van Wylen and Sonntag. *Fundamentals of Classical Thermody-
namics*. Wiley.

5.702 Thermodynamics
(72 hours of lectures, tutorial and laboratory work)
Heat pump and refrigeration cycles.
Vapour compression, absorption and compressed air systems.
Properties of non-reactive mixtures of gases and vapours. Gibbs-
Reciprocating engines and compressors, criteria of performance.
Axial and radial flow turbines and compressors. Gas turbine cycles
with heat exchange, intercooling and reheat. Steady heat conduction
through composite wall cylinders. Three-dimensional steady heat con-
duction in homogeneous materials.
Relaxation processes. Unsteady one-dimensional heat conduction.
Electrical analogy. Heat transfer by free and forced convection.
Similarity parameters. Heat exchangers. Radiation heat exchange
between black and non-black surfaces. Radiation geometric factors.
Reciprocity theorem. Radiation from gases and flames.

Prescribed books:
Reference books:
Rogers, G. F. and Mayhew, Y. R., *Engineering Thermodynamics,
Taylor, G. F. and Taylor, E. S., *The Internal Combustion Engine*
International Textbook Co.

5.703 Thermodynamics
(48 hours of lectures, tutorial and laboratory work)
Gibbs and Helmholz functions. Maxwell relations. Equation of state
for real gases. Van der Waal’s and Clapeyron’s equations. Momentum and
energy transport in fluids. Laminar and turbulent thermal boundary layers.
Raynold’s analogy. Combustion processes. Thermodynamic analysis of
fluid flow in compressors, turbines, Cascades. Surging in compressors.
Matching gas turbine components. Jet propulsion. Rocket motors and
ramjets. Binary vapour and super-critical power plants. Nuclear power
systems. Air conditioning and air distribution systems.
Reference books:
As for 5.702 Thermodynamics, plus:
Vincent, G. T., *The Theory and Design of Gas Turbines and Jet*
Salisbury, *Steam Turbines and Their Cycles*.

18.121 Engineering Administration
(72 hours lectures)
An introduction to the scientific techniques of decision-making and
industrial organisation, dealing with the following topics:
Statistical Concepts, Quality Control Charts, Sampling Schemes,
Method Studies, Introduction to Work Measurement and Incentive
Schemes, Replacement Theory (Inventory Control), Resource Allocation
(Linear programming), Queuing Theory (Scheduling), Regression Analysis.
The Organisation of a Typical Factory. Employer-Employee Relations.
The Handling of Materials, Planned Maintenance, Techniques used when
Experimenting in Industry, Interpretation of Cost Data, Production Plan-
ing, Controlling the Manufacturing Process, Quality Control.

18.811G Methods Engineering
(70 hours)
The systematic application of methods engineering to manufacturing
operations.
(a) The organisation of physical facilities in preparation for
manufacturing.
(b) Performance analysis and improvement.
(c) The integration of man, materials and equipment for operation
efficiency.
Prescribed books:
18.821G PRODUCTION CONTROL
(70 hours)
The principles of control of production in industrial operations.
Intermittent, continuous and associated types of production and
their control; forms used and organisation required.
Production planning; technical considerations.
Inventory and stores control; purchasing, economic batch sizes.
Reference books:
Magee, J. F., Production Planning and Inventory Control. Wiley.
Buffa, R. S., Modern Production Management. Wiley.

18.831G INDUSTRIAL MANAGEMENT I
(40 hours)
A brief study of the organisational structure of the enterprise and
the relationship of the structure to the objectives of the enterprise.
An examination of the function and operation of organisational
groups.
Reference books:
Buffa, E. S., Modern Production Management. Wiley.

14.061 ACCOUNTING
(30 hours)
This course will include:
(a) an examination of basic accounting theory and relative concepts,
(b) the application of accounting principles and their expression in
the accounting record,
(c) a study of the various types of business enterprise and
(d) the preparation, analysis and interpretation of accounting reports.
Prescribed books:

18.841G ENGINEERING ECONOMICS
(70 hours)
The course will consist of a study of the application of economics
to industrial operations and engineering projects.
Reference books:
Sinclair, I., Economics Made Easy.
Samuelson, P., Economics.
Ronald.

14.042 INDUSTRIAL LAW
(30 hours)
Comprising lectures in:
(a) The elements of mercantile law, as applied to industrial contracts,
and agreements. The elements of bankruptcy law and company
law.
(b) Industrial Law. State and Commonwealth awards.
Bases of awards. Basic and secondary wages.
Piece, casual and junior work.
Wages rates, loadings and penalties.
Compensation.
Industrial disputes.
Arbitration and conciliation.
(c) Employers' Associations.
(d) Industrial regulations.
(e) Patents, trade marks and registered designs.
(f) The writing of specifications.
(g) Liability and insurance.
Reference book:
Sykes, E., Employer, Employee and the Law. Law Book Society.

18.832G ORGANISATION AND ADMINISTRATION
(30 hours)
The historical development of the theory and practice of organisation
in industry.
The nature and types of organisation.
The application of the principles of organisation in the design of
organisational structures.
Reference book:

18.832G INDUSTRIAL MANAGEMENT II
(50 hours)
Control of the components of organisation.
Case studies illustrating control.
Reference book:
Holden, Shallenberger and Deans; Selected Cases, Problems in Indus-
trial Management. Prentice-Hall.
Electrical Engineers are responsible for the research, design, production and maintenance of equipment for generation, distribution and utilization of electric power and for communications.

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. 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 the proper understanding of the problems involved.

In the early stages of the courses, students concentrate on acquiring a knowledge of the basic science subjects of mathematics, physics and chemistry, together with an introduction to engineering. Then students are introduced to the basic electrical engineering subjects, including electric circuit theory, electric power engineering and electronics. Also their knowledge is broadened by service subjects from mechanical and civil engineering and metallurgy. Advanced students study specialised subjects on power and control in their final year.

During the course each full-time student is required to complete 20 weeks of industrial training, which are normally made up of a period of ten weeks after each of the second and third years, and to submit detailed reports on these training periods. In the final year, the full-time student prepares a thesis covering some aspect of supervised research, and delivers a seminar paper on a selected topic. Additional study is prescribed in the third and fourth years for those students reading for the degree of Bachelor of Engineering with Honours.

NOTE TO STUDENTS COMMENCING COURSES IN 1967
A major revision of the Engineering courses is envisaged for implementation in 1968 to coincide with the new matriculation conditions that will then exist.
In anticipation of this the content of Engineering I is being altered in 1967, and consequently students, who in 1967, enrol in Year I or Stage I of Engineering courses, will not follow exactly the course outlines for later stages shown below.

CLASSIFICATIONS
(a) Classifying subjects are shown in Bold-faced type.
(b) Classification is determined by enrolment in the classifying subject.
(c) If a student enrols in more than one classifying subject, then the year or stage of the lower classifying subject applies.
(d) If the student enrols in no classifying subject, then he is classified in the year or stage of the highest classifying subject he has passed.

BACHELOR OF ENGINEERING
YEAR I
(30 weeks full-time course)

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YEAR II
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Note: The student may elect to include 5.501: Fluid Mechanics in his programme for the second year of the course in lieu of being required to complete such subject in the third year of the course.
YEAR III
(30 weeks full-time course)

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YEAR IV**
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YEAR II
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Special arrangements will be made for years III, IV and V.

** It is anticipated that Year IV will be offered in 1967.
BACHELOR OF SCIENCE (TECHNOLOGY)

STAGE I
(30 weeks part-time course)

<table>
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STAGE II
(30 weeks part-time course)

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<td>Physics I</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>12</td>
<td>12</td>
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</tr>
</tbody>
</table>

STAGE III
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics II</td>
<td>5½</td>
<td>5½</td>
<td>5½</td>
</tr>
<tr>
<td>Mathematics II Part 1</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Descriptive Geometry</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6.101: Electric Circuit Theory</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>12½</td>
<td>12½</td>
<td>12½</td>
</tr>
</tbody>
</table>

STAGE IV
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.152: Electric Circuit Theory</td>
<td>3½</td>
<td>3½</td>
<td>3½</td>
</tr>
<tr>
<td>Mathematics II Part 2</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.701: Thermodynamics</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6.652: Electrical Measurements</td>
<td>1½</td>
<td>1½</td>
<td>1½</td>
</tr>
<tr>
<td>8.112: Materials and Structures</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>13</td>
<td>13</td>
<td>13</td>
</tr>
</tbody>
</table>

STAGE V
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.251: Electric Power Engineering</td>
<td>3½</td>
<td>3½</td>
<td>3½</td>
</tr>
<tr>
<td>6.356: Electronics</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6.357: Electronics</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Seminar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>11½</td>
<td>11½</td>
<td>11½</td>
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</table>

STAGE VI
(30 weeks part-time course)

<table>
<thead>
<tr>
<th>Hours per week</th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.262: Electric Machines</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>4.922: Materials Science</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>6.052: Electrical Measurement*</td>
<td>1¾</td>
<td>1¾</td>
<td>1¾</td>
</tr>
<tr>
<td>6.454: Power Systems and Control</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Seminar†</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>13½</td>
<td>13½</td>
<td>13½</td>
</tr>
</tbody>
</table>

* Applies to students who have not done this subject in Stage IV.
† Applies to students who have not done this subject in Stage V.

The department also provides lectures and laboratory work in the following subjects for courses other than Electrical Engineering:

<table>
<thead>
<tr>
<th></th>
<th>Term 1</th>
<th>Term 2</th>
<th>Term 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.801: Electrical Engineering</td>
<td>3 hrs./week</td>
<td>30 weeks</td>
<td></td>
</tr>
<tr>
<td>6.801S: Laboratory</td>
<td>1½ hrs./week</td>
<td>24 weeks</td>
<td></td>
</tr>
<tr>
<td>6.801S: Electrical Engineering</td>
<td>4 hrs./week</td>
<td>24 weeks</td>
<td></td>
</tr>
<tr>
<td>6.801S: Laboratory</td>
<td>2 hrs./week</td>
<td>24 weeks</td>
<td></td>
</tr>
<tr>
<td>6.802S: Electrical Engineering</td>
<td>3 hrs./week</td>
<td>24 weeks</td>
<td></td>
</tr>
</tbody>
</table>
NORMAL PRE-REQUISITES

Below is set out the normal pattern of pre-requisites in B.Sc. (Tech.) Course in Electrical Engineering.

<table>
<thead>
<tr>
<th>Stage</th>
<th>SUBJECT</th>
<th>PRE-REQUISITES</th>
</tr>
</thead>
<tbody>
<tr>
<td>III</td>
<td>Physics IIT</td>
<td>Physics I; Mathematics I</td>
</tr>
<tr>
<td></td>
<td>Mathematics II Part 1</td>
<td>Mathematics I</td>
</tr>
<tr>
<td></td>
<td>6.101 Electric Circuit Theory</td>
<td>Physics I; Mathematics I</td>
</tr>
<tr>
<td>IV</td>
<td>Mathematics II Part 2</td>
<td>Mathematics II Part 1</td>
</tr>
<tr>
<td></td>
<td>5.701 Thermodynamics</td>
<td>Physics III; Mathematics II Part 1</td>
</tr>
<tr>
<td></td>
<td>8.112 Materials &amp; Structures</td>
<td>Mathematics I; Physics I; Engineering I</td>
</tr>
<tr>
<td></td>
<td>6.356 Electronics</td>
<td>6.101 Electric Circuit Theory; Physics II</td>
</tr>
<tr>
<td></td>
<td>6.357 Electronics</td>
<td>6.152 Electric Circuit Theory</td>
</tr>
<tr>
<td></td>
<td>6.356 Electronics</td>
<td>6.356 Electronics</td>
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<tr>
<td>VI</td>
<td>4.922 Materials Science</td>
<td>Physics II</td>
</tr>
<tr>
<td></td>
<td>6.262 Electrical Machines</td>
<td>6.251 Electric Power Engineering</td>
</tr>
<tr>
<td></td>
<td>6.454 Power Systems and Control</td>
<td>6.251 Electric Power Engineering</td>
</tr>
</tbody>
</table>

SUBJECTS IN THE
DEPARTMENT OF ELECTRICAL ENGINEERING

6.001S ELECTRICAL ENGINEERING
(96 hours of lectures, tutorial and laboratory)

A course of lectures together with appropriate laboratory work covering advanced circuit theory, analysis and synthesis; electrical measurements; and electric and magnetic field theory.

Prescribed books:
Kuo, F. F., Network Analysis and Synthesis. Wiley.
Stout, M. B., Basic Electrical Measurements. Prentice Hall.

Reference books:
Harris, F. K., Electrical Measurements. Wiley.

6.052 ELECTRICAL MEASUREMENTS
(30 hours of lectures and tutorial)

Dimensional analysis, primary and secondary standards.

Prescribed book:
Harris, F. K., Electrical Measurements. Wiley.

Reference books:
Stout, M. B., Basic Electrical Measurements. Prentice Hall.

6.101 ELECTRIC CIRCUIT THEORY
(90 hours of lectures, tutorial and laboratory)


Prescribed book:


Reference Books:
Corcoran, G. F. and Reed, H. R., Introductory Electrical Engineering. Wiley.
Stout, M. B., Basic Electrical Measurements. Prentice-Hall.
Matsch, L. W., Spacitors, Magnetic Circuits and Transformers. Prentice-Hall.

6.102 ELECTRIC CIRCUIT THEORY
(165 hours of lectures, tutorial and laboratory)


Terminated two-port networks and constant-k filters. Transmission lines: Transient travelling waves. Steady-state waves in lossless and lossy transmission lines. Radio-frequency and power-frequency lines. Impedance charts and matching with stubs.


Prescribed books:
Kuo, B. C., Automatic Control Systems. Prentice-Hall.

Reference books:

6.152 ELECTRIC CIRCUIT THEORY
(105 hours of lectures, tutorial and laboratory)

The subject matter is identical with the Section A of 6.102 Electric Circuit Theory.

Prescribed and Reference books:
As for 6.102 Electric Circuit Theory with the exception of Kuo, B. C., Automatic Control Systems.

6.201 ELECTRIC POWER ENGINEERING
(150 hours of lectures, tutorial and laboratory)


Principles of rotating machines. Electromechanical energy conversion. Basis of machine operation (a) the BLV, BLI viewpoint and (b) the magnetic field viewpoint. Generators and motors. Energy balance. Singly and multiply excited magnetic systems. Reactance torque. The electrostatic machine.

Performance and analysis of rotating machines. Torque generated voltages and magnetic fields in a.c. machines with sinusoidal mmf and flux density distribution, and in d.c. machines. Polyphase induction and synchronous machines and d.c. machines.

Equivalent circuits, current locus diagrams, torque speed characteristics. Tests. Losses, rating and heating.

Prescribed book:

6.202S POWER SYSTEMS
(96 hours of lectures, tutorial and laboratory)

Transmission line parameters. Steady state performance, analytical and graphical solution of long lines and systems.

Symmetrical components, sequence impedances. Transformers; leakage reactance, connections in three phase banks, harmonies and unbalanced conditions. System operation; ABCD constants, power circle diagrams, unbalanced faults. Voltage surges; travelling waves, effect of termination. Protection against overvoltages.

System stability; steady state and transient limits. The swing equation and equal area criterion. System protection, circuit breakers. Economic loading of power systems.

Prescribed books:
M. I. T. Staff, Magnetic Circuits and Transformers. Wiley.
Reference books:
Westinghouse, *Transmission and Distribution*.

### 6.212S ELECTRICAL MACHINES
(96 hours of lectures, tutorial and laboratory)

*Metadynes:* construction, operation.

*D.C. Machine Transients.*

Ratings of Machines: temperature rise, heating and cooling.

Motor Generator Sets. Armature Windings, d.c. and a.c.

Induction Motors: Review of elementary theory and extension to induction generator, double-cage rotors, cascade operation etc.

A.C. Commutation Machines: Simple phase-advancer, frequency-changer regulator, Schrage motor etc.


**Prescribed book:**

### 6.251 ELECTRIC POWER ENGINEERING
(105 hours of lectures, tutorial and laboratory)

The subject matter is similar to that for 6.201 Electric Power Engineering.

**Prescribed book:**

### 6.262 ELECTRICAL MACHINES
(120 hours of lectures, tutorial and laboratory)

Heating and cooling transients, equivalent rating of machines. Time constants, linear d.c. machine transients, non-linear graphic analysis, starting times.

*Metadynes.*

Induction motor aspects, “n” phase system for differing primary and secondary phase numbers, bar and end-ring currents. Simple phase advancer and frequency-changer for power-factor and/or speed control, and other methods. Schrage and other polyphase commutator motors, Single phase motors, two phase servomotor.

Synchronous machines: oscillation, load and steady-state stability, capability charts, transient load and short-circuit currents, saturation and saliency.

**Prescribed book:**

### 6.301 ELECTRONICS
(180 hours of lectures, tutorial and laboratory)

The subject matter is identical with that for 6.356 Electronics and 6.357 Electronics combined.

**Prescribed and reference books:**
See 6.356 and 6.357.

### 6.322S ELECTRONICS
(144 hours of lectures, tutorial and laboratory)

A course of lectures, laboratory and design work in electronic engineering relative to automatic control and industrial processes.

**Prescribed and reference books:**
To be advised.

### 6.356 ELECTRONICS
(60 hours of lectures, tutorial and laboratory)

Fermi statistics and semi-conductors; behaviour of p-n junction diodes; structure and operation of transistors; thermionic emission, electron ballistics and Hall effect.

Vacuum and gas-filled thermionic diodes and triodes.

Basic amplifiers, common emitter amplifier, multi-electrode tube and transistors.

**Prescribed books:**

### 6.357 ELECTRONICS
(120 hours of lectures, tutorial and laboratory)

Small signal amplifiers; amplifiers with extended frequency response; small signal tuned amplifiers; large signal amplifiers; amplifiers with negative feedback; large signal tuned amplifiers.

Oscillator circuits; amplitude modulation and detection; frequency modulation; non-linear analysis; power supplies.

**Prescribed book:**

### 6.401S CONTROL SYSTEMS
(96 hours of lectures, tutorial and laboratory)


**Prescribed and reference books:**
To be advised.

### 6.454 POWER SYSTEMS AND CONTROL
(120 hours of lectures, tutorial and laboratory)

**Power Systems Section:**
Transmission line parameters. Steady state performance, analytical and graphical methods for solution of long lines and systems.

Symmetrical components, sequence impedances.

Transformers; leakage reactance, connections, harmonics and unbalanced conditions in three phase transformer banks.

Solution of systems for balanced and unbalanced faults. Voltage
surges, calculation for lossless lines, effect of terminations. Protection of lines and equipment against surges.

System stability; steady state and transient limits. Effect of stability on system design and operation.

Functions and principles of operation of protective devices. Circuit breakers, circuit interruption under fault conditions.

**Prescribed books:**


**Reference books:**

Westinghouse. *Transmission and Distribution*.


**Control Systems Section**
Equations and models of linear systems. Use of block diagrams.

Components of feedback and control systems.

Transient response of second order system. Effect of derivative, integral and tachometric feedback controls.

Frequency response; polar, Bode and closed loop plots.

Stability; Nyquist and Routh criterions. Relative stability; M-contours, phase and gain margin.

Root Locus technique.

Series and feedback compensation; frequency domain and s-plane design.

Use of analogue computers for system simulation.

**Prescribed book:**

**Reference books:**


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**6.501 ELECTRICAL ENGINEERING (HONOURS)**

*Semiconductor physics*

(60 hours of lectures, tutorial and laboratory work)

Valence bond and energy band models; distribution of electrons in energy bands; transport of charge carriers in semiconductors.

**Prescribed books:**

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**6.502S ELECTRICAL ENGINEERING (HONOURS)**

(72 hours of lectures)

Material will be selected from the following topics:

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

**Reference books:**
To be advised.

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**6.801/6.801S ELECTRICAL ENGINEERING**

(90/96 hours lectures, tutorial and laboratory)

A course for students in courses other than Electrical Engineering.

D.C. circuit theory, A.C. circuit theory, three-phase circuits.

Magnetic circuits and the transformer.

Principles of electrical machines, D.C. machines, the 3-phase induction motor, synchronous machines.

Introduction to electronics.

**Prescribed book:**

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**6.802/6.802S ELECTRICAL ENGINEERING**

(60/72 hours of lectures and tutorial)

A special course for Mechanical Engineering students only.

Fourier series; transients, instrumentation.

Theory of p-n junction diodes and transistors. Use of active elements in electronic circuits.

Electrical power amplification.

**Prescribed books:**

Smith, R. J., *Circuits, Devices and Systems*. Wiley
**SUBJECT IN THE FACULTY OF APPLIED SCIENCE**

**4.922 MATERIALS SCIENCE**

A course of basic metallurgy for engineering students. The atomic structure of metals. The grain structure of metals. The structure of alloys, and the properties and heat treatment of commercially important alloys, principally those based on aluminium, copper and iron. Corrosion, fuels and refractories.

**Prescribed book:**
Rollason. *Metallurgy for Engineers.*

**Reference book:**

**SUBJECTS IN THE FACULTY OF SCIENCE**

**CHEMISTRY I**

A course of about 90 lectures, and 60 hours laboratory work in the Department of Chemistry and 30 hours lectures in the Faculty of Engineering.

The course will include general chemistry (20 lectures), inorganic chemistry (20 lectures) and Engineering Applications of Chemistry (15 lectures).

**Prescribed books:**
Sorum, *Introduction to Semimicro Qualitative Analysis.*

**GEOL OGY IE**

A course of one lecture and two laboratory hours per week for two terms together with three days field work.

The course introduces the principles of geology and their applications to engineering problems.

**Prescribed book:**

**MATHEMATICS I**

A course of four lectures and two tutorial hours per week for three terms, covering the following topics:

- Differential calculus, integral calculus and their applications; special functions; differential equations; number systems, matrices and determinants; introduction to groups and rings; co-ordinate geometry in two and three dimensions, introduction to vectors and their applications. From time to time there is an option for students to take a course of more advanced lectures.

**Prescribed books:**
Ayres, Frank, *Calculus OR Differential and Integral Calculus.*
Schaum Publishing Co.

**PURE MATHEMATICS II**

A course of four lectures and two tutorial hours per week for three terms arranged on the following pattern:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1</td>
<td>Linear Algebra A</td>
<td>Analysis B</td>
<td>Calculus (Several variables C</td>
<td>Vector Calculus D</td>
</tr>
<tr>
<td>Term 2</td>
<td>Linear Algebra E</td>
<td>Linear Algebra F</td>
<td>Differential Equations G</td>
<td>Complex Variable H</td>
</tr>
<tr>
<td>Term 3</td>
<td>Differential Geometry J</td>
<td>Complex Variable K</td>
<td>Differential Equations L</td>
<td>Calculus M</td>
</tr>
</tbody>
</table>

101
Prescribed books:
Churchill, R. V., *Complex Variables and Applications*.
Agnew, R. P., *Differential Equations*.
Kaplan, W., *Advanced Calculus*.
Nering, E. D., *Linear Algebra and Matrix Theory*.
Rainville, E. D., *The Laplace Transform, an Introduction*.
Mendelson, B., *Introduction to Topology*.
Weatherburn, C. E., *Differential Geometry*.
Willmore, T. J., *Differential Geometry*.

**APPLIED MATHEMATICS II**

A course of four lectures and two tutorial hours per week for three terms arranged on the following pattern:

<table>
<thead>
<tr>
<th>Lecture</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Term 1</td>
<td>Dynamics N</td>
<td>Dynamics P</td>
<td>Fortran Programming Q</td>
<td>Probability R</td>
</tr>
<tr>
<td>Term 2</td>
<td>Dynamics S</td>
<td>Hydrodynamics T</td>
<td>Numerical Analysis U</td>
<td>Statistics V</td>
</tr>
<tr>
<td>Term 3</td>
<td>Dynamics W</td>
<td>Hydrodynamics X</td>
<td>Computing Y</td>
<td>Statistics Z</td>
</tr>
</tbody>
</table>

Prescribed books:
Newell, H. E., *Vector Analysis*.
Coulson, C. A., *Electricity*.

**MATHEMATICS II**

A Course of four lectures and two tutorial hours per week for three terms, comprising twelve modules selected from Pure Mathematics II and Applied Mathematics II as follows:

1st term — Modules C, D, Q, R.
2nd term — Modules G, H, U, V.
3rd term — Modules L, M, Y, Z.

Part-time students may take Mathematics II in two parts — each of two lectures per week for three terms.

Mathematics II, Part 1, comprises Modules C, D, G, H, L, M.

Prescribed books:
Mathematics II Part 1
Newell, H. E., *Vector Analysis*.

Mathematics II Part 2

**PURE MATHEMATICS III**

A Course of four lectures and two tutorial hours per week for three terms, comprising the following:

- Analysis of the real number system; real variable theory; metric topology; theory of groups and rings; general topology; complex variable theory; differential equations.

Prescribed books:
Churchill, R. V., *Complex Variables and Applications*.
Rudin, W., *Principles of Mathematical Analysis*.
Simmons, G. F., *Introduction to Topology and Modern Analysis*.
Herstein, I. N., *Topics in Algebra*.

**ENGINEERING MATHEMATICS**

The Syllabus and prescribed and reference books will be provided by the Department of Mathematics.

**PHYSICS I**

The course includes study of mechanics, properties of matter, heat, light, wave motion, sound, electricity and magnetism. The first term work will be common to all students. For the second and third terms, depending on school grading in the subject and first term performance, the class will be divided into Physics IA and Physics IB.

The Physics IA course will assume a rather elementary prior knowledge of the subject, and the syllabus will be a general introductory one. The Physics IB course will assume a rather greater knowledge of Physics on entrance. The introductory material will be covered at a faster rate and additional lecture material of a broader scope, such as some elements of astronomy, will be introduced. Both courses will be of the same length, involving about 90 lectures, together with 90 hours of laboratory/tutorial work, together with a final examination of two three-hour papers.
Second year work will not be transferred into Physics IB. Consequently a satisfactory pass in either Physics IA or Physics IB will qualify for entry to Physics II.

(A detailed syllabus for Physics I and Physics II students will be issued early in the year).


**PHYSICS II**

A course which includes the following:

1. **Electricity and Magnetism:**

2. **Electronics:**
   A survey of the principles of electronic circuitry, using valves.

3. **Physical Optics and Radiation:**
   Electromagnetic wave and quantum concepts; interference; diffraction; polarization.

4. **Atomic Physics:**
   Quantum theory of radiation; X-rays, nucleus, isotopes, radioactivity; optical spectra; Bohr theory.

5. **Solid State Physics:**
   Electronic and thermal properties of solids; the perfect solid; defects in solids; strength of solids.

6. **Thermodynamics and Kinetic Theory:**
   The first and second laws of thermodynamics; specific heats; ideal gases; Carnot cycle; entropy; absolute scale of temperature; the approach to absolute zero; practical cycles; kinetic molecular theory; van der Waal's equation; Maxwell distribution; mean free path; transfer phenomena; introduction to the classical statistical mechanics.

7. **Electromagnetism:**
   Introductory field concepts; law of force; constitutive equations; Maxwell's equations, electromagnetic wave propagation in free space.

8. **Mechanics:**
   Damped harmonic motion; forced vibrations; resonance; Q number; anharmonic motion; combination of harmonic motion. Longitudinal and transverse progressive waves; wave velocities; interference of waves; sound; Doppler effect; selected topics in mechanics.

9. **Nuclear Physics:**
   Artificial nuclear disintegration; artificial radioactivity; alpha decay; beta decay; gamma rays and gamma decay.

   A course of about 120 lectures and 180 hours laboratory work; a final examination of two three-hour papers.

Prescribed books:
Halliday and Resnick, *Physics for Students of Science and Engineering*.


Wiedner and Sells, *Elementary Modern Physics*.

Sproull, *Modern Physics*.

**PHYSICS IIT**

(for students in the Department of Electrical Engineering)

A terminating course which comprises units 1 to 7 inclusive detailed under Physics II.

A course of about 90 lectures and 75 hours laboratory work; a final examination of one three-hour paper and one and a half-hour paper.

Prescribed books:
As for Physics II.

**PHYSICS IIT**

(for students in the Departments of Applied Science and Engineering excepting Electrical Engineering)

A terminating course which comprises units 1 to 5 inclusive set out under Physics II.

A course of about 60 lectures and 75 hours laboratory work; a final examination of one three-hour paper.

Prescribed books:
As for Physics II.

**PHYSICS III**

A course which includes the following:

- Electricity and Magnetism.
- Electronics and Electricity in Gases.
- Nuclear Physics.
- Quantum Mechanics.
- Spectroscopy.
- Plasma Physics.
- Solid State.
- Relativity and Electromagnetic Theory.

A course of about 120 hours lectures and 240 hours laboratory work; a final examination of four three-hour papers.

Prescribed books:
Richtmeyer, Kennard and Lauritsen, *Introduction to Modern Physics*.
Eisberg, *Fundamentals of Modern Physics*.
Bleaney and Bleaney, *Electricity and Magnetism*.
Dekker, *Solid State Physics*. OR
Millman, *Vacuum Tube and Semi-conductor Electronics*.
Pippard, *Classical Thermodynamics*.
Jenkins and White, *Optics*.
Cobine, *Gaseous Conductors*.
Hill, *Introduction to Statistical Thermodynamics*.
THE UNIVERSITY OF NEWCASTLE

FACULTY OF ENGINEERING

PROVISIONAL TIMETABLE FOR 1967

Room Location:

E — Engineering Building, Tighe's Hill.
M — University Building, Tighe's Hill.
A, B, C, D — University Buildings, Shortland.
B.01 — University Main Theatre.

FULL-TIME STUDENTS

YEAR I

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time of Classes</th>
<th>Room No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I</td>
<td>6</td>
<td>Tu. 12-1, W. 12-1</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>6</td>
<td>F. 11-12</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>6</td>
<td>Tu. 9-10, W. 9-10, F. 9-11</td>
</tr>
<tr>
<td>Engineering I</td>
<td>6</td>
<td>M. 9-12, M. 1-4</td>
</tr>
</tbody>
</table>

YEAR II

<table>
<thead>
<tr>
<th>Hours</th>
<th>Time of Classes</th>
<th>Room No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics IIT</td>
<td>4½</td>
<td>Tu. 11-12, F. 9-10</td>
</tr>
<tr>
<td>5.002 Descriptive Geometry</td>
<td>2</td>
<td>Th. 9-11 or Tu. 2-4</td>
</tr>
<tr>
<td>5.501 Fluid Mechanics</td>
<td>1½</td>
<td>Th. 9-10.15 or F. 3.45-5</td>
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<td>5.701 Thermodynamics</td>
<td>1½</td>
<td>M. 9-10.15</td>
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<tr>
<td>5.501/5.701 Laboratory</td>
<td>1½</td>
<td>F. 2-3.30</td>
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<tr>
<td>8.112 Materials and Structures</td>
<td>3</td>
<td>Th. 2.5 or F. 6.30-9.30</td>
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<tr>
<td>Mathematics II</td>
<td>5</td>
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<tr>
<td>4.922 Materials Science</td>
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YEAR III

Civil Engineering

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<td>6.801S Electrical Engineering</td>
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<td>8.122 Structures</td>
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<tr>
<td>8.221 Engineering Materials</td>
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<td>8.423 Surveying</td>
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<tr>
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Electrical Engineering

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<tbody>
<tr>
<td>5.304 Theory of Machines</td>
<td>3</td>
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<td>5.501 Fluid Mechanics</td>
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<td>F. 3.45-5</td>
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<td>5.501 Laboratory</td>
<td>1½</td>
<td>F. 2.3-3.30</td>
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<td>6.102 Electric Circuit Theory</td>
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<td>M. 1.30-5</td>
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<td>6.201 Electric Power Engineering</td>
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<td>Tu. 1-2.30, W. 9-10.30</td>
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<tr>
<td>6.301 Electronics</td>
<td>6</td>
<td>Tu. 2.30-4.30, Th. 2.30-4.30</td>
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<td>6.501 Honours</td>
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<td>Tu. 10-12</td>
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Mechanical Engineering

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<tbody>
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<td>5.101 Mechanical Engineering Design</td>
<td>5</td>
<td>M. 6-9, Th. 9-11</td>
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<td>5.204 Mechanical Technology</td>
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<td>Th. 11-13-1.30</td>
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<tr>
<td>5.302 Theory of Machines</td>
<td>3</td>
<td>M. 2-5</td>
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<tr>
<td>5.502 Fluid Mechanics</td>
<td>3</td>
<td>Tu. 1-4</td>
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<tr>
<td>5.702 Thermodynamics</td>
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<td>Tu. 11-12.30, W. 11-12.30</td>
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<tr>
<td>8.133</td>
<td>Structures</td>
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<tr>
<td>8.141/142</td>
<td>Engineering Computations</td>
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<td>Seminar</td>
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<td>8.522</td>
<td>Hydraulics</td>
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<tr>
<td>8.613</td>
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<td>Mathematics C.E. 4</td>
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<td>6.001</td>
<td>Electrical Engineering Parts 1 &amp; 2</td>
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<td>Electrical Engineering Part 3</td>
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<td>6.202</td>
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<td>6.212</td>
<td>S Electrical Machines</td>
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<td>6.322</td>
<td>S Electronics</td>
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<td>6.401</td>
<td>S Control Systems</td>
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<td>6.502 S</td>
<td>Electrical Engineering (Honours)</td>
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<td>5.102</td>
<td>Mechanical Engineering Design</td>
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<td>5.321/322</td>
<td>Automatic Control</td>
<td>3</td>
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<td>5.304/305</td>
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<td>5.503/601</td>
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<td>5.703/601</td>
<td>Thermodynamics</td>
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**Hours**

- **Electrical Engineering**
  - 6.801S: 4
  - 8.133: 3
  - 8.141/142: 2
  - Seminar: 2
  - Mathematics M.E. 3: 2

- **Civil Engineering**
  - 8.132: 5
  - 8.141/142: 2
  - 8.223: 6
  - 8.522: 3
  - 8.613: 4
  - Mathematics C.E. 4: 2
  - Honours Hydraulics: 1
  - Honours Materials: 1
  - Honours Structures: 1
  - Honours Surveying: 1

- **Mechanical Engineering**
  - 5.102: 3
  - 5.321/322: 3
  - 5.304/305: 3
  - 5.503/601: 2
  - 5.703/601: 2

**Time of Classes**

- **Electrical Engineering**
  - 6.801S: Tu. 10-12.30
  - 8.133: W. 6.15-7.45
  - 8.141/142: Tu. 9-11, F. 5.30-7.30
  - Mathematics M.E. 3: Tu. 9-11, F. 6-7.30 (3rd Term only)

- **Civil Engineering**
  - 8.132: M. 2-4, F. 9-12
  - 8.141/142: Tu. 4-6
  - 8.223: Tu. 9-11, F. 7.30-9.30
  - 8.522: M. 10-1
  - 8.613: M. 6-8.30
  - Mathematics C.E. 4: Tu. 2-3
  - Honours Hydraulics: F. 12-1
  - Honours Materials: (to be arranged)
  - Honours Structures: (to be arranged)
  - Honours Surveying: (to be arranged)

**Room No.**

- **Electrical Engineering**
  - 6.801S: M.238
  - 8.133: M.220
  - 8.141/142: M.238
  - 8.522: M.238
  - 8.613: M.238
  - Mathematics C.E. 4: E.47
  - Honours hydraulics: E.47
  - Honours Materials: E.43
  - Honours Structures: E.47
  - Honours Surveying: (to be arranged)

- **Civil Engineering**
  - 8.132: M.243
  - 8.141/142: M.243
  - 8.223: M.243
  - 8.522: M.243
  - 8.613: M.243
  - Mathematics C.E. 4: M.243
  - Honours Hydraulics: M.243
  - Honours Materials: M.243
  - Honours Structures: M.243
  - Honours Surveying: (to be arranged)

- **Mechanical Engineering**
  - 5.102: E.33
  - 5.321/322: E.33
  - 5.304/305: E.38
  - 5.503/601: E.48
  - 5.703/601: E.43

**Part-Time Engineering Students — B.Sc. (Tech.)**

- **Common First Stage**
  - Engineering I: 6
  - Mathematics I: 6

- **Common Second Stage**
  - Physics I: 6
  - Chemistry I: 6

- **Stage III**
  - Civil Engineering
    - Physics IIT: 3
    - Descriptive Geometry: 2
    - Materials & Structures: 3
    - Surveying: 2
    - Mathematics II: 3

- **Electrical Engineering**
  - Physics IIT: 6
  - Descriptive Geometry: 2
  - Electric Circuit Theory: 3
  - Mathematics II: 3

- **Mechanical Engineering**
  - Physics IIT: 3
  - Descriptive Geometry: 2
  - Electric Circuit Theory: 3
STAGE IV

Civil Engineering

5.701 Thermodynamics 14 Tu. 6-7.15 or Th. 10.30-11.45 E.48
5.501 Fluid Mechanics 14 Th. 9-10.15 or F. 3.45-5 E.48, E.40
5.501/5.701 Lab. 14 Tu. 7.30-9 or F. 2-3.30 E.48, E.40
8.121 Structures 3 Th. 2-5 E.48
8.112 Mathematics II Structures 3 F. 6-9 E.40
Geology 3

Electrical Engineering

6.052 Electrical Measurements 14 W. 6.15-7.45 M.220
6.152 Electrical Circuit Theory 3 Th. 1.30-5 M.203
8.112 Materials & Structures 3 F. 6.30-9.30 or Th. 2-5 E.40, E.41
Mathematics II Part 2 3 Th. 7-9, Tut. Th. 6-7 E.40, A.248
5.701 Thermodynamics 14 Tu. 6-7.15 or Th. 10.30-11.45 E.48
5.701 Lab. 14 Tu. 7.30-9 or F. 2-3.30 E.48, E.40

Mechanical Engineering

5.701 Thermodynamics 14 Tu. 6-7.15 or Th. 10.30-11.45 E.48
5.501 Fluid Mechanics 14 Th. 9-10.15 or F. 3.45-5 E.48, E.40
5.501/5.701 Lab. 14 Tu. 7.30-9 or F. 2-3.30 E.48, E.40
8.133 Structures 3 Th. 2-5 E.40
5.202 Mechanical Technology 1 Th. 12-1 E.41
Mathematics II part 2 3 Th. 7-9 Tut. Th. 6-7 E.40, A.248

STAGE V

Civil Engineering

8.521 Hydraulics 2 Th. 6-8 E.43
8.422 Surveying 2 Tu. 2-4.30 E.47
8.221 Engineering Materials 5 Th. 6-7.30 E.47
W. 9-11 E.47

Electrical Engineering

6.251 Electric Power Engineering 3 Tu. 1-2.30, Th. 12.30-2.30 M.235
6.356/7 Electronics 6 Tu. 2.30-4.30, Th. 2.30-4.30 M.235
                        F. 6-8 M.235
Seminar 2 Tu. 7.30-9.30 E.41

Mechanical Engineering

5.101 Mechanical Engineering Design 5 M. 6-9, Th. 9-11 E.33
5.302 Theory of Machines 2 Th. 2.40 E.38
5.204 Mechanical Technology 2 Tu. 11.30-1.30 E.33
6.801 Electrical Engineering Seminar 2 W. 6-9 M.203

STAGE VI

Civil Engineering

6.801 Electrical Engineering 3 W. 6-9 M.203
8.141/2 Engineering Computations 2 Tu. 4-6 E.48
8.222 Engineering Materials 2 Tu. 9-11 E.43
8.611 Civil Engineering 2 M. 6-8.30, Th. 5.30-7.30 E.48
8.612 Civil Engineering Seminar 2 Tu. 7.30-9.30 E.41

Electrical Engineering

4.922 Materials Science 2 Th. 6-8 M.208
6.052 Electrical Measurements 14 W. 6.15-7.45 M.208
6.262 Electric Machines 4 Tu. 3-5, F. 5.30-7.30 M.238
6.454 Power and Control Systems 2 M. 6-8, Tu. 1-3 M.238
Seminar 2 Tu. 7.30-9.30 E.41

Mechanical Engineering

5.102 Mechanical Engineering Design 3 Tu. 9-11, F. 6-7.30 E.33
5.321 Auto Control 14 Tu. 6-7.30 E.33
5.502 Fluid Mechanics 3 Tu. 1-4 E.48
5.702 Thermodynamics 2 Tu. 11-12.30, F. 7.30-8.30 E.33
6.802 Electrical Engineering 3 W. 6-9 M.235
5.304 Theory of Machines 1 Tu. 7.30-8.30 E.33
Seminar (Mechanical) 1 Tu. 4-5.30 E.43

OLD B.E. COURSE (See 1959 Handbook for details)
Timetable by arrangement with Head of Department.
GRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING

STAGE I

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STAGE II

Not available in 1967.

BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING

YEAR I — As for Common First Year

YEAR II

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<td>(Civil &amp; Mechanical only)</td>
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<td>Materials and Structures</td>
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YEARS IV & V — As for Years III & IV Bachelor of Engineering Courses.