GENERAL SECTION

CONSULT THE CALENDAR FOR:

Academic Dress
University of Newcastle Act, 1964 — 1970
By-laws
The Council
The Senate
Officers and Former Officers of the University
Prizes and Scholarships
University Medallists
Lists of Graduates and Diplomates

FOREWORD

I would like to take this opportunity of welcoming to the University all students of engineering, particularly those who are enrolling for the first time. We live in a time when the problems which society presents to the engineer grow every year more complex, more interesting, more deeply involved with the future of human society itself. We at the University hope that you will find real satisfaction in the time you spend here preparing for entry to this challenging profession.

Engineering courses of study provide a sound combination of the basic and applied sciences with professional practice, together with provision for study of the liberal arts. Part-time and Full-time courses are provided in the fields of Civil, Electrical, Industrial, Mechanical, and Chemical Engineering, as well as Naval Architecture. Also, the first two years or four stages of Mining Engineering and Surveying degree courses may be taken at this University and the degrees completed on a full-time basis at the University of New South Wales in Kensington.

The Faculty continues to grow rapidly. In 1969, total enrolments exceeded 500 for the first time, and in 1971 the total was well over 650; an increasing proportion of the total enrolments are in the postgraduate field, including the new formal Master's degree course M.Eng.Sc., first introduced in 1969. The Faculty's move to the Shortland campus, begun in May 1970, will finally be complete when early in 1972 we occupy our second classroom block: the sixth and last Engineering building on the Shortland site. From now on our affairs will be fully integrated with those of the University as a whole.

The sense of common purpose which creates a kind of unity among all engineers is no doubt at least partly responsible for the good staff-student relations which we continue to enjoy in the Faculty, and our increasing numbers have not affected the closeness of these relations. In 1970, for the first time, two students were elected to the Faculty Board's Undergraduate Studies Committee, and this new departure seems to have worked well so far. Typical of student participation in Faculty affairs was the recent presentation by the Engineering Fraternity of a memorial plaque commemorating Brigadier Corlette, one of Newcastle's most eminent engineers and one of the first honorary graduates of this University.

Finally, I should like to encourage students to participate fully in both Faculty and general University activities, and to remember that academic staff are here to help them in every way they can. When you need any kind of help or guidance, do not hesitate to consult with your Head of Department or other member of the academic staff.

F. M. HENDERSON
Dean
Faculty of Engineering
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- Elective Programmes
- Electives—Group B
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- Naval Architecture
- Postgraduate Diploma Subjects

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Foreword

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- Chemical Engineering
- Civil Engineering
- Electrical Engineering
- Mechanical Engineering

SUBJECTS TAUGHT IN

THE FACULTY OF ARTS

THE FACULTY OF ECONOMICS AND COMMERCE

THE FACULTY OF MATHEMATICS

THE FACULTY OF SCIENCE

MECHANICAL AND INDUSTRIAL ENGINEERING

DESCRIPTION OF ELECTIVE UNITS

Group A
Group B
Group C

PRINCIPAL DATES

1972

JANUARY

1 Saturday
New Year's Day

3 Monday
New Year's Day Holiday

7 Friday
Last day for lodgement of Re-Enrolment Forms—Continuing Students

17 Monday
Deferred Examinations begin

21 Friday
Last day for lodgement of Applications for Admission from persons resident in Australia who were enrolled in another Australian University in 1971 or who are seeking admission on the basis of examination results which were not available by 1st November, 1971.

29 Saturday
Last Day of Deferred Examinations

31 Monday
Public Holiday — Australia Day

FEBRUARY

16 Wednesday to
18 Friday
New students required to attend the University in person to have their enrolment approved and to pay fees.

22 Tuesday
Last day for payment of First Term Course Fees and Annual General Services Fee (i.e. the lodgement of enrolment approvals with the Cashier together with fees, scholarship voucher, fees warrant or extension notice)

28 Monday
FIRST TERM begins

MARCH

17 Friday
Graduation Day

31 Friday
Public Holiday — Good Friday
PRINCIPAL DATES

APRIL

1 Saturday to
4 Tuesday
25 Tuesday

PRINCIPAL DATES

1 Easter Recess
25 Tuesday

MAY

13 Saturday

FIRST TERM ends

JUNE

5 Monday
12 Monday
16 Friday

SECOND TERM begins
Public Holiday — Queen’s Birthday
Last day for payment of Second Term Fees.
Last day for acceptance of applications for examinations.

Last day for withdrawal without academic penalty from courses in the faculties of Arts and Economics and Commerce. For information regarding fees payable on withdrawal refer to page 35.

JULY

10 Monday

Last day for withdrawal without academic penalty from courses in all faculties other than Arts and Economics and Commerce. For information regarding fees payable on withdrawal refer to page 35.

AUGUST

12 Saturday

SECOND TERM ends

SEPTEMBER

4 Monday
15 Friday

THIRD TERM begins
Last day for payment of Third Term Fees

OCTOBER

2 Monday
27 Friday

Public Holiday — Eight Hour Day
Third Term Lectures and other Classes cease

NOVEMBER

4 Saturday
25 Saturday

THIRD TERM ends
Annual Examinations begin
Annual Examinations end

1973

FEBRUARY

26 Monday

FIRST TERM begins
FACULTY OF ENGINEERING

Dean
Professor F. M. Henderson

Sub-Dean
Mr. R. J. Wilson

CHEMICAL ENGINEERING

Professor
I. McC. Stewart, M.E.(Qld.), S.M.(M.I.T.), F.Inst.F.,

Senior Lecturer
W. G. Kirchner, M.Sc., Ph.D.(N.S.W.), A.S.T.C.,

Lecturers
B. W. Lancaster, M.Sc.(N.S.W.), Ph.D.(Melb.)
J. Roberts, B.Sc.(N.S.W.), M.E., A.S.T.C., A.R.A.C.I.
K. L. Smith, B.E.(Syd.), M.Sc.(N.S.W.), Ph.D.

STUDENT ADVISER
Dr. W. G. Kirchner

CIVIL ENGINEERING

Professor
F. M. Henderson, M.Sc., B.E.(N.Z.), M.I.C.E., M.ASCE,
F.I.E.Aust.

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

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

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

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

Professor

Associate Professor
J. B. Moore, B.E., M.Eng.Sc.(Qld.), Ph.D.(Santa Clara), M.I.E.E.E.

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

Lecturers
T. E. Fortmann, M.S.(Stan.), Ph.D.(M.I.T.), M.I.E.E.E., M.S.I.A.M.

Professional Officers

MECHANICAL ENGINEERING

Professor

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

Senior Lecturers
E. Betz, M.E., Ph.D.(N.S.W.), A.S.T.C., F.I.E.Aust.
G. D. Butler, B.E.(N.S.W.), M.Sc.(Cranfield), A.S.T.C., M.I.E.Aust., A.M.O.R.S.

Lecturers
L. W. Browne, B.E.(Syd.)
M. J. Hallinan, A.S.T.C.
K. L. Hitz, B.E.(N.S.W.), Ph.D., Grad.I.E.Aust.
H. A. Willems, B.E.(N.S.W.), M.E., Dipl. Naval Arch. M.T.S.(Dordrecht), A.S.T.C.

Senior Tutors
R. D. Parbery, B.E., B.Sc.
B. T. Valaire, B.Sc.(Tech.) (N.S.W.), Grad.I.E.Aust.

Professional Officers
B. J. Hill, B.Sc.(Eng.), Grad.I.E.Aust.,
R. J. Scobie, A.S.T.C.
O. J. Scott, B.E.
ADMINISTRATIVE STAFF

Vice-Chancellor and Principal

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

Deputy Vice-Chancellor

Personal Assistant to Vice-Chancellor
A. Nell Emanuel, B.A.(N.S.W.)

—☆—

BURSAR'S DIVISION

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

Deputy Bursar
L. F. Norberry, A.A.S.A., A.C.I.S.

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

Assistant Bursar — Staff
R. J. Goodbody

—☆—

SECRETARY'S DIVISION

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

Student Administration
J. D. Todd, B.Com., A.A.S.A.
P. H. Beckett, B.A.(Syd.)

Examinations
Glennie Jones, B.A.(N.S.W.)

Faculty Secretariat
J. S. Boydell, M.A.(Cantab.)
T. G. Chapman, B. A.(Syd.)
D. L. Farmer, B.Sc., Dip.Ed.(Syd.)

Publications and Publicity
J. W. Armstrong, B.A.
E. Joan Bale, B.A.(N.S.W.)

Statistics and Systems
T. R. Rodgers, B.A.

—☆—

PLANNER'S DIVISION

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

Assistant Planner

Assistant Staff Architects
W. J. Crook, B.Arch.(N.S.W.), A.R.A.I.A.
A. Lee, A.S.T.C.

Staff Engineer
ADMINISTRATIVE STAFF

STUDENT COUNSELLING UNIT

Senior Counsellor
A. P. T. Loftus, B.A.(Melb.), M.A.Ps.S.

Student Counsellor
B. E. Hazell, M.A.(Syd.), M.A.Ps.S.

Assistant Student Counsellor

APPOINTMENTS OFFICE

Appointments Officer
H. Floyer, B.Ec.(Syd.)

COMPUTER CENTRE

Director

Programmer
I. R. Beaman, B.Sc.(N.S.W.), Dip.Ind.Eng.

THE LIBRARY STAFF

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

Assistant University Librarian (Technical Services)
M. Elizabeth Guilford, B.A.(N.E.), A.L.A.A.

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

Acquisitions Librarian
Barbara R. Cook, B.A.; Dip.Lib.(N.S.W.), A.L.A.A.

Serials Librarian
B. Mitcheson, B.A., A.L.A.A.

Assistant Librarians
C. I. Walsh, B.A.(W.Ont.), Dip.Lib.(N.S.W.)

Graduate Library Staff
Janet M. Brice, B.A.(N.S.W.)
L. Faldiga, B.A.
Carolyn R. Fredman, B.A.(N.S.W.)
Anna M. Lee, B.Sc.
Winifred Murdoch, B.Sc.(N.E.)
Mary E. Rabbitt, B.A.(N.S.W.)
Barbara E. Samojluk, B.A.
Jennifer M. Scobie, B.A., Dip.Ed.(Syd.)
The University of Newcastle began its existence as the Newcastle University College of the University of New South Wales, then known as the New South Wales University of Technology. The College was formally opened on 3rd December, 1951, and the first students were enrolled in the 1952 academic year. By the University of Newcastle Act of 1964 it became an autonomous institution on 1st January, 1965.

Enrolments in the first year of the College's existence totalled 370 of whom only five were starting degree courses — the others were seeking a diploma or were converting their diplomas into degrees. In 1954 courses in the Faculty of Arts were offered for the first time. As the New South Wales University of Technology, whose courses were given in the College, had no Faculty of Arts, supervision of these courses was entrusted to the University of New England. This relationship continued until 1959 by which time the New South Wales University of Technology had become the University of New South Wales and was empowered to offer courses in the Faculty of Arts. Enrolments have steadily increased, reaching 1000 in 1960 and 3571 in 1971.

The Newcastle University College was established on the site of the Newcastle Technical College at Tighe's Hill. In 1960 an area of some 200 acres was acquired at Shortland and building commenced in 1964. The transfer of the University began at the end of 1965. Courses in all faculties are now given on the Shortland Campus.

The University is governed by a Council of twenty-four members. The Chancellor, who acts as chairman, is chosen either within the twenty-four members or from outside, the size of the Council being increased to twenty-five in the latter instance. The Council comprises representatives of the University staff, Convocation, the students, the Legislative Council and the Legislative Assembly; nominees of the Governor; and the Vice-Chancellor, who is the chief executive officer of the University.


The principal academic body in the University is the Senate comprising the Vice-Chancellor, Professors, a representative of each of the Faculty Boards and certain other ex officio members. Teaching and research in each Faculty are supervised by a Faculty Board consisting principally of the permanent academic staff of the Departments in the Faculty. A number of Boards of Studies have also been established, each board having the task of integrating or supervising activities in a particular area of interest.
MATRICULATION

The By-laws governing matriculation and admission to courses are set out below. The University does not conduct its own matriculation examination but recognises the New South Wales Higher School Certificate Examination and the University of Sydney Matriculation Examination for this purpose.

By-law 5.1 — Matriculation

1. (1) Except as provided in By-law 5.3.3, a candidate, before being admitted to matriculation, shall:

(a) have passed in the New South Wales Higher School Certificate Examination or the University of Sydney Matriculation Examination in at least five recognised matriculation subjects, one of which shall be English and any three of which shall be passed at least at second level; and

(b) have attained in that examination the aggregate of marks prescribed by the Senate from time to time and calculated in the manner determined by the Senate.

(2) The recognised matriculation subjects shall be:

- English
- Greek
- Chinese
- Mathematics
- Latin
- Japanese
- Science
- French
- Hebrew
- Agriculture
- German
- Dutch
- Modern History
- Italian
- Art
- Ancient History
- Bahasa Indonesia
- Music
- Geography
- Spanish
- Industrial
- Economics
- Russian
- Arts

(3) Mathematics and Science, both passed as full courses, together shall, for the purpose of sub-section (1) (a) of this section, be counted as three subjects, but otherwise, each shall count as one subject.

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

2. A person who has applied to undertake a course of study as a matriculated student shall upon —

(a) the approval of his admission to a Faculty and the payment of such fees as may from time to time be determined by the Council; and

(b) signing the Matriculation Register of the University become a matriculated student of the University and shall be deemed to have accepted the privileges and obligations of membership of the University.

By-law 5.3 — Admission to Courses

1. (1) A candidate for any first degree of the University shall satisfy the conditions for admission to matriculation set out in By-law 5.1.1 or shall have been admitted to matriculation under section 3 of this By-law before entering on any course for such degree. Compliance with the conditions for admission to matriculation shall not in itself entitle a person to enter upon a course.

(2) A person who has satisfied the conditions for admission to matriculation 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. A candidate for any degree shall before entering on the course for that degree have satisfied any special conditions prescribed under By-law 5.2.

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 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: A person, not being a matriculated student, shall not have the privileges of a matriculated student and shall not be eligible to proceed to a degree.

PREREQUISITES

Although prerequisites are not prescribed, lectures in the following faculties, courses or subjects will be given on the assumption that students will have studied for the New South Wales Higher School Certificate the subjects listed below to the level indicated:—
MATRICULATION

FACULTY

APPLIED SCIENCE
Second level Short Course Mathematics and Science including Physics and Chemistry options.

ARCHITECTURE
Second level Short Course Mathematics and Science.

ARTS
Economics I — Second level Short Course Mathematics.
English I — Second level English.
French I — Second level French.

ECONOMICS AND COMMERCE
Second level Short Course Mathematics.

ENGINEERING
Second level Short Course Mathematics and Science including Physics and Chemistry options.

MATHEMATICS
Second level Short Course Mathematics.

SCIENCE
Second level Short Course Mathematics and Science.

PROCEDURES

ENROLMENT

All forms relating to enrolment are obtainable from the Student Administration Office, Room G.63, Building “A”.

PERSONS SEEKING ADMISSION TO AN UNDERGRADUATE COURSE AT THE UNIVERSITY OF NEWCASTLE FOR THE FIRST TIME

Students seeking admission in the 1972 academic year will be required to lodge an “Application for Admission — 1972” with the Student Administration Office not later than

(a) 5.00 p.m. on Monday, 1 November, 1971, in the case of:
   — persons resident in Australia who are seeking admission on the basis of qualifications which they already hold at 1 November, 1971;
   — persons resident outside of Australia or persons applying for admission on the basis of qualifications gained outside Australia.

(b) 5.00 p.m. on Friday, 21 January, 1972, in the case of:
   — persons resident in Australia who
   (i) are seeking admission on the basis of the results of examinations taken after 30 September, 1971;
   (ii) in 1971 have been enrolled in another Australian University;
   or
   (iii) have applied to attempt the University of Sydney Matriculation Examination in February, 1972.

No guarantee can be given that applications received after the prescribed dates will be considered.

Applications sent by post should be addressed to The Secretary, The University of Newcastle, N.S.W. 2308.

Students proposing to attempt the University of Sydney Matriculation Examination in February, 1972 should indicate on the application for admission the subjects and levels proposed to be offered for examination, and must advise the Secretary of their results as soon as they are known.
PROCEDURES

Documentary evidence must accompany each application where studies have been carried out at secondary educational institutions outside New South Wales or where previous University studies have been undertaken.

Each student will be advised by letter of the outcome of his application and those accepted will be informed of the procedures to be followed for the completion of enrolment. However, it should be noted that in 1972 new students will be required to attend the University in person to have their enrolment approved and to pay fees. The days Wednesday, 16 February to Friday 18 February, 1972 have been set aside for this purpose.

PERSONS RE-ENROLLING IN UNDERGRADUATE COURSES

Undergraduates re-enrolling will be required to complete an enrolment form and lodge it with the Student Administration Office on or before Friday, 7 January, 1972. Students enrolled in 1971 will be sent a re-enrolment form with the advice of their examination results in December.

Students awaiting deferred or special examination results must also lodge a re-enrolment form on or before Friday, 7 January, 1972. The re-enrolment form should be completed on the basis that the student will be successful at the deferred or special examinations. Students unsuccessful at the deferred or special examinations will be notified in writing of the action they will be required to take to have their re-enrolment in 1972 approved.

Approval of Re-Enrolment

When a student's re-enrolment programme has been approved the authorised re-enrolment form will be posted to the student at his home address unless he indicates that it should be posted to his term address.

CANDIDATES FOR POSTGRADUATE DIPLOMA COURSES

DIPLOMA IN APPLIED PSYCHOLOGY

Applicants for admission to the Postgraduate Diploma in Applied Psychology are selected biennially. No new candidates will be accepted in 1972.
PROCEDURES

DIPLOMA IN INDUSTRIAL ENGINEERING

Intending candidates will be required to complete an Application Form to register as a candidate for the Postgraduate Diploma course in Industrial Engineering and lodge it with the Student Administration Office on or before Friday, 21 January, 1972.

Each student, whose undergraduate studies were undertaken in another University, will be required to submit a full transcript of his academic record with his application.

CANDIDATES FOR THE DEGREE OF MASTER OR OF DOCTOR OF PHILOSOPHY

Candidates Re-Enrolling

A letter will be sent by the University to each candidate whose re-registration is approved. A higher degree enrolment form will be enclosed with the letter and the candidate will be required to complete the form and return it to the Student Administration Office on or before Friday, 7 January, 1972.

Candidates Registering for the First Time

These persons should complete an Application Form to register as a candidate for a Higher Degree and lodge it with the Student Administration Office on or before Friday, 21 January, 1972. A separate application form will be available for candidates wishing to register for a Course Work Masters degree.

NON-ACCEPTANCE

The student whose enrolment is not accepted will be notified in writing.

LATE ENROLMENTS

(i) Students who are unable to lodge their Application Form or Enrolment Form by the prescribed date, shall make written application to The Secretary for an extension of time. This application must be received by The Secretary on or before Friday, 21 January, 1972 in the case of new students, or Friday, 7 January, 1972 in the case of students re-enrolling. otherwise the University reserves the right not to accept the student's application or enrolment.

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

(iii) Deferred Examinations

A student who has taken a deferred examination or special examination will be required to lodge an Enrolment Form with the Student Administration Office within one week from the day of publication of the examination results.

"SHOW CAUSE" STUDENTS

Students who, after failure at the annual examinations, are required to "show cause" why they should be allowed to continue in a course or to re-enrol in a subject (or subjects) as the case may be, will be informed of this fact in writing after notification of examination results in December. Such a student will be provided with a form on which he must state his "show cause" case.

The student's "show cause" statement and completed re-enrolment form must be lodged with the Student Administration Office on or before Friday, 7 January, 1972.

STUDENTS WISHING TO RE-ENROL AFTER A PERIOD OF EXCLUSION

A student wishing to re-enrol after a period of exclusion should make an appointment for an interview with the Dean of the Faculty concerned before Friday, 7 January, 1972 to present his case for the acceptance of his re-enrolment.

UNIVERSITY SKILLS ASSESSMENT

In the first week of First Term as part of its service to students, the Student Counselling Unit holds a voluntary half day session in which a variety of skills relevant to university work, such as Reading Speed, Note-Taking, Study Skills etc. are tested. Attendance is voluntary and results are completely confidential. Many students derive benefit from later discussing their results with a counsellor. Some students are later invited, (on the basis of a weak result) to participate in a course designed to overcome their particular difficulty.

ENROLMENT IN CORRECT SUBJECTS

Considerable inconvenience is caused to the University and to the student if he attends classes in a subject in which he has not enrolled. It is essential that the student consider carefully the subjects he is required, or wishes, to enrol in before submitting his Enrolment Form.
WITHDRAWAL FROM THE 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 is regarded as not passing the examination (unless withdrawal without penalty has been approved).

A student is required to notify The Secretary to the University in writing of his withdrawal within seven (7) days of the date of withdrawal. Unless the Dean of his Faculty grants him permission to withdraw without penalty, a student who withdraws after the date shown below will be deemed to have failed in the subject or subjects from which he withdraws.

(a) Faculties of Arts, and Economics and Commerce
   Second Friday in Second Term
(b) Faculties of Applied Science, Architecture, Engineering, Mathematics, and Science
   Sixth Monday in Second Term

AMENDMENTS

Any action taken by a student which involves an amendment to or a variation in his course programme or enrolment status is required to be documented.

A student must formally apply for permission to do any of the following:

(a) completely withdraw from course
(b) withdraw from a subject or subjects
(c) substitute one subject for another
(d) add a subject to existing programme
(e) transfer from F/T to P/T within degree course
(f) transfer from P/T to F/T within degree course
(g) transfer from one degree course to another
(h) transfer from a degree course in one Faculty to a degree course in another Faculty

If the variation sought is not listed above, a brief indication of the nature of the change sought is required.

NOTES

1. Exemptions in a subject unit or units, the substitution of a unit or units within a subject and exemption from practical work, is the responsibility of the Head of the Department concerned who will authorise such exemption or exemptions.
2. Students are reminded that compliance with the Degree or Diploma Requirements governing their courses is their responsibility. Approval of a Variation Application does not of itself entitle the applicant to any rights or privileges to which the completion of his previous programme might have entitled him.

HOW TO DOCUMENT WITHDRAWALS AND AMENDMENTS

All withdrawals and amendments should be recorded on a Variation Application Form.

It is essential that students notify the Student Administration of variations in their courses promptly. Automatic approval is not given: the student must have valid and sufficient reasons for making the change and these reasons should be stated on the Variation Form.

Variation Forms are available from the Student Administration Office.

CHANGE OF ADDRESS

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

A Variation Application Form should be used to notify a change of address.

IDENTITY CARDS

Each student wishing to obtain a travel concession, to borrow a book from the Library or to confirm his membership of the Newcastle University Union is required to produce on demand the identity card which will be given to him.
PROCEDURES

Identity cards will be issued to students at the Student Administration Office and should be available for collection soon after the commencement of First Term. The student will be required to produce his fee receipt before an identity card will be issued to him.

A notice will be displayed on notice boards and inserted in “University News” advising students when identity cards are available for collection.

Loss of Identity Card

If a student loses his identity card he should pay to the University Cashier, the sum of 50 cents, and present the receipt to the Student Administration Office for the purpose of obtaining a replacement card.

Return of Identity Card

Each student, who during the academic year withdraws completely from his course, will be required to hand his Identity Card to the Student Administration Office before leaving the University.

Non-Degree Students and Identity Card

Each non-degree student, who does not elect to pay the General Service Fee, will be issued with an identity card appropriately endorsed. It must be shown on request to prove status as a student of the University.

TRAVEL CONCESSIONS

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

Application forms for these concessions may be obtained at the Student Administration Office, Building “A”.

The Student’s Identity Card has to be produced each time a concession is required.

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 who are 18 but under 30 years of age and 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, Teachers’ College Scholarships or Bursaries granted by the State Bursary Endowment Board.

(c) Concessions are not available to students who are 30 years of age or over; or to married women or ordained clergymen.

TRAIN —

(a) Periodical tickets are available during term 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 classes 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.

LOST PROPERTY

Inquiries regarding lost property should be directed to the Attendant (Patrol) at the rear of the Main Lecture Theatre B01 (Room 04).
FEES

GENERAL INFORMATION

COMPLETION OF ENROLMENT

Fees are determined by the University Council and are subject to alteration without notice.

Enrolment is not effective until fees for the course in which the student has enrolled, are paid. Fees should be paid on or before Tuesday, 22 February, 1972. After that, a late fee will apply. Enrolments will not be accepted after 31 March, 1972 without the Secretary’s special written approval. This will be given only in exceptional circumstances.

Payment of fees by mail is encouraged. Money Orders should be made payable at the Newcastle University Post Office, 2308. The Cashier’s Office is located on the first floor of the Administration Building. A continuous service will apply from 9.00 a.m. to 4.30 p.m. Monday to Friday throughout the year with the exception of vacation periods when the Cashier’s Office will be closed between 12.30 p.m. and 1.30 p.m.

Any alterations to the Cashier’s hours during enrolment periods will be published in the press and displayed on selected University notice boards.

PAYMENT OF FEES BY TERM

The Entrance Fee and General Services Fee must be paid in full at the time of enrolment. However, students may pay Course Fees by the term, in which case they are required to pay First Term Course Fees and the whole of the General Services Fee by the due date.

Students paying fees under this arrangement will receive accounts for Second and Third Term fees prior to the commencement of these terms.

EXTENSION OF TIME IN WHICH TO PAY FEES

Students who are unable to pay fees by the prescribed date may apply in writing to the Vice-Principal for an extension of time in which to pay fees. Special forms are available for this purpose. Completed forms must be forwarded to the Vice-Principal’s Office before Wednesday, 16 February, 1972.

SCHOLARSHIP HOLDERS AND SPONSORED STUDENTS

Students holding scholarships or receiving other forms of financial assistance must attach to their authorised enrolment forms submitted to the Cashier, warrants or other forms of documentary evidence that their fees will be paid by Sponsors. The University looks to Sponsors to provide a separate voucher, warrant or letter for each student sponsored. Where such documentary evidence is not available, students are expected to make payment by the due date to avoid late fees and apply for a refund of fees when the authority required is available.

DATES FOR PAYMENT OF FEES IN 1972

<table>
<thead>
<tr>
<th>TERM</th>
<th>FIRST TERM</th>
<th>SECOND TERM</th>
<th>THIRD TERM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Fees payable before or on</td>
<td>$6.00 payable on and after</td>
<td>$10.00 payable on and after</td>
</tr>
<tr>
<td>FIRST TERM</td>
<td>Tuesday February 22</td>
<td>Wednesday February 23</td>
<td>Thursday March 30</td>
</tr>
<tr>
<td>SECOND TERM</td>
<td>Friday June 16</td>
<td>Monday June 19</td>
<td>Monday July 3</td>
</tr>
<tr>
<td>THIRD TERM</td>
<td>Friday September 15</td>
<td>Monday September 18</td>
<td>Tuesday October 3</td>
</tr>
</tbody>
</table>

* Refer page 37 for other Late Fees

FAILURE TO PAY FEES

Students cease to be entitled to membership and privileges of the University where they are indebted to the University and fail to make settlement or satisfactory arrangements regarding their indebtedness. 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 or amounts due for other purposes are outstanding. In very special cases, the Vice-Principal may grant exemption from this disqualification upon receipt of a written statement setting out all the relevant facts.

FEE ADJUSTMENTS

Should an application to withdraw from a course or a subject be approved, the University will consider an application for an adjustment of course fees based on the student’s last date of attendance at lectures or tutorials. All correspondence dealing with adjustments to fees should be addressed to the Accountant.
FEES

Where notification of withdrawal from a course is received by the Secretary 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 of term, no refund will be made for that term.

THE UNIVERSITY RESERVES THE RIGHT TO DEFER PROCESSING APPLICATIONS FOR FEE REFUNDS RECEIVED IN THE EARLY PART OF FIRST TERM UNTIL AFTER THE SIXTH WEEK OF FIRST TERM.

The University Administration does not refund any portion of the General Services Fee. Students withdrawing from courses may enquire of the University Union, Sports' Union and Students' Association regarding refund possibilities.

DESIGNATION OF STUDENTS

FULL-TIME STUDENTS

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 until the written approval of the Dean of the Faculty is given that he be re-classified as a part-time student. This re-classification would be exceptional.

PART-TIME STUDENTS

A Part-Time Student is either one who enrolls in half or less than half of 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

A Non-Degree Student is a student who is permitted to enrol in one or more subjects of a first degree course. Such a person is not eligible to proceed to a degree and cannot enjoy the privileges of a matriculated student. A student enrolled in the Professional Accounting Studies course in the Faculty of Economics and Commerce is classified as a Non-Degree student taking one subject.
FEES

OTHER FEES

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deferred examinations, per subject</td>
<td>$4</td>
</tr>
<tr>
<td>Examination under special supervision, per paper</td>
<td>$8</td>
</tr>
<tr>
<td>Review of examination results, per subject</td>
<td>$6</td>
</tr>
<tr>
<td>Statement of matriculation status</td>
<td>$6</td>
</tr>
<tr>
<td>Laboratory Kits, per kit</td>
<td>$8</td>
</tr>
</tbody>
</table>

FEES FOR THE DEGREE OF MASTER

(a) Research and Thesis

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Fee</td>
<td>$5</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (full-time)</td>
<td>$138 p.a.</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (part-time)</td>
<td>$93 p.a.</td>
</tr>
<tr>
<td>Final Examination &amp; Graduation Fee</td>
<td>$36</td>
</tr>
</tbody>
</table>

(b) Course Work and Dissertation or Formal Study Courses (Master of Eng. Sc.)

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Registration Fee</td>
<td>$5</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (full-time)</td>
<td>$330 p.a.</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (part-time)</td>
<td>$198 p.a.</td>
</tr>
<tr>
<td>Final Examination &amp; Graduation Fee</td>
<td>$36</td>
</tr>
</tbody>
</table>

FEES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualifying Examination Fee (if applicable)*</td>
<td>$15</td>
</tr>
<tr>
<td>Registration Fee</td>
<td>$5</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (full-time)</td>
<td>$138 p.a.</td>
</tr>
<tr>
<td>Course &amp; Supervision Fee (part-time)</td>
<td>$84 p.a.</td>
</tr>
<tr>
<td>Final Examination &amp; Graduation Fee</td>
<td>$51</td>
</tr>
</tbody>
</table>

*Payable when an examination is prescribed for the assessment of a student prior to registration as a higher degree candidate.

HIGHER DEGREE FEES

Course and Supervision Fee

This fee for Higher Degree candidates is assessed on a term basis, the period of registration being from the first day of the term to the Friday immediately preceding the first day of the following term. Candidates proceeding to a Higher Degree must enrol or re-enrol at the beginning of each academic year at the normal enrolment time. The usual late fees apply in respect of late enrolments.

All fees and monies owing to the University by a Higher Degree candidate must be paid before the student's thesis can be lodged for examination.

Where a Higher Degree candidate withdraws from a course during a term, no portion of the term fee will be refunded.

General Services Fee

Higher Degree candidates are required to pay the General Services Fee (see page 37). Where a Higher Degree candidate’s enrolment is effective from first or second term, the General Services Fee covers a period of registration from the first day of the term to the Friday immediately preceding the first day of first term in the following academic year. Where a Higher Degree candidate enrols on or after the first day of third term, the General Services Fee paid will cover liability in respect of this fee to the end of the long vacation following the next academic year.

Re-submission of Thesis

A candidate required to re-submit a thesis, will not be required to pay further fees, unless laboratory work is involved, in which case the appropriate course and supervision fee will be payable on a term basis. The General Services Fee will also apply.
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 to which he is proceeding.

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.

NOTICE BOARDS

EXAMINATIONS

A notice board has been placed on the wall opposite the entrance to the Main Lecture Theatre (B.01) for the specific purpose of displaying examination timetables and notices concerning all matters pertaining to examinations. Students are specifically requested to be acquainted with the notices periodically displayed thereon.

STUDENT MATTERS GENERALLY

The Main notice board is the display point for notices concerning enrolment matters, scholarships, University rules and travel concessions, etc. This notice board is located on the first floor at the top of the main staircase in Building "A".

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.

OWNERSHIP OF STUDENT'S WORK

Unless other arrangements have been agreed upon 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 Identity Card as evidence that they are entitled to the rights and privileges afforded by the University.

Each student wishing to obtain a travel concession, to borrow a book from the Library or to confirm his membership of the Newcastle University Union is required to produce on demand his identity card. Identity cards will be available for collection at the Student Administration Office soon after the commencement of First Term. The Student must produce his fee receipt before an identity card will be issued.

Loss of Identity Card

If a student loses his identity card, he should pay to the University Cashier, the sum of 50c., and present the receipt to the Student Administration Office for the purpose of obtaining a replacement card.

Return of Identity Card

Each student, who during the academic year withdraws completely from his course, will be required to hand his Identity Card to the Student Administration Office before leaving the University.
GENERAL REQUIREMENTS

CHANGE OF ADDRESS

Students are responsible for notifying the Student Administration Office in writing of any change in their address as soon as possible. Failure to do this could lead to important correspondence or course information not reaching the student. The University cannot accept responsibility if official communications fail to reach a student who has not notified the Student Administration Office of a change of address. The Transport Authorities may challenge a student whose address on his identity card is incorrect. A change of address should be notified on a Variation Application Form.

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

TRAFFIC REGULATIONS

1. "Authorised Person" means a person authorised in writing by the Vice-Chancellor for the purposes of these Regulations.

"Notice" means a written advice signed by an authorised person on behalf of the Vice-Chancellor.

2. Any student, member of the academic staff or other person employed by the University who wishes to bring a motor vehicle on to the Shortland site shall obtain a University parking permit which shall be clearly displayed on the vehicle.

3. No person shall park or leave any vehicle on the Shortland site except in places set aside from time to time for parking.

4. No person shall drive any vehicle on to the University site:
   (a) in a dangerous or careless manner
   (b) at a speed exceeding 20 miles per hour
   (c) so as to cause undue noise
   (d) other than on formed roads currently open for traffic

5. The driver of any vehicle within the Shortland site shall comply with the directions shown on all traffic signs, road markings and directory notices. Government traffic regulations shall apply to marked pedestrian crossings.

6. Any person who contravenes or fails to observe any of the above regulations may be advised in writing by a notice which may be posted or handed to the person or affixed to his vehicle by an authorised person.

7. Any person who contravenes or fails to observe any of these regulations shall, if a student, be deemed guilty of a breach of discipline (By-Law 4) or if in the employ of the University, be deemed guilty of a breach of regulations and may be dealt with accordingly.

8. The maximum penalty for the time being which may be applied under these regulations shall be the banning for a period of three months of any vehicle driven by the person concerned.

NOTE:

Permits may be obtained from the Senior Attendant (Patrol) in Room 04 at the rear of the main lecture theatre (B.01) between 9 a.m. and 5 p.m. on Mondays to Fridays inclusive.
EXAMINATIONS

Examinations and other exercises may be held in any subject and at any time. In the assessment of a student's progress in a University course, consideration will be given to laboratory work and class exercises and to any term or other tests conducted throughout the year. The results of such examinations and class work may be incorporated with those of the annual examinations.

ANNUAL EXAMINATIONS

A student desiring to sit for an annual examination must lodge an application with the Secretary on the appropriate form by the prescribed date, 16 June, 1972.

A student who, because of religious convictions, would prefer not to sit for an examination on a particular day or particular day of the week should indicate this in writing when lodging his application to sit for examinations. While the University cannot guarantee to meet such requests it will be willing to co-operate where possible.

The cashier is authorised to receive application forms during the three weeks immediately following the prescribed closing date if they are accompanied by a late fee of $4.00. Applications submitted more than three weeks after the closing date will not be accepted except with the approval of the Secretary. Where an application is not accepted, the student concerned is not eligible to sit for the examination.

No student is eligible to attend the annual examination in any subject if any portion of fees or other charges due by him is outstanding by the end of the third week of third term.

The annual examinations take place in November-December. Timetables showing the time and place at which individual examinations will be held will be posted on the examinations notice board near the Main Lecture Theatre. Misreading of the timetable will not under any circumstances be an acceptable excuse for failure to attend an examination.

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

(a) Candidates are required to obey any instruction given by a Supervisor 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 of the examination.
(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 for the commencement of the examination.
(e) No candidate shall be permitted to leave the examination room before the expiry of thirty minutes from the commencement of the examination.
(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 an examination.
(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.

FURTHER EXAMINATIONS

After completion of the written annual examination papers, a student may be called upon by an examiner to complete further written, practical or oral tests as part of the annual examination. It is therefore important that the Examinations Section be advised of any change in address from that given on the Application for Admission to Examinations.

EXAMINATION RESULTS

The official examination results will be posted on the notice board at the top of the main staircase. Each student will be advised by mail of his examination results. A set of examination results will be offered to the newspapers for publication. No results will be given by telephone.

Examination results may be reviewed for a fee of $6.00 per 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 prescribed fee by the date notified in the publication of results.
EXAMINATIONS

SPECIAL EXAMINATIONS

Special examinations may be granted according to the conditions contained in By-Law 5.9.3 which states:

5. When a candidate is prevented by illness or by any 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 before the commencing date of the examination supported by medical or other proper evidence may direct the examiners to take the circumstances into account in determining whether or not a special examination should be provided for the candidate in any subject in which he does not pass at the annual examination.

7. When a candidate at the annual examination is to a substantial degree affected by illness during the course of an examination in any subject 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 in the Faculties of Applied Science, Architecture, Engineering, and Mathematics. The examinations will be held in January-February and results will be published in the same manner as for the annual examinations.

ACADEMIC PROGRESS REQUIREMENTS

GENERAL

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, the University has enacted certain By-laws relating to continuation in a course. The relevant By-laws are set out below.

BY-LAWS

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 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.

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 reasonable probability that he will make satisfactory progress in his studies it may authorise the re-admission of that student under such condition 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.

PROCEDURES

The onus is on a student required to "Show Cause" to take the appropriate action should he wish to re-enrol. Such a student must lodge his "Show Cause" statement and completed re-enrolment form by the date prescribed each year to ensure consideration of his case.
THE LIBRARY

The Library, totalling approximately 190,000 volumes and made up of monographs, pamphlets, serials and microform sets, exists to acquire, preserve and make available for use all research materials needed by the staff and students of the University.

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 his first visit to the Library the student is provided with a brochure outlining the Library's resources, its services, such as the copying service, its special facilities, such as the microprint reading room, and procedure for borrowing.

The Library, fittingly, occupies a central position on the site, next to the Union.

HOURS OF OPENING

During academic year

Monday-Friday 8.30 a.m. to 10.00 p.m.
(long vacation excepted)

Saturday and Public Holidays 9.00 a.m. to 5.00 p.m.
(all vacations excepted)

Sunday 1.00 p.m. to 5.00 p.m.
(all vacations excepted)

The Library is closed for the Easter Weekend, i.e., March 31—April 4 inclusive.

During long vacation

Monday, Wednesday, Friday 9.00 a.m. to 5.00 p.m.

Tuesday, Thursday 9.00 a.m. to 7.00 p.m.

UNIVERSITY SERVICES

AMENITIES

The Amenities Office is located in the temporary building adjacent to the main University building.

The Amenities Officer and his Staff assist students in the following fields:

SPORT

The Amenities Officer, Mr. Bradford is liaison officer for all sporting matters between the Sports Union, the University and all outside sporting organisations.

The Amenities Office assists student Sporting Clubs in the arranging of Inter-varsity contests and travel as well as giving help when required at club level.

ACCOMMODATION

The Amenities Office conducts a student accommodation service for students requiring housing and will deal with any accommodation problems which students may encounter while attending the University. A register is maintained of rooms, flats and private board available in Newcastle. Do not hesitate to use this service which is operated for the convenience of students.

INSURANCE

The Amenities section on behalf of the Sports Union is responsible for the operation of the Personal Accident Insurance Scheme.
UNIVERSITY SERVICES

APPOINTMENTS OFFICE

The Appointments Office was established in 1971 primarily to help students obtain information about careers and to assist graduating students find employment.

All new students are invited to consult the Appointments Office sometime during their first year at the University. Follow up consultations during second and third years may serve to bring the student to a state of mind where he or she feels confident that his or her chosen career is suitable and within the realms of possibility. The Appointments Office would hope to have available or to obtain information for the student in order that by a little research in the early years, frustration and disappointment can be avoided after graduation.

Careers Library
1. A section of the Careers Library will contain books, periodicals, articles, etc. giving general information on various professional occupations.
2. Information is being assembled about the manpower requirements of numerous employers — types of graduates needed, educational qualifications for appointment, experience gained, prospects etc.
3. Professional associations are being approached to supply information about the activities of their bodies, conditions of membership and application forms.

During 1972 it is hoped that the Appointments Office will move into Building "A", when a Library and Reading Room will become available in which students may consult relevant material.

Employer Interviews
Some employers have representatives come to the University for the purpose of giving students first hand information about the kinds of graduates recruited, the job involvement, salaries, prospects etc.
Students make appointments to interview the representatives singly or in small groups.

Employment Vacancies
Some Government Departments inform the University on a regular basis of vacancies within their organizations, other employers only as specific vacancies occur.
The 'Positions Vacant' columns of a major local newspaper are always on hand.

The Sydney University Appointments Board has indicated that where a Newcastle University student proves he is a bona-fide student, he can obtain copies of the "Notices of Vacancies" prepared by that Board, upon payment of the current nominal fee.

Casual and Part-time Employment
Unfortunately, it is a fact of life that some students do not have enough money to sustain them during University studies, and have to supplement their financial resources by part-time or casual work. Students may call at the Appointments Office at the commencement of each year and complete a card indicating their needs. As opportunities are notified to the Appointments Office, appropriate students are informed.

The Appointments Office will provide administrative assistance to the Faculties seeking professional vacation employment for their students. Vacation employment will be sought for those students seeking employment for financial reasons.

Graduate Careers Directory
The Graduate Careers Council of Australia prepares a Directory in three parts for distribution each year to graduating students. The Directory provides general background information on the types of appointments that will be available with a large number of employer organizations in the ensuing year. The Appointments Office arranges distribution of this Directory; a few spare copies are available upon request for undergraduates.

All students are invited to consult and use the resources of the Appointments Office; this service is free.

The Appointments Office is located in Room U.10 in the Temporary Buildings.
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

Anglican — The Reverend A. J. A. Scott, B.A.(Melb.), Th.L.,
83 Queen's Road,
NEW LAMBTON. Tel. 57 1875

Baptist — The Reverend T. H. Binks,
133 Kemp Street,
HAMILTON. Tel. 614048

Methodist — The Reverend W. D. Adams, B.A.(Syd.),
B.D.(Melb.)
23 William Street,
HAMILTON. Tel. 61 4040

Presbyterian — The Reverend H. V. Barratt, B.A.(Syd.)
St. Phillip's Manse,
NEWCASTLE. Tel. 2 2379

Roman Catholic — The Reverend Father L. A. Larkin, B.A.(Syd.),
B.Ed.(Melb.), S.T.B.(Baltimore),
M.A.C.E.
Catholic Presbytery,
HAMILTON. Tel. 61 1107

UNIVERSITY SERVICES

HALL OF RESIDENCE

Stage One of the First Hall will provide accommodation for 173 students and about 12 tutors. The Hall is governed by a Board of Trustees consisting of the Warden and six members, three of whom are nominated by the Council, two elected by the students of the Hall and one by the resident tutors. The Hall is situated near the South Eastern boundary of the Sports Oval, close to the tennis and squash courts.

At the time of writing, fees have not been determined.

Applications for residence should be sent to the Warden, First Hall of Residence, University of Newcastle, N.S.W. 2308.

Warden
Dr. M. W. Blackmore, B.Sc., Ph.D. (Belf.)
The Student Counsellors assist students—past, present and future—in a wide variety of matters. Most students, whatever their academic level, at one time or another need help in dealing with difficulties which arise during the course of their University lives.

A student should not feel that he or she must have a major problem before consulting a Counsellor. Many worries take only a few minutes to clear up, and frequently the Counsellor's function is simply to direct a bewildered student to the right source of information.

Students who are worried about inadequate study methods, personal difficulties, choice of courses or career planning are invited to arrange an appointment with a Student Counsellor. All contacts with a counsellor are regarded as completely confidential.

The S.C.U. is divided into three major divisions—Personal Counselling, Study Skills Training and Research with some inevitable overlap between the sections. Apart from individual counselling, courses in an increasing number of areas are held for groups of students.

Student Counselling is now a thoroughly established and widely accepted part of University life throughout Australia, and at this University, approximately one-third of all students utilise it.

STUDY AT THE UNIVERSITY LEVEL

The S.C.U. published a brief but comprehensive book on this subject in 1967 and although it was produced specifically for the students of this University, and reflects the attitudes of several Heads of Departments here, it is already widely used in other Universities and tertiary institutions throughout Australia. A Revised Edition was published in November, 1969 as the first printing had sold out. It may be purchased from the Cashier at 40 cents per copy.

LOCATION

The Secretary to the S.C.U. and two Counsellors are located in the Administration Building (Room G75—entrance at the N.W. end of building). It is generally most satisfactory for students, both full-time and part-time, to make appointments through the Secretary. Counsellors are available for evening appointments.

S.C.U. STAFF

Senior Student Counsellor — A. P. T. Loftus, B.A.(Melb.), M.A.Ps.S.

Student Counsellor — B. E. Hazell, M.A.(Syd.), M.A.Ps.S.


Secretary — Mrs. Joy Hoesli

Stenographer — Mrs. Vicki Lloyd
STUDENT LOAN FUND

The Council of the University has established a Student Loan Fund which is managed by a committee consisting of the Deputy Chairman of Senate, the Bursar and the Vice-Principal (Chairman).

Loans may be made to an undergraduate where the committee is of the opinion that his academic performance is of sufficient merit and his financial circumstances warrant a loan.

The total outstanding accommodation to any one undergraduate shall not normally exceed $200 at any one time and an undergraduate granted a loan is required to enter into an agreement.

Repayment must commence not later than twelve months after graduation or when the borrower fails or withdraws from his course or on demand as required by the University. No interest is charged while the borrower is an undergraduate but interest at a rate of not less than 5% per annum on the balance owing from time to time is charged from the date of graduation or the date on which an undergraduate fails or withdraws from a course.

In special circumstances the Committee may grant a loan to a student other than an undergraduate.

Any student wishing to seek assistance from the Fund may apply in person to the Vice-Principal or through the President of the Students' Representative Council or his nominee.

OVERSEAS STUDENTS

Overseas students who wish to obtain any information or help are invited to see the Overseas Students' Adviser in the Student Counselling Unit.

UNIVERSITY HEALTH SERVICE

Pending the establishment of a Health Centre, an interim service, located in the Union, functions during term time. The medical officer, Dr. G. J. Cousins attends each Wednesday, and qualified nurses are on duty on the other days.

The service, which is free, is essentially diagnostic and does not undertake continuing treatments.

UNIVERSITY ORGANISATIONS

CONVOCATION

Convocation consists of members or former members of the University Council; graduates of the University or graduates of the University of New England or the University of New South Wales who spent at least three years as students at the Newcastle University College; full-time members of the academic staff and graduate permanent members of the administrative, library and technical staff; and graduates of other Universities, either resident in the Hunter Valley or North Coast areas or approved by Council, who have been admitted as members of Convocation by Council after payment of the fee prescribed by Council.

At least two meetings are held each year, an Annual Meeting during First Term and an ordinary meeting in Third Term.

Convocation elects a Chairman who is called the Warden of Convocation and whose term of office is two years, and a Standing Committee of Convocation consisting of the Warden and twelve other members.

This body, which has the right to discuss and to pronounce an opinion on any matter relating to the University and to communicate directly with either the Council or the Senate, provides a means whereby graduates can remain active in university affairs. Five of the members of the Council are elected by the members of Convocation.

OFFICE BEARERS

Warden — Mr. W. G. Derkenne, LL.B.(Syd.), B.A.
Secretary — Miss F. M. Burns, B.A.
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 recreational and common room facilities for its members; a complete range of catering services; rooms for meetings and functions of all kinds including a film viewing room (16mm); billiards, table tennis, chess and music rooms; a reading room; a stationery shop catering for all members' academic needs; and the University Co-operative Bookshop. The offices of the Students' Representative Council and the Students' Counsellor together with the A.U.S. Travel Service, N.S.W. Banking Facilities and the Student Health Centre are also situated within the building.

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 comprising:

Two members appointed by the Council of the University
Ten members of the Union (at least two of whom must be graduates) elected by the members of the Union.
Two members of the Union who are members of the Students Representative Council.
One member of the Union who is a committee member of the Sports Union.
and the Secretary Manager of the Union.

Elections for the Board are held in the month of April.

President — Mr. G. S. Martin, B.A. (N.S.W.)
Secretary Manager — Mr. W. V. Bridgewater

THE UNIVERSITY OF NEWCASTLE COMPANY

The University of Newcastle Company is the Citizen Military Force's Unit affiliated with the 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.

The function of the Company is to train graduates and undergraduates for commissioned rank in the C.M.F. and the training designed with this in view, is done on an Infantry basis and consists of:

(a) An Annual Camp for three weeks in February
(b) An optional camp of fourteen days in December
(c) Two weekend bivouacs a year
(d) Parades on Friday nights of two hours duration
(e) Weekend day parades

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.

Members of the University of Newcastle Company are eligible for the following benefits:

An opportunity to reach commissioned rank in 2-3 years.
Tax-free pay for all training undertaken.
Refund of travelling expenses.
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 — Maj. F. O'Toole
Full-time Staff — WO2 K. Stoker
S/Sgt. P. Toohey
THE UNIVERSITY OF NEWCASTLE
SPORTS UNION

The Sports Union is the student organisation responsible for the promotion and control of sporting activities within the University. All students are automatically members of the Sports Union. There are twenty-six affiliated clubs: Athletics, Australian Rules, Badminton, Men's Basketball, Women's Basketball, Cricket, Fencing, Golf, Men's and Women's Hockey, Judo, Mountaineering, Men's and Women's Rowing, Rugby Union and Rugby League, Sailing, Ski-ing, Soccer, Softball, Squash, Surfing, Swimming, Scuba, Table Tennis, Tennis, Volleyball, most of which participate in local competitions and send teams to Inter-varsity contests each year. Inter-Faculty Contests conducted throughout the year aim to stimulate friendly rivalry among the various Faculties, and to encourage a higher student participation in sport. Each club has a student representative on the Sports Union Committee, which meets monthly. The Executive 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 a portion of the General Services Fee and is used to meet such costs as equipment, affiliation fees and Inter-varsity contests.

For outstanding individual performance in sport, the University awards "Blues" each year at the Annual "Blues" Dinner.

The number of constituent clubs is increasing continually, and students interested in participating in any sport are urged to contact the Amenities Officer, Mr. Bradford, or one of the Sports Union Executive for further information. The Sports Union Amenities office is located in the temporary building adjacent to the main University building.

President — Professor R. G. Tanner, M.A. (Melb. and Cantab.)
Secretary — Miss C. F. Clarke, B.A.
Amenities Officer — Mr. H. Bradford

THE UNIVERSITY OF NEWCASTLE
STUDENTS' ASSOCIATION

Included in the General Services fee of the University, which all of you pay or have paid for you, is $8.00 subscription to the Students' Association. You are all financial members of this Association, and you have every right — and a duty to yourselves — to take part in the running of the Association and the administration of your collective assets. At present, the governing administrative body of the Association is the Students' Representative Council (SRC), with its standing committees, such as the finance committee, the disciplinary committee etc. The ultimate policy-making power rests with general meetings of the Association; these can be called at seven days notice by any twenty members of the Association presenting their signatures to the SRC Office, which is in the Union Basement, near the Music Room and Games area. The functions of the Association are many and varied.

Officers of the Association act as a method of liaison between the student body and the University authorities. Complaints and requests from students may be handled by the Education and Welfare Committee, or by the SRC as a whole when brought to its attention by one of the Faculty or General Representatives. At present, the Association has helped to finance and set up a Student Health Centre, in conjunction with the Union, Sports Union and the University and also helps provide automatic accident insurance cover for Association members.

One of the ways in which the income of the Association is spent is in grants to affiliated clubs and societies (which include cultural, social, political and religious societies). To this end the Vice-President is the Clubs' and Societies' Liaison Officer, and, with his assistant and the Clubs' and Societies' Committee, gives such help to these societies as they may seek from time to time.

The Association is also responsible for publishing the student newspaper "Opus", the literary magazine "Nimrod" and the Orientation Handbook, which may be seen around the campus at the time of their publication. A weekly "Bulletin" is issued to publicise activities of the SRC, and affiliated clubs and societies.

Each year the Association organises, with assistance from the University and the Union, Orientation Week and other activities designed to help new students adjust to university life. Early in July Autonomy Day is also organised by the SRC — of this nothing need be said other than that it is the equivalent of Commem, Foundation Day, or similar activities at other universities.
UNIVERSITY ORGANISATIONS

As the Students' Association is a constituent member of the Australian Union of Students, students of the University may take part in the activities of this body. Some of these activities which affect students more directly are the several intervarsity cultural festivals, travel to New Zealand and many countries in Asia, village schemes in Papua/New Guinea, raising money for aboriginal scholarships and World University Service, national campaigns on education, and the national student newspaper, National "U".

The Association, via general student meetings, ad hoc committees, and its officers pursues policy on a wide variety of social, political, educational and welfare activities both internal to the campus and affecting our society as a whole. Frequently, controversial issues are raised and discussed. The ultimate decision on what your Association does, and how your money is spent, depends on all of you. The executive officers of your association are not there to decide policy, but to carry out your decisions. We can only do this if you make these decisions, by offering candidates for elections, voting at these elections, coming to general meetings and letting us know your requests and complaints. Like God, we can only help those who help themselves.

PRESIDENT — Mr. A. Svirskis
SECRETARY — Miss Lesley E. Stead, (B.A.)

FACULTY OF ENGINEERING

REQUIREMENTS FOR THE DEGREES OF
BACHELOR OF ENGINEERING
AND
BACHELOR OF SCIENCE (ENGINEERING)

1. Definitions.

In these requirements, "the Faculty" means the Faculty of Engineering, "the Faculty Board" means the Faculty Board of the Faculty of Engineering, "the Dean" means the Dean of the Faculty of Engineering, and "the Department" means the Department responsible for the subject in which the candidate is enrolled.

2. Qualifications for the Degree of Bachelor of Engineering.

(i) In order to qualify for the award of the Degree of Bachelor of Engineering, a candidate shall complete normally by full-time study the subjects, and satisfy the industrial experience requirements as prescribed by the Faculty Board in one of the following courses:

Bachelor of Engineering in Chemical Engineering
Bachelor of Engineering in Civil Engineering
Bachelor of Engineering in Electrical Engineering
Bachelor of Engineering in Industrial Engineering
Bachelor of Engineering in Mechanical Engineering
Bachelor of Engineering in Naval Architecture

or, with the permission of the Dean, one of the combined degree courses approved by the Faculty Board.

(ii) A candidate for the Bachelor of Science (Engineering) degree in the University may transfer to the full-time course with such advanced standing as may be approved by the Dean.

(iii) The degree of Bachelor of Engineering may be conferred either as a pass degree or a degree with honours.

(iv) There shall be two classes of Honours, namely Class I and Class II. Class II shall have two divisions, namely Division I and Division II.

(v) The most distinguished candidate in a course, at graduation with Honours, Class I may be awarded a University Medal.
3. Qualifications for the Degree of Bachelor of Science (Engineering).

(i) In order to qualify for the award of the Degree of Bachelor of Science (Engineering) a candidate shall complete normally by part-time study the subjects, and satisfy the industrial experience requirements, as prescribed by the Faculty Board in one of the following courses:

- Bachelor of Science (Engineering) in Chemical Engineering
- Bachelor of Science (Engineering) in Civil Engineering
- Bachelor of Science (Engineering) in Electrical Engineering
- Bachelor of Science (Engineering) in Industrial Engineering
- Bachelor of Science (Engineering) in Mechanical Engineering
- Bachelor of Science (Engineering) in Naval Architecture

(ii) A candidate for the Bachelor of Engineering degree in the University may transfer to the part-time course with such advanced standing as may be approved by the Dean.

(iii) The degree of Bachelor of Science (Engineering) may be conferred either as a pass degree, or as a degree with merit.

(iv) The Faculty Board shall publish a schedule of subjects and industrial experience requirements prescribed for each of the courses listed in clauses 2(i) and 3(i) and a schedule of the prerequisites and corequisites prescribed for each subject offered by the Faculty in those courses.

4. Enrolment in Subjects, and Progression.

(i) Progression in courses is by subject provided that a candidate will be expected to follow the programme laid down by the Faculty Board for the course in which he is enrolled, unless he is otherwise authorised by the Dean.

(ii) A candidate may enrol in a subject only in accordance with the conditions laid down by the Faculty which offers the subject with respect to prerequisites and corequisites for that subject.

(iii) No candidate may enrol in any year for a combination of subjects which is incompatible with the time-table offered by the University for that year.

(iv) A candidate whose progress is unsatisfactory may be excluded from any examination, subject or course or may be permitted to continue his course subject to certain conditions, in accordance with By-laws 5.4.1 and 5.4.2.

(v) A candidate from another University or approved tertiary institution may be granted advanced standing in accordance with the By-laws of the University, in recognition of work completed in such University or institution.

(vi) To complete a subject qualifying towards a degree a candidate shall attend such lectures, tutorials, seminars, laboratory classes, field work and camps and submit such written work and pass such examinations as the Department may require.

(vii) A candidate may withdraw from a subject in which he has enrolled only by informing the Secretary of the University in writing.

(viii) A candidate who withdraws from a subject in which he has enrolled shall be deemed to have failed in that subject unless he has secured written permission from the Dean to withdraw without penalty.

5. Relaxation.

In order to provide for exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any requirement provided that such relaxation shall be consistent with the By-laws.

AWARD OF HONOURS

(The following statement represents the current policy of the Faculty, but is not part of the formal Degree Requirements)

The award of Honours in the Degree of Bachelor of Engineering is based on the complete record of the candidate over the whole four years of his course, the last two years of the course being given significantly greater weight than each of the first two years of the course. Defining the average performance in terms of grades, the average performances required to reach the various classes of Honours are as follows:

- 1st Class Honours: Midway between Distinction and Credit Level
- 2nd Class, Division One: Credit level
- 2nd Class, Division Two: Midway between Credit and Pass level.

The standard for the Pass with Merit in the Degree of Bachelor of Science (Engineering) is to be as for 2nd Class Honours, Division 1, and the average grade is to be computed in the same general manner as for the B.E. Degree.

These standards are used as a guideline only, and may be modified by Faculty in particular cases where the record of the candidate appears to warrant such action.
COMBINED DEGREE COURSE

A student may enrol in the combined courses leading to a BA/BE or B.Sc./BE degree on the successful completion of his first year course. Only in exceptional circumstances will a student be allowed to transfer to a combined degree course during his second year or later.

Extract from the requirements for the degree of Bachelor of Arts:

*Arts/Engineering*

(b) Notwithstanding the provisions of clause 12 of these Requirements a candidate may:

(i) after completing the first year of a course in the Faculty of Engineering and with the permission of the Dean of the Faculty of Arts, enrol in the combined Arts/Engineering course approved by the Council on the recommendation of the Faculty Boards of the Faculties of Arts and Engineering;

(ii) qualify for admission to the degree of Bachelor of Arts by passing the subjects prescribed for the first four years of the combined Arts/Engineering course; or

(iii) qualify for admission to the degree of Bachelor of Arts with Honours by satisfying the provisions of clauses 16, 17 and 18 of these Requirements either within one year of qualifying for admission to the ordinary degree or within one year of qualifying for admission to the degree of Bachelor of Engineering.

Extract from the requirements for the degree of Bachelor of Science:

*Science/Engineering*

9. Notwithstanding the other provisions of these Requirements a candidate may:

(i) after completing the first year of a course in the Faculty of Engineering and with the permission of the Dean of the Faculty of Science, enrol in the combined Science/Engineering course approved by the Faculty Boards of the Faculties of Science and Engineering;

(ii) qualify for admission to the degree of Bachelor of Science by passing the subjects prescribed for the first three years of the combined Science/Engineering course approved by the Faculty Boards of the Faculties of Science and Engineering;

(iii) qualify for admission to the degree of Bachelor of Science with Honours at graduation by passing the subjects prescribed for the first three years of the combined Science/Engineering course approved by the Faculty Boards of the Faculties of Science and Engineering and fulfilling the conditions of Clause 6 of these Requirements.

POSTGRADUATE COURSES

REQUIREMENTS FOR THE POSTGRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING

1. In these Requirements, unless the contrary intention appears, the "Faculty Board" means the Faculty Board of the Faculty of Engineering.

2. An applicant for registration as a candidate for the Diploma shall complete the prescribed application form and lodge it with the Secretary at least one calendar month before the commencement of first term.

3. An applicant for registration as a candidate for the Diploma shall—

(a) have satisfied all of the Requirements for admission to a degree in the University of Newcastle; or

(b) have satisfied all of the Requirements for admission to a degree in another University recognised for this purpose; or

(c) hold other qualifications approved by the Faculty Board for the purpose of registration in the course.

4. Notwithstanding the provisions of clause 3 above, the Faculty Board may require an applicant to complete such other prerequisite studies as it may prescribe or a candidate to complete such other concurrent studies as it may prescribe.

5. To complete a subject qualifying towards the diploma a candidate shall attend such lectures, tutorials, seminars, laboratory classes, field work and camps and submit such written work and pass such examinations as the Department may require.

6. A candidate may withdraw from a subject in which he has enrolled only by informing the Secretary of the University in writing.

7. A candidate who withdraws from a subject in which he has enrolled shall be deemed to have failed in that subject unless he has secured written permission from the Dean to withdraw without penalty.

8. To qualify for the Diploma a candidate shall, in not less than two years of part-time study, complete the subjects as prescribed for the course by the Faculty Board.

9. A candidate may not enrol in a Stage 2 subject without having completed all of the Stage 1 subjects except with the permission of the Dean.

10. In order to provide for exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any requirements provided that such relaxation shall be consistent with the By-laws.
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ENGINEERING SCIENCE

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

2. A person may register for the degree of Master if—
   (a) he is a graduate or graduand of the University of Newcastle or other approved University; or
   (b) he produces evidence of such academic and professional attainments as may be approved by the Senate, on the recommendation of the Faculty Board.

3. An applicant shall satisfy the Faculty Board that he is adequately prepared to undertake advanced studies in the Department appropriate to the field of specialisation proposed, and may be required to undertake preliminary studies and examinations before his registration as a candidate for the degree; or may be given provisional registration requiring concurrently with some of his advanced work the completion of specified preparatory studies before his registration is confirmed.

4. An applicant approved by the Faculty Board 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.

5. On the recommendation of the Head of the Department concerned the Faculty Board shall appoint a programme supervisor and project supervisor to supervise the work of each candidate.

6. After registration a candidate shall complete satisfactorily a course of studies approved by the Dean of the Faculty, comprising twelve units of advanced work as may be prescribed by the Faculty Board. Not less than two nor more than four of such units shall comprise the investigation of and report on a project specified by the Head of the Department concerned.

7. To complete a unit qualifying towards the degree a candidate shall attend such lectures, tutorials, seminars, laboratory classes, field work and camps and submit such written work and pass such examinations as the Department concerned may require.

8. Where it is appropriate to the candidate’s total programme the Dean may approve advanced work, equivalent in total to not more than six units to be taken in other Faculties of the University.

9. A candidate from another university or approved tertiary institution may be granted standing by the Faculty Board in up to six units in recognition of work completed in such university or institution.

10. A candidate whose progress is unsatisfactory may be excluded from any examination, subject, or course, or may be permitted to continue his course subject to certain conditions.

11. A candidate may withdraw from the course only by informing the Secretary of the University in writing.

12. A candidate who withdraws from the course shall be deemed to have failed unless he has secured written permission from the Dean to withdraw without penalty.

13. A candidate shall submit three copies of his project report in a form according with the instructions of the Head of the Department, not later than three terms after the completion of the course of formal study.

14. It shall be understood that the University retains the three copies of the report and is free to allow the report to be consulted or borrowed. Subject to the provisions of the Copyright Act (1968) the University may issue the report in whole or in part in photostat or microfilm or other copying medium.

15. The Faculty Board, at the request of an examiner, may require the candidate to answer any questions concerning his work.

16. No candidate shall be considered for the award of the degree until the lapse of three complete terms but not more than six complete terms in the case of a full-time student, and six complete terms, but not more than ten complete terms in the case of a part-time student, from the date from which the registration becomes effective.

17. In exceptional circumstances the Senate, on the recommendation of the Faculty Board, may relax any of the above requirements.
REQUIREMENTS FOR THE DEGREE OF
MASTER OF ENGINEERING

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

2. A person may register for the degree of Master if—
   (a) he is a graduate or graduand of the University of Newcastle or other approved University with Honours in the subject to be studied for that degree; or
   (b) he is a graduate or graduand of the University of Newcastle or other approved University; or
   (c) in exceptional cases he produces evidence of such academic and professional attainments as may be approved by the Senate, on the recommendation of the Faculty Board.

3. In the case of applicants desiring to register under provision 2(b), and (c), the Faculty Board may require the applicants to carry out such work and sit for such examinations as the Board may determine before registration as a candidate for the degree of Master is confirmed.

4. In every case, before permitting an applicant to register as a candidate, the Faculty Board shall be satisfied that adequate supervision and facilities are available.

5. An applicant approved by the Faculty Board 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.

6. (i) Every candidate for the degree shall be required to submit a thesis embodying the results of an investigation or design, to take such examinations and to perform such other work as may be prescribed by the Faculty Board. 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 6 (i) shall be conducted under the direction of a supervisor appointed by the Faculty Board or under such conditions as the Faculty Board may determine.

7. 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 candidate who has obtained the degree of Bachelor with Honours or a qualification deemed by the Faculty Board to be equivalent or who has had previous research experience, this period may, with the approval of the Faculty Board, be reduced by up to three terms.

8. For each candidate there shall be two examiners appointed by Senate, one of whom shall be an external examiner.

9. A candidate who fails to satisfy the examiners may be permitted to resubmit his thesis in an amended form. Such a resubmission must take place within twelve months from the date on which the candidate is advised of the result of the first examination. No further resubmission shall be permitted.
REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

1. The degree of Doctor of Philosophy may be awarded by the Council
on the recommendation of the Senate to a candidate who has satisfied
the following requirements.

2. A candidate for registration for the degree of Doctor of Philosophy
shall:—

(i) have satisfied all of the requirements for admission to the degree
of master or the degree of bachelor with first or second class
honours in the University of Newcastle or a degree from another
University recognised by the Senate as having equivalent standing;
or
(ii) have satisfied all of the requirements for admission to the degree
of bachelor with third class honours or without honours in
the University of Newcastle or a degree from another University
recognised by the Senate as having equivalent standing, and have
achieved by subsequent work and study a standard recognised by
the Senate as equivalent to at least second class honours;
or
(iii) in exceptional cases submit such other evidence of general and
professional qualifications as may be approved by the Senate.

3. The Senate may require a candidate, before he is permitted to register,
to undergo such examination or carry out such work as it may pre­
scribe.

4. A candidate for registration for a course of study leading to the
degree of Ph.D. shall:—

(i) apply 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 can­
didate 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.

5. Before being admitted to candidature, an applicant shall satisfy the
Senate that he can devote sufficient time to his advanced study and
research.

6. Subsequent to registration, the candidate shall pursue a course of
advanced study and research for at least nine academic terms, save
that any candidate who before registration was engaged upon research
to the satisfaction of the Senate, may be exempted from three acad­
emric terms.

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

8. The course, other than field work, must be carried out in a Depart­
ment 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.

9. 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.

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

11. On completing his course of study every candidate shall 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 or in a language approved by the
Senate and reach a satisfactory standard of literary presentation.

12. The thesis shall 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.

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

14. 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.

15. The candidate shall give in writing three 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 and that the thesis is fit for examination.

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 pos­
sibility of disarrangement.
18. It shall be understood that the University retains 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 (1968) the University may issue the thesis in whole or in part in photostat or microfilm or other copying medium.

19. 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.

20. The Senate shall appoint three examiners of whom at least two shall not be members of the teaching staff of the University.

21. The examiners may require the candidate to answer, viva voce or in writing, any questions concerning the subject of his thesis or work.

22. The result of the examination shall be in accordance with the decision of a majority of the examiners.

23. A candidate permitted to re-submit his thesis for examination shall do so within a period of twelve months from the date on which he is advised of the result of the first examination.

REQUIREMENTS FOR THE DEGREE OF DOCTOR OF ENGINEERING

1. The degree of Doctor of Engineering may be awarded by the Council, on the recommendation of the Senate, for an original contribution or contributions of distinguished merit to the science and/or practice of engineering.

2. A candidate for the degree of Doctor of Engineering shall hold a degree of the University of Newcastle or a degree from another University recognised by the Senate as being equivalent or shall have been admitted to the status of such a degree.

3. The degree shall be awarded on published* work of the candidate although in special circumstances unpublished work may be considered provided that these circumstances are recognised as sufficient by the Senate.

4. Every candidate in submitting his published work and such unpublished work as he deems appropriate shall submit a short discourse describing the research embodied in his submission. The discourse shall make clear the extent of originality and the candidate's part in any collaborative work.

5. A candidate for the degree shall make an application in writing to the Secretary setting out a statement of his academic qualifications. With the application he shall submit:—

(a) Four copies of the work referred to in clause 4 of these Requirements.

(b) Four copies of any additional work, published or unpublished, which he may desire to submit in support of his application.

(c) A Statutory Declaration indicating those sections of the work, if any, which have been accepted previously in partial fulfilment of the requirements for a degree or diploma in any University.

6. The Senate shall appoint three examiners of whom at least two shall not be members of the teaching staff of the University.

7. The University may at the request of an examiner require the candidate to answer any questions concerning his work.

8. The result of the examination shall be in accordance with the decision of a majority of the examiners.

*In these requirements, the term "published work" shall mean printed in a periodical or as a pamphlet or as a book readily available to the public. The purpose of requiring publication is to ensure that the work submitted has been available for criticism by relevant experts, and examiners are given discretion to disregard any of the work submitted if, in their opinion, the work has not been so available for criticism.
DEPARTMENT OF CHEMICAL ENGINEERING

Chemical Engineering is the "engineering of processes in which materials undergo chemical or physical change". As a discipline Chemical Engineering may claim to be among the most modern of the branches of Engineering, having developed mainly since about 1920. From their early concentration in the petroleum refining and heavy chemical industries, Chemical Engineers are now being recognized as "process engineers" in the widest sense and are engaged in the preparation and smelting of metaliferous ores, in power-production, particularly from nuclear stations; in food-processing and ceramics and as fuel-engineers, as well as in the industries producing conventional "chemicals".

Currently there is a heavy demand for Chemical Engineers in the whole range of fields from research and development, through operations and administration to technical sales. A number of cadetships are available but a large proportion of firms recruit at graduate level and broad opportunities are available for students who read independently for a full-time course.

Three types of course are available:—
part-time for six years for Cadets in approved Chemical Engineering employment for the B.Sc.(Eng.).
full-time for four years for the B.E.
full-time for five years for the combined B.Sc./B.E., which may be taken with a science major in Chemistry (or alternatively Mathematics).

All courses are recognised as providing the academic qualifications for the Institution of Engineers, Australia and the Royal Australian Chemical Institute. The full-time courses qualify for the British Institution of Chemical Engineers.

All courses are broadly based on a foundation of Chemistry, Mathematics, Physics and general Engineering Science. In his professional subjects, the Chemical Engineer studies the application of scientific method and knowledge to the performance of chemical processes and chemical engineering equipment in such fields as fluid flow; heat transfer; diffusional processes; transport and separation of solid particles; fuels, combustion and furnaces. Electives are available in the final years of courses permitting students to widen their education or deepen their specialist ability by selection from a wide range of subjects in the whole university.

All students take part in a number of inspections of selected process plants both in the Hunter Valley and in Sydney, and generally at least one laboratory exercise is arranged at an industrial site. In addition full-time students are required to obtain at least twenty weeks of approved industrial experience during their long vacations.

There is a considerable demand for Chemical Engineers qualified in research or in specialized fields and postgraduate courses are available for work towards Ph.D and both research and course work Masters degrees.

COURSE OUTLINES

DEPARTMENT OF CHEMICAL ENGINEERING

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 IN CHEMICAL ENGINEERING

#### Subject | Average Hours per week | 28 weeks full-time course
--- | --- | ---
#### YEAR I
- CHEMISTRY I | 6
- Engineering I | 6
- Mathematics I | 6
- Physics I or IB | 6
---
| 24 |
#### YEAR II
- CHEMICAL ENGINEERING I | 9
- Chemistry II | 9
- Mathematics II | 6
---
| 24 |
#### YEAR III
- Chemical Engineering IIA | 11
- CHEMICAL ENGINEERING IIB | 11
- Elective I | 3
---
| 25 |
- Industrial Experience |
#### YEAR IV
- CHEMICAL ENGINEERING III | 18
- Elective II | 6
---
| 24 |
- Industrial Experience |

### BACHELOR OF SCIENCE (ENGINEERING) IN CHEMICAL ENGINEERING

#### Subject | Average Hours per week | 28 weeks part-time course
--- | --- | ---
#### STAGE 1
- CHEMISTRY I | 6
- Mathematics I | 6
---
#### STAGE 2
- ENGINEERING I | 6
- Physics I or IB | 6
---
#### STAGE 3
- CHEMISTRY II | 9
- Mathematics II Part I | 3
---
#### STAGE 4
- CHEMICAL ENGINEERING I | 9
- Mathematics II Part II | 3
---
#### STAGE 5
- CHEMICAL ENGINEERING IIA PART 1 | 6
- Chemical Engineering IIB Part I | 5
---
#### STAGE 6
- Chemical Engineering IIA Part 2 | 4
- CHEMICAL ENGINEERING IIB PART 2 | 5
- Elective | 3
---
| 13 |

**NOTE:**
1. Three years approved industrial experience must be secured concurrently with the course.
2. Design Project from Year IV of the Bachelor of Engineering in Chemical Engineering Course may be taken as the elective by suitably qualified students.
BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING

Subject: Average Hours per week

YEAR I
-- 28 weeks full-time course --
CHEMISTRY I
Engineering I
Mathematics I
Physics IA or IB

12

24

YEAR II
Chemical Engineering I
CHEMISTRY II
Mathematics IIB

18

24

YEAR III
CHEMISTRY IIIA
and one (1) of
Chemistry IIB
Geology I
Mathematics II A
Physics II

78

18-24

YEAR IV
Chemical Engineering IIA
CHEMICAL ENGINEERING IIB
General Elective I

25

YEAR V
CHEMICAL ENGINEERING III
General Elective II

24

NOTES: (*) Alternatively students may take Mathematics IIA and Mathematics IIC in Year II, and Chemical Engineering I and Mathematics IIB in Year III.

Approved industrial experience is required and may be obtained during any two of the long vacations following Year II.

DESCRIPTION OF SUBJECT UNITS

DEPARTMENT OF CHEMICAL ENGINEERING

FIELD EXCURSIONS

Inspections of Chemical Engineering plants of particular technical interest or relevance to course material are an integral part of the Chemical Engineering subjects. Normally students are expected to take part in several half day or full day inspections of plants in the Newcastle area for Chemical Engineering I, Chemical Engineering IIA, Chemical Engineering IIB. In addition, an excursion to the Sydney area of about four days duration is arranged in Year III (Stage 5).

ENGINEERING I

ME111 Graphics
ME112 Engineering Drawing and Elementary Design
CE 111 Statics
EE 101 Introduction to Electrical Engineering

NOTE: Workshop Practice is not a required subject for Chemical Engineers but students are strongly recommended to take this subject if they feel competent to handle the extra study load.

CHEMICAL ENGINEERING I

Stage 4; Year II

Prerequisites—Mathematics I, Physics IA or IB

A course of about 120 hours lectures and 120 hours tutorials and laboratory covering:

FLUID-STATICS AND DYNAMICS

Particularly related to the flow and metering of fluids in pipes with an introduction to boundary layer theory and dimensional analysis.

HEAT AND MASS TRANSFER

Introduction to conduction, convection and radiation and to diffusion phenomena with analysis of industrial applications.
INDUSTRIAL CHEMICAL PROCESSES
Study of major industrial processes in relation to the chemistry and the mass and energy balance of the process. Basic equipment items.

PROCESS CALCULATIONS (Applied Thermodynamics)
Engineering calculations of mass and energy balances; enthalpy changes on formation, reaction, solution and change of state; properties and behaviour of ideal and real gases; equilibrium relationships.

FUELS AND COMBUSTION I
Classification, sampling, testing and processing of fuel, including carbonisation and oil refining; Combustion and gasification reactions and equipment; Thermal and economic evaluation of fuels and equipment.

LABORATORY (Approximately 40 hours)
Instrumental techniques; fluid flow and heat transfer.

Texts

- Efficient Use of Fuel 1964 H.M.S.O.

**"Perry" will be used as a reference throughout the whole course and students should purchase it at this stage.**

Recommended References

- Numerical Methods and Fortran Programming McCracken, D. D. and Dorn, W. S. 1965 Wiley
- Fuels Solid, Liquid and Gaseous Brame and King 1965 Arnold
- Introduction to the Study of Fuel McCrae 1965 Elsevier

CHEMICAL ENGINEERING IIA
Stages 5 & 6; Year III
Prerequisites—Chemical Engineering I, Mathematics II, Chemistry II.

Part I

APPLIED THERMODYNAMICS II
(Approx. 30 hours)
Thermodynamics applied to problems of energy generation and cryogenics; to the derivation of properties of fluids and of phase equilibrium at high temperatures and pressures.

Text

- Introduction to Thermodynamics Sonntag, R. E. and Van Wylen, G. J. 1971 Wiley

REACTION ENGINEERING PRINCIPLES I
(Approx. 30 hours)

Text

- Chemical Reaction Engineering Levenspiel, O. 1964 Wiley

MASS TRANSFER OPERATIONS
(Approx. 56 hours lectures and tutorials and 42 hours laboratory)
Equilibrium stage and continuous contact processes for leaching, absorption, extraction and distillation; stage efficiencies; hydraulic behaviour of equipment.

Texts

- Alternative (to Coulson & Richardson):

Recommended References

- Distillation Van Winkle, M. 1967 McGraw-Hill

PROCESS STATISTICS
(Approx. 28 hours lectures and tutorials)
Statistical analysis of experimental and operating data; sampling theory; non-parametric statistics.

Text

INDUSTRIAL CHEMICAL PROCESSES
Study of major industrial processes in relation to the chemistry and the mass and energy balance of the process. Basic equipment items.

PROCESS CALCULATIONS (Applied Thermodynamics)
Engineering calculations of mass and energy balances; enthalpy changes on formation, reaction, solution, and change of state; properties and behaviour of ideal and real gases; equilibrium relationships.

FUELS AND COMBUSTION I
Classification, sampling, testing and processing of fuel, including carbonisation and oil refining; Combustion and gasification reactions and equipment; Thermal and economic evaluation of fuels and equipment.

LABORATORY (Approximately 40 hours)
Instrumental techniques; fluid-flow and heat-transfer.

Texts

Efficient Use of Fuel, 1964 H.M.S.O.

*"Perry" will be used as a reference throughout the whole course and students should purchase it at this stage.

Recommended References
Chemical Engineering Vol. I
Coulson, J. M. and Richardson, J. F. 1966 Pergamon
(Revised Edition)
Numerical Methods and Fortran Programming
Mccracken, D. D. and Dorn, W. S. 1965 Wiley
Unit Operations of Chemical Engineering
Fuels Solid, Liquid and Gaseous
Brame and King 1965 Arnold
Introduction to the Study of Fuel
Mccrae 1965 Elsevier
Radiative Transfer
Describing Chemical Engineering Systems

CHEMICAL ENGINEERING IIA
Stages 5 & 6; Year III
Prerequisites—Chemical Engineering I, Mathematics IIB, Chemistry II.

Part I
APPLIED THERMODYNAMICS II
(Approx. 30 hours)
Thermodynamics applied to problems of energy generation and cryogenics; to the derivation of properties of fluids and of phase equilibrium at high temperatures and pressures.

Text
Introduction to Thermodynamics
Sonntag, R. E. and Van Wylen, G. J. 1971 Wiley

REACTION ENGINEERING PRINCIPLES I
(Approx. 30 hours)

Text
Chemical Reaction Engineering
Levenspiel, O. 1964 Wiley

MASS TRANSFER OPERATIONS
(Approx. 56 hours lectures and tutorials and 42 hours laboratory)
Equilibrium stage and continuous contact processes for leaching, absorption, extraction and distillation; stage efficiencies; hydraulic behaviour of equipment.

Texts
Chemical Engineering Vol. II
Coulson, J. M. and Richardson, J. F. 1970 Pergamon
Alternative (to Coulson & Richardson):
Unit Operations of Chemical Engineering
Mass Transfer Operations

Recommended References
Separation Processes
Judsonking, C. 1971 McGraw-Hill
Distillation
Van Winkle, M. 1967 McGraw-Hill

PROCESS STATISTICS
(Approx. 28 hours lectures and tutorials)
Statistical analysis of experimental and operating data; sampling theory; non-parametric statistics.

Text
Statistics Manual
PART II
TRANSPORT PRINCIPLES II
(Approx. 42 hours lectures and tutorials)
Heat and mass transfer in unsteady state conditions; generalized transport theory for momentum, mass and heat transfer in laminar, turbulent and simple boundary layer conditions; correlations of transfer co-efficients, mass transfer with reaction.

PARTICULATE AND THERMAL SYSTEMS
(Approx. 42 hours lectures and 42 hours laboratory)
Filtration, sedimentation, centrifuges, cyclones, gas cleaning; furnaces and kilns; breakage, sizing, separation and flow of particulate solids.

Texts
Chemical Engineering Vol. 2
Coulson, J. M. and Richardson, J. F. 1966 Pergamon

Recommended References
Engineering Heat Transfer
Hsu, S. T. 1963 Van Nostrand

Mathematical Methods for Chemical Engineers
Jensen, K. A. and Jeffries, G. U. 1965 Academic

Transport Phenomena
Bird, R. B. et al 1960 Wiley

Mass Transfer with Chemical Reaction
Astarita, G. 1967 Elsevier

Boundary Layer Theory
Schlichting, H. 1955 McGraw-Hill

Conduction of Heat in Solids
Carslaw, H. S. and Jaeger, J. C. 1959 C.U.P.

Heat Transmission

CHEMICAL ENGINEERING IIIB
Stages 5 and 6; Year III

PART II
Pre- (or co-) requisite—Chemical Engineering II A

PROCESS ENGINEERING
(Approx. 43 hours lectures and tutorials)
The plant as an integrated unit, requirements and specifications of services (steam, air, water, gas, effluent). Selection of service equipment; piping and reticulation; buildings and foundations, siting. Estimation and analysis of process and production costs; profitability; cash-flow; economics of the plant in relation to the total organisation.

DESIGN II, CHEMICAL EQUIPMENT DESIGN
(Approx. 48 hours lectures and tutorials)
Physical and detail design of heat exchangers, distillation and absorption towers, simple storage vessels; layout for instrumentation and ancillary equipment. Mechanical drives; materials handling equipment.

CHEMICAL PROCESS CONTROL I
(Approx. 21 hours lectures and laboratory)
Relationship between measurement and control information display, plant response. Types of controllers, transfer functions, analogue computer.

Texts
Project Engineering of Process Plants
Rase, H. R. and Barrow M. H. 1957 Wiley

Plant Design and Economics for Chemical Engineers

Chemical Engineer's Handbook

Process Heat Transfer

Introduction to Chemical Process Control
Perlmutter, D. D. 1965 Wiley

S.A.A. Codes:
Pressure Vessels (CBI.P.L.V) 1967 S.A.A.
Steel Structures (C.A.I.) 1967 S.A.A.
Building Loads (350) 1967 S.A.A.
\textbf{Recommended References}

\begin{itemize}
  \item \textit{Costs and Economics of the Australian Process Industries} \\
       Buchanan and Sinclair (2nd. Ed.) 1967 Wests
  \item \textit{Process Heat Transfer} \\
  \item \textit{Process Plant Piping} \\
       Rase, H. R. 1964 Wiley
  \item \textit{Economic Analysis for Engineering and Managerial Decision Making} \\
       Barish 1962 McGraw-Hill
  \item \textit{Water and Waste Water Engineering Vol. II} \\
       Fair G., Geyer J. C., Dkun D. A. 1968 Wiley
\end{itemize}

\textbf{ME 481 ENGINEERING ADMINISTRATION}  \\
(Dept. of Mechanical Engineering).

**CHEMICAL ENGINEERING III**

\textbf{YEAR IV}

Prerequisites—Chemical Engineering IIA and Chemical Engineering IIB.

The subject CHEMICAL ENGINEERING III requires the completion of course work in Advanced Topics, of a Research Project and a Design Project and participation in the Chemical Engineering Seminar.

**CHEMICAL ENGINEERING SEMINAR**

Regular two hour seminar sessions will be held during the year for discussion of literature reviews, chemical engineering practice and of research within the department. Each student will present not less than two half-hour papers in the course of the year.

**RESEARCH PROJECT**

An assigned task of experimental investigation or of design, construction and testing of experimental equipment, to be reported formally in a thesis.

**DESIGN PROJECT**

Preparation of a formal design report for a specified plant for chemical production, including process flow sheets, full mass and energy balances and the detailed design of one or more specified items of equipment.

\textbf{ADVANCED TOPICS IN CHEMICAL ENGINEERING III}

Students will be required to complete not less than six of the following short courses normally of approximately two hours per week for fourteen weeks, the programme to be approved by the Head of the Department.

**AUTOMATIC CONTROL**

(ME 361) in Dept. of Mechanical Engineering.  
(Approx. 56 hours lectures and laboratory)—(i.e. 2 units)*  
(NOTE: Students who wish to take Advanced Automatic Control in Year IV may, subject to approval by the Head of the Department, take ME 361 as a 3rd Year elective).

* **COMBUSTION AND FURNACE DESIGN**

The combustion of coal, gas and oil flames in large furnaces; aerodynamics of flames and aerodynamic modelling of furnaces; furnace heat transfer; deposits and fouling.

* **HEAT TRANSFER III**

More advanced topics in radiant heat transfer, heat transfer in packed beds.

**REACTION ENGINEERING II**

Kinetics of multiple reactor systems; kinetics of gas solid and gas liquid reactions, catalysts. Heat transfer in reactors.

* **TRANSPORT PRINCIPLES III**

Studies of generalized transport theory for high fluxes and variable properties; further topics in boundary layer theory.

**MASS TRANSPORT III**

Vapour-liquid stage operation for multi-component systems; rigorous and short calculation procedures; extractive distillation; gas chromatograph theory; ion-exchange systems.

* These topics will be available to students with the appropriate backgrounds from other Departments and for students reading for a master’s degree or postgraduate diploma.

**PROCESS EVALUATION**

Process evaluation, development and selection—Theory and application of design variables—recycle process computations—Introduction to optimisation techniques, linear and dynamic programming, direct search techniques.
CHEMICAL PROCESS CONTROL
A laboratory-tutorial course on the control characteristics of process plant and equipment and industrial control systems.

POLYMER CHEMISTRY
(A series of about 12 lectures in the Department of Chemistry on the production and properties of industrial polymers.)

Note: All advanced topics listed are not necessarily available in any one year. Text book details will be advised by lecturers.

INDUSTRIAL EXPERIENCE
Students will submit a report in first term of 3rd and 4th year covering their period of approved industrial experience during long vacations.

ELECTIVES
Electives may be taken in any Department of the University in which suitable courses are offered, subject to the approval of the Heads of the Department concerned and of Chemical Engineering, and to time-table restrictions.

ELECTIVE I (nominally 3 hours per week) represents a study load equivalent to about 1/4 of a normal 1st year subject or 1/3 of a normal second year subject.

ELECTIVE II (nominally 6 hours per week) represents a study load equivalent to a first year subject or 1/2 a third year pass subject in Faculties of Arts and Science.

The Head of the Department of Chemical Engineering should be consulted regarding units available.

SPECIAL TOPICS AND SUBJECTS AVAILABLE TO OTHER DEPARTMENTS

(1) CHEMICAL ENGINEERING IIIC A full third year subject comprising selected range of topics of interest to students of applied Mathematics (for details see Mathematics Handbook).

(2) Electives available to students from other university departments. Each elective comprises about 42 hours contact time (lectures, tutorials and laboratory) normally taken over half the academic year.

Fuels and Combustion I no prerequisite (From Chem. Eng. I)
Fluids-Solids Separations prerequisite a first course in Fluid Mechanics (From Chem. Eng. II A)
Heat Transfer III prerequisite a first course in Heat Transfer (Particulate Systems) (From Chem. Eng. III)
Combustion Engineering prerequisite a first course in Heat Transfer (From Chem. Eng. III)
Process Evaluation prerequisite Linear Algebra from Maths. II or equivalent (From Chem. Eng. III)

DEPARTMENT OF CIVIL ENGINEERING
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 Department of Civil Engineering currently offers the following first degree courses in Civil Engineering — Bachelor of Engineering in Civil Engineering (full-time course), Bachelor of Science (Engineering) in Civil Engineering (part-time course), Bachelor of Arts/Bachelor of Engineering in Civil Engineering (full-time course), and Bachelor of Science/Bachelor of Engineering in Civil Engineering (full-time course). These courses 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 20 weeks of industrial training, and to submit detailed reports on each training period. In the final year, the full-time student completes a project covering some aspect of supervised research, and delivers a seminar paper on some selected topic.

The first two years full-time and the equivalent four years part-time of the Bachelor of Surveying Degree Course of the University of New South Wales is offered by the University of Newcastle through the Department of Civil Engineering. After students have successfully completed the above courses they may transfer with full standing into the third year of full-time study in the Bachelor of Surveying Degree Course at the University of New South Wales. The Bachelor of Surveying Course is currently a four year full-time course at the University of New South Wales so that Newcastle students must successfully complete the third and fourth years of full-time study in Sydney to qualify themselves for the Degree of Bachelor of Surveying.
The first two years of this University's Bachelor of Engineering Degree in Civil Engineering is accepted by the University of New South Wales as exemption from the first two year's of that University's Bachelor of Engineering Degree course in Mining Engineering.

Postgraduate study in Civil Engineering can be directed either towards the M.Eng.Sc. degree, consisting principally of course work and some project work, or towards the M.E. or Ph.D. degrees, which are essentially research degrees in which the student is required to carry out an investigation having some element of novelty and originality, and to write a thesis on the results.

COURSE OUTLINES

DEPARTMENT OF CIVIL ENGINEERING

CLASSIFICATIONS

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
<th>28 weeks full-time course</th>
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</thead>
<tbody>
<tr>
<td><strong>YEAR I</strong></td>
<td></td>
<td></td>
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<tr>
<td>Chemistry IS</td>
<td>3</td>
<td></td>
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<tr>
<td>Engineering I</td>
<td>6</td>
<td></td>
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<tr>
<td>Engineering Technology</td>
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<tr>
<td>MATHEMATICS I</td>
<td>6</td>
<td></td>
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<tr>
<td>Physics IA</td>
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<td></td>
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</table>

*Plus 5-day Survey Camp.

A candidate for a degree normally shall complete periods of practical experience acceptable to the Faculty Board totalling 20 weeks, before 31st January in the year in which the degree is to be awarded.

### BACHELOR OF SCIENCE (ENGINEERING) IN CIVIL ENGINEERING

<table>
<thead>
<tr>
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<tr>
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<td>Engineering Technology</td>
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*Plus 5-day Survey Camp.

A candidate for the degree normally shall complete periods of practical experience acceptable to the Faculty Board.
BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN
CIVIL ENGINEERING

In the combined course set out below the Arts subjects shall be
chosen from the approved Schedule of Subjects offered for the degree
of Bachelor of Arts.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
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<tr>
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<td>28 weeks full-time course</td>
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</tbody>
</table>

**YEAR I**

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<tr>
<td>Engineering Technology</td>
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<tr>
<td>MATHEMATICS I</td>
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<td>Physics IA</td>
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**YEAR II**

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**YEAR III**

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**YEAR IV**

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<td>Arts Subject Part II or Part III</td>
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**YEAR V**

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* Plus 5-day Survey Camp.

Students may select Physics II and Physics III in lieu of Mathematics IIC and Mathematics IIIIA.
### Bachelor of Surveying

#### Full-time Course

**Subject**

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<th>Average Hours per week</th>
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<td>Engineering I</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics</td>
<td>6</td>
</tr>
<tr>
<td>CE161</td>
<td>Land Surveying I*</td>
</tr>
<tr>
<td>Physics 1A</td>
<td>6</td>
</tr>
<tr>
<td>EE101</td>
<td>Introduction to Electrical Engineering</td>
</tr>
</tbody>
</table>

**Average Hours per week**

|        | 24 1/2 |

**YEAR II**

| CE350J | Seminar | 2 |
| CE261 | Surveying Computations I | 2 1/2 |
|        | Mathematics II B | 6 |
| CE223J | Engineering Geology | 1 1/2 |
| CE201 | Engineering for Surveyors | 3 |
| CE262 | Land Surveying II** | 5 1/2 |
| EE201 | Principles of Electrical Engineering | 1 1/2 |

**Average Hours per week**

|        | 22 |

**University of New South Wales Subjects**

**YEAR III**

<table>
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<td>8.821S</td>
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<td>8.831S</td>
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<td>8.842S</td>
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<td>8.851S</td>
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<tr>
<td>8.881S</td>
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</table>

**Average Hours per week**

|        | 25 1/2 |

**YEAR IV**

| 8.822 | Geodesy II | 3 1/2 |
| 8.832 | Astronomy II | 2 1/2 |
| 8.852 | Photogrammetry II | 4 1/2 |
| 8.882 | Cadastral Surveying | 2 |
| 6.811 | Electronic Instrumentation for Surveyors | 1 |
| 11.411 | Town Planning | 2 |
| 25.533 | Geophysics | 2 |
| 8.011 | Thesis | 3 |
|        | Humanities, Advanced Elective | 2 |

**Average Hours per week**

|        | 22 1/2 |

---

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

---

#### Part-time Course

**Subject**

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<tr>
<td>Mathematics</td>
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</tbody>
</table>

**STAGE 2**

| CE161 | Land Surveying I* | 5 |
| Physics 1A | 6 |
| EE101 | Introduction to Electrical Engineering | 1 1/2 |

**Average Hours per week**

|        | 12 1/2 |

**STAGE 3**

| CE350J | Seminar | 2 |
| CE261 | Surveying Computations I | 2 1/2 |
|        | Mathematics II B | 6 |
| CE223J | Engineering Geology | 2 |

**Average Hours per week**

|        | 12 1/2 |

**STAGE 4**

| CE201 | Engineering for Surveyors | 3 |
| CE262 | Land Surveying II** | 5 1/2 |
| EE201 | Principles of Electrical Engineering | 1 1/2 |

**Average Hours per week**

|        | 10 |

---

Year III and Year IV of the University of New South Wales course is as indicated under the full-time course.

* A five-day survey camp must be attended as part of this subject.
** A two-week survey camp must be attended as part of this subject.
# SUBJECTS OF INSTRUCTION

<table>
<thead>
<tr>
<th>Subjects &amp; Courses</th>
<th>Hours per week</th>
<th>Prerequisites</th>
<th>Year Stage</th>
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<tr>
<td><strong>Engineering I</strong></td>
<td></td>
<td></td>
<td>I 1</td>
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<tr>
<td>ME111: Graphics</td>
<td>1½</td>
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<tr>
<td>ME112: Engineering Drawing &amp; Elementary Design</td>
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<td>CE111: Statics</td>
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<td>ME131: Dynamics</td>
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<td><strong>Engineering Technology</strong></td>
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<td>ME121: Workshop Practice</td>
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<tr>
<td>EE101: Introduction to Electrical Engineering</td>
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<tr>
<td>CE221: Properties of Materials</td>
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<tr>
<td>CE212: Mechanics of Solids</td>
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<td>CE222: Concrete Technology</td>
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<td>ME271: Thermodynamics or</td>
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<td>ME212: Engineering Design</td>
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<td>CE212: Mechanics of Solids</td>
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**Subjects & Courses** | **Hours per week** | **Prerequisites** | **Year Stage**
---|-------------------|-------------------|----------------
**Materials & Structures C** | | | |
CE313: Structural Analysis & Design I | 6 | Mat. & Struct. B. | 5
| 6 | |

**Materials & Structures D** | Mat. & Struct. A | 5 |
ME301: Engineering Computations | 1½ | | |
CE452: Engineering Construction | 3 | Mat. & Struct. B | |
CE324: Soil Mechanics | 3 | | |
| 7½ | |

**Materials & Structures E** | Mat. & Struct. II | IV |
CE414A: Structural Analysis II | 3 | | |
| 3 | |

**Materials & Structures F** | Mat. & Struct. C | V 6 |
CE414B: Structural Design II | 3 | Mat. & Struct. II (BA/BE) | 3 |
| 3 | |

**Civil Engineering I** | Eng. I, Maths I | II |
CE223J: Engineering Geology | 1½ | | |
CE241: Surveying I | 3 | | |
EE201: Principles of Electrical Engineering | 1½ | | |
| 7½ | |

**Civil Engineering IS** | Eng. I, Maths I, II |
EE201: Principles of Electrical Engineering | 1½ | | |
| 3 | |

**Civil Engineering II** | Civ. Eng. I | III |
CE332: Fluid Mechanics II | 3 | | |
CE342: Surveying II | 1½ | | |
ME481: Engineering Administration | 1½ | | |
ME482: Engineering Economics | 1½ | | |
CE350J: Seminar | 1½ | | |
<p>| 9 | |</p>
<table>
<thead>
<tr>
<th>Subjects &amp; Courses</th>
<th>Hours per week</th>
<th>Prerequisites</th>
<th>Year Stage</th>
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<tbody>
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<td>Water Resources Engineering II</td>
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<th>Prerequisites</th>
<th>Year Stage</th>
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<td>CE453</td>
<td>Project</td>
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<td></td>
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<tr>
<td>CE452</td>
<td>Engineering Construction (3)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME481</td>
<td>Engineering Administration (14)</td>
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<tr>
<td>ME482</td>
<td>Engineering Economics (14)</td>
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<tr>
<td>CE342</td>
<td>Surveying II (14)</td>
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<tr>
<td>CE433</td>
<td>Water Resources Engineering I (14)</td>
<td>Civil Eng. IIB (corequisite)</td>
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<td>CE434</td>
<td>Water Resources Engineering II (14)</td>
<td>Civil Engineering IS</td>
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<td>CE425</td>
<td>Earth &amp; Rock Engineering (14)</td>
<td>Mat. &amp; Struc. II</td>
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<td>CE451</td>
<td>Transportation Engineering (14)</td>
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<tr>
<td><strong>Civil Engineering A</strong></td>
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<tr>
<td>CE231</td>
<td>Fluid Mechanics I (1)</td>
<td>Eng. I, Maths I</td>
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<td>CE223J</td>
<td>Engineering Geology (1)</td>
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<td><strong>Civil Engineering B</strong></td>
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<td>CE332</td>
<td>Fluid Mechanics II (3)</td>
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<tr>
<td>CE241</td>
<td>Surveying I (3)</td>
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</table>
### Subjects & Courses

**Civil Engineering C**
- Free selection of 9 hrs/wk. from —
  - CE433  Water Resources Engineering I (1½)
  - CE434  Water Resources Engineering II (1½)
  - CE432  Surveying II (1½)
  - CE451  Transportation Engineering (1½)
  - ME481  Engineering Administration (1½)
  - ME482  Engineering Economics (1½)
  - CE452  Earth & Rock Engineering (1½)
  - CE414B  Structural Analysis II (3)
  - ME212  Engineering Design or (1½)
  - ME271  Thermodynamics 9

**Electives I & II**
- CE161  Land Surveying I 5
- CE262  Surveying Computation 4½
- CE261  Engineering for Surveyors 2½
- CE201  3 Eng. I

These electives, normally in years III and IV of the Bachelor of Engineering course, may consist of subjects or part-subjects offered within the Faculty or by other Faculties, subject to the approvals of the Heads of the Department of Civil Engineering, and of any other Departments responsible for the subject or part-subject.

An Elective with a normal study load of from 4½ to 6 hours per week is equivalent to a first year subject in the Faculties of Arts or Science.

An Elective with a nominal study load of 3 hours per week is equivalent to half of a first year subject in the Faculties of Arts or Science.

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### Elective subjects within the Department of Civil Engineering

**Subject** | **Hours per week** | **Prerequisites or Corequisites**
---|---|---
CE415A  Structural Analysis—Continua | 1½ | Materials & Structures III or
CE415B  Structures—Plasticity | 1½ | Materials & Structures E & F
CE415C  Advanced Design | 1½ |
CE415D  Structures—Foundation Eng. | 1½ |
CE435A  Fluid Mechanics—Theoretical Hydrodynamics | 1½ | Civil Engineering II or
CE435B  Fluid Mechanics—Open Channel Flow | 1½ | Civil Engineering IIA or
CE435C  Fluid Mechanics—River and Coastal Engineering | 1½ |
CE436  Water Resources Engineering | 1½ | Civil Engineering III or IIIA
CE426A  Advanced Materials | 1½ | M. & S. I or M. & S. B.
CE426B  Concrete Technology | 1½ | M. & S. I or M. & S. A.
CE426C  Soil Mechanics | 1½ | M. & S. II or M. & S. D.
CE443  Surveying | 1½ | C.E.I., C.E.IIA or C.E.IIB
CE454  Highway Engineering | 1½ | C.E.I., C.E.IIA or C.E.IIB
CE470  Special Topic | 1½ |
CE471  Special Topic | 1½ |

The number of elective units offered in any one year will depend upon demand and availability of staff.
DESCRIPTION OF SUBJECT UNITS

DEPARTMENT OF CIVIL ENGINEERING

Subjects offered in the Faculty of Engineering, as listed in the course outlines, are made up of subject units drawn from the following, and both subject content and unit content may be varied from time to time.

Each subject unit has an identification number with prefixed letters indicating the Department responsible for the unit, CE for Civil Engineering, EE for Electrical Engineering, and ME for Mechanical Engineering. The first numeral generally indicates the Year of the full-time course in which the unit is normally taken; the second numeral indicates the field of study; the third numeral for undergraduate courses indicates the level, or sequence in the field. A suffix letter J indicates that the unit is a joint offering of more than one department.

The hours shown for each subject unit are the total attendance hours for lectures, laboratory, design and tutorial classes. As a guide to private study and preparation, students should allow, on the average about 11 hours for each hour of lectures and one hour for each hour of laboratory, design or tutorial. The note Arr. indicates that the unit is an elective for which the hours are fixed by arrangement.

CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Indicating Numerals</th>
<th>Field of Study</th>
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<tbody>
<tr>
<td>CE-0-</td>
<td>Service Courses</td>
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<td>CE-1-</td>
<td>Structures</td>
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<td>CE-2-</td>
<td>Materials</td>
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<td>CE-3-</td>
<td>Fluid Mechanics, Water Resources</td>
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<td>Surveying — general courses</td>
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<td>Civil Engineering practice</td>
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<td>CE-6-</td>
<td>Surveying — Specialist courses</td>
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CE202 MATERIALS AND STRUCTURES 84
Uniaxial loading, states of stress and strain; stress and strain relationships; internal forces, internal stresses; deflexion of beams, torsion, buckling; structure of metals, ceramics and plastics; behaviour under static and dynamic loading; deterioration of engineering materials.

Prescribed Texts

Reference Texts
Van Vlack, L. H.: *Elements of Materials Science* Addison-Wesley 1964

CE303 STRUCTURAL DESIGN 84
Design of steel and reinforced concrete structures for students not following the Civil Engineering course.

Prescribed Texts
As for CE306.

Reference Texts
As for CE306.

CE104 STRUCTURES I FOR ARCHITECTS 60
A course in statics applied to structures. Equilibrium of two-dimensional force systems, funicular polygon; shear force, axial force, bending moment; pin-jointed frames; analytical and graphical treatment; three-dimensional systems.

Prescribed Texts
As for CEIII

Reference Texts
As for CEIII
CE205  STRUCTURES II FOR ARCHITECTS  
Uniaxial loading, states of stress and strain; stress and strain relationships; internal forces, internal stresses, deflexion of beams, torsion and buckling.  
**Prescribed Texts**
Nash, W. A.: *Strength of Materials* Schaum 1967

**Reference Text**

CE306  STRUCTURES III FOR ARCHITECTS  
Principles of structural design, loadings, use of codes; steel design, riveted, bolted and welded joints, columns (Perry-Robertson formula), beams, plated beams, plated web girders, roof trusses; reinforced concrete design, simple beams, doubly reinforced beams, tee-beams, one-way slabs, axially loaded columns, eccentrically loaded columns by charts, column footings.  
**Prescribed Texts**
S.A.A. Loading Code — Part I  
*Dead and Live Loads* A.S.C.A. 34.1 1969  
(Standards Association of Australia)

(Standards Association of Australia)

*Code for Concrete Buildings* A.S.C.A.2  
(Standards Association of Australia)

*Hot Rolled Carbon Steel Sections and Plates* B.H.P. AIS (B.H.P. Co. Ltd.)

*Steel Structures Code* A.S.C.A.1-1968  
(Standards Association of Australia)

**Reference Texts**
Ferguson, P. M.: *Reinforced Concrete Fundamentals* Wiley
Bresler, B., Lin, T. Y. & Scalzi, J. B.: *Design of Steel Structures* Wiley

CE407  STRUCTURES IV FOR ARCHITECTS  
Types of multistorey frames and methods of bracing; introduction to analysis of indeterminate frames using moment distribution and frame tables. Approximations used for preliminary design; introduction to plastic analysis of frames; soil mechanics problems in foundations—retaining walls; description of behaviour of two-way and flat slabs including ribbed slabs; introduction to prestressed concrete, prestress losses; ultimate load behaviour of reinforced and prestressed beams; design by load balancing; elementary theory of shells and folded plates.  
**Reference Texts**
Lin, T. Y.: *Design of Prestressed Concrete Structures* Wiley
Ferguson, P. M.: *Reinforced Concrete Fundamentals* Wiley
Teng, W. C.: *Foundation Design* Prentice-Hall 1962

CE111  STATICS  
Two-dimensional force systems; equilibrium, funicular polygon; rigid bars, shear force, axial force, bending moment; pin-jointed frames, analytical and graphical treatment; equilibrium of three-dimensional force systems.  
**Prescribed Text**
Hall, A. S. & Archer, F.: *Principles of Statics*, University of New South Wales Students Union.

**Reference Texts**
Meriam, J. L.: *Statics* Wiley 1966

CE212  MECHANICS OF SOLIDS I  
Uniaxial loading, states of stress and strain, stress and strain relationships; internal forces, internal stresses, deflexion of beams, torsion, buckling.  
**Prescribed Text**
CE313 STRUCTURAL ANALYSIS AND DESIGN I 168
Analysis of elastic statically determinate and indeterminate systems by classical methods; torsion; basic design of steel and reinforced concrete structures; timber design.

Prescribed Texts
S.A.A. Loading Code — Part I
   Dead and Live Loads              A.S.C.A.34.1-1969
   (Standards Association of Australia) 

Code for Welding in Building Part I
   A.S.C.A.8, Pt. 1-1965
   (Australian Standards Association)

Code for Concrete Buildings
   A.S.C.A.2
   (Australian Standards Association)

Ferguson, P. M.: Reinforced Concrete Fundamentals
   Wiley

Bresler, B., Lin, T. Y. & Scalzi, J. B.: Design of Steel Structures
   Wiley

OR

McGuire, W.: Steel Structures
   Prentice-Hall

Norris, C. H. & Wilbur, J. B.: Elementary Structural Analysis
   McGraw-Hill

Reference Texts
   Lockwood

Matheson, J. A. L.: Hyperstatic Structures
   Vols. I and II

Laursen, H. I.: Structural Analysis
   McGraw-Hill 1969

CE313A STRUCTURAL ANALYSIS I
84
(Topic in Civil Engineering IIM in the Faculty of Mathematics)
Analysis component of CE313
Analysis of Elastic statically determinate and indeterminate systems by classical methods; torsion.

Prescribed Text
Norris C. H. & Wilbur, J. B.: Elementary Structural Analysis
   McGraw-Hill

Reference Texts
Matheson, J. A. L.: Hyperstatic Structures
   Vols. I & II

Laursen, H. I.: Structural Analysis
   McGraw-Hill

CE414 STRUCTURAL ANALYSIS AND DESIGN II 168

Prescribed Texts
As for CE313

Lin, T. Y.: Design of Prestressed Concrete Structures
   Wiley

Code for Prestressed Concrete
   A.S.C.A.35 S.A.A.
   (Standards Association of Australia)

Neal, B. G.: The Plastic Methods of Structural Analysis
   Chapman & Hall

Martin, H. C.: Introduction to Matrix Methods of Structural Analysis
   McGraw-Hill 1966

   Pergamon 1965

Reference Texts
As for CE313.

Livesley, R. K.: Matrix Methods of Structural Analysis
   Pergamon 1964

Heyman, J.: Plastic Design of Frames Vols. 1 & 2
   Cambridge U.P. 1971
CE414A  STRUCTURAL ANALYSIS II  
Analysis component of CE414.  

Prescribed Texts  
Neal, B. G.:  The Plastic Methods of Structural Analysis  
Chapman & Hall  
Martin, H. C.:  Introduction to Matrix Methods of Structural Analysis  
McGraw-Hill  
Pergamon  

Reference Texts  
Livesley, R. K.:  Matrix Methods of Structural Analysis  
Pergamon  
Heyman, J.:  Plastic Design of Frames Vols. 1 & 2  
Cambridge U.P.  

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CE414B  STRUCTURAL DESIGN II  
Design component of CE414.  

Prescribed Texts  
Lin, T. Y.:  Design of Prestressed Concrete Structures  
Wiley  
Code for Prestressed Concrete  
A.S.C.A.35 S.A.A.  
(Standards Association of Australia)  

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CE452  ENGINEERING CONSTRUCTION  

Prescribed Texts  
Antill, J. M. & Ryan, P. W. S.:  Civil Engineering Construction  
Angus and Robertson  
Antill, J. M.:  Civil Engineering Management  
Angus and Robertson  

Reference Texts  
McGraw-Hill  

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CE220  BUILDING SCIENCE IIIB FOR ARCHITECTS  
60  
General materials technology; introductory course of lectures and laboratory work on the load-deformation characteristics of structural materials; concrete technology.  

Prescribed Texts  
McGraw-Hill  
Troxell, G. E. & Davis, H. E.:  Composition and Properties of Concrete  
McGraw-Hill  

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CE221  PROPERTIES OF MATERIALS I  
70  
A course of lectures and laboratory work on the basic structure of metals, ceramics and organic solids; behaviour of materials under static and dynamic loads; deterioration of engineering materials.  

Prescribed Texts  
Richards, C. W.:  Engineering Materials Science  
Chapman & Hall  

Reference Texts  
Prentice-Hall  
Van Vlack, L. H.:  Elements of Materials Science  
Addison Wesley  
Van Vlack, L. H.:  Elements of Materials Science  
Addison Wesley  
Cottrell, A. H.:  The Mechanical Properties of Matter  
Wiley  

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CE222  CONCRETE TECHNOLOGY  
84  
Materials in concrete; concrete mix design; properties of hardened and plastic concrete, manufacturing and field control; special concretes; lectures and laboratory work.  

Prescribed Texts  
Neville, A. M.:  Properties of Concrete  
S. A. A. Code A77—Aggregates for Concretes  

Reference Texts  
Lea, F. M. & Desch, C. H.:  The Chemistry of Cement and Concrete  
Arnold  
Taylor, W. H.:  Concrete Technology and Practice  
Angus and Robertson  
Coding A2 (Cement), A100-110 (Concrete), CA2 (Building)  
S.A.A.
CE223J  ENGINEERING GEOLOGY  42
A course of lectures, laboratory work and field excursions on the principles of geology and their application to civil engineering problems.

**Prescribed Texts**
Legget, R.: *Geology and Engineering* 2nd Ed. ... ... ... McGraw-Hill

CE324  SOIL MECHANICS  84
Index properties, classification of solids; permeability, capillarity, seepage and flow nets; stresses in soils; settlement and consolidation; compaction, shear strength and failure criteria; stability of retaining walls, slopes and footings.

**Prescribed Text**
Lambe, T. W. & Whitman, R. V.: *Soil Mechanics* ... ... ... Wiley 1969

**Reference Texts**
Capper, P. L., Cassie, W. F. & Geddes, J. D.: *Problems in Engineering Soils* ... ... ... Spon 1966
Bishop, A. W. & Henkel, D. J.: *The Measurement of Soil Properties in the Triaxial Test* ... Edward Arnold 1964
Lambe, T. W.: *Soil Testing for Engineers* ... ... ... Wiley

A number of references will be made during the course to the following Journals and Proceedings which are all available in the Library:

*Journal of Soil Mechanics and Foundation Division* ... ... ... ... ... (ASCE)
*Geotechnique* ... (Institution of Civil Engineers, London)
*International Conferences on Soil Mechanics and Foundation Engineering* ... ... ... (Proceedings)
*Aust.-N.Z. Conferences on Soil Mechanics and Foundation Engineering*
*Norwegian Geotechnical Institute Publication*
*Danish Geotechnical Institute Publication*
*Special Technical Publications* ... ... ... (A.S.T.M.)

CE425  EARTH AND ROCK ENGINEERING  42
Site investigation, design of spread footings, strip and combined footings, raft foundations, piled foundations, design of embankments, cuttings, earth and rockfill dams, introductory rock mechanics.

**Prescribed Texts**
Terzaghi, K. & Peck, R. B.: *Soil Mechanics in Engineering Practice* ... ... ... 2nd Ed. Wiley 1967
Parcher, J. V. & Mehn, R. E.: *Soil Mechanics and Foundations* ... ... ... ... ... Merrill 1968

**Reference Texts**
As for CE324.

CE231  FLUID MECHANICS I  42
Fluid properties and definitions. Fluid statics:— statics of moving systems, forces on surfaces, buoyant forces, stability of floating and submerged bodies. Fluid flow concepts:— Types of flow, continuity equations, Euler's equation of motion along a streamline, Bernoulli equation, energy equation. Linear momentum equation. The moment of Momentum equation. Linear and angular momentum applications. Introduction to dimensional analysis. Viscous effects:— fluid resistance, laminar and turbulent flow, flow in pipes and conduits. Fluid measurement.

**Prescribed Text**

**Reference Text**
Dougherty, R. L. & Franzini, J. B.: *Fluid Mechanics with Engineering Applications* ... ... ... McGraw-Hill
CE332  FLUID MECHANICS II  84
Similitude; flow nets, boundary layers; closed conduit flow; pipe networks; unsteady flow; waterhammer, hydraulic machinery, open channel hydraulics, backwater curves.
Prescribed Texts
Henderson, F. M.: Open Channel Flow
Collier-MacMillan 1966
Reference Texts
Rouse, H.: Engineering Hydraulics .... ... Wiley
Stryker, V.: Handbook of Fluid Dynamics ... McGraw-Hill
Davis, C. V. & Sorenson,: Handbook of Applied Hydraulics
3rd Ed. McGraw-Hill
Morris, H. M.: Applied Hydraulics in
Engineering .... ... Ronald Press
Valentine, H. R.: Applied Hydrodynamics .... Butterworths
CE433  WATER RESOURCES ENGINEERING I  42
Prescribed Texts
Linsley, R. K. & Franzini, J. B.: Water Resources
Engineering .... .... .... .... McGraw-Hill
Australian Rainfall and Runoff .... .... The Institution of
Engineers, Australia, Stormwater Standards Committee
Reference Texts
Chow, V. T.: Handbook of Applied
Hydrology .... .... .... .... McGraw-Hill
Water Resources Use and
Management .... .... (Melbourne University Press)
McGauhey, P. M.: Engineering Management of Water
Quality .... .... .... .... McGraw-Hill
CE434  WATER RESOURCES ENGINEERING II  42
Prescribed Text
As for CE434
Reference Text
As for CE434
CE340  SURVEYING FOR ARCHITECTS  30
Introduction, chaining methods of measurement, corrections, chain surveys; use of the level, differential levelling, booking; contours, volumes of earth-works; use of the theodolite, methods of reading angles, applications in buildings; traversing, setting out.
Bannister, A. & Raymond, S.: Surveying .... Pitman
CE241  SURVEYING I  84
A course of lectures, field work and a survey camp; basic measurement techniques and instruments, traversing, plane tabling, tacheometry; contours, areas, volumes, route surveys and associated calculations; hydrographic and underground surveys; introduction to photogrammetry; controlling and setting out small engineering projects.
Prescribed Texts
Bannister, A. & Raymond, S.: Surveying .... Pitman
Von Vega, Baron G.: Seven Place Logarithmic Tables
of Numbers and Trigonometrical Functions .... Hafner
Reference Text
Clark, D.: Plane and Geodetic Surveying Vol. I
(Plane Surveying) .... Constable
CE342  SURVEYING II
Precise Levelling, precise angle measurement, short-range electromagnetic distances; controlling and setting out large engineering works, precise setting out; photogrammetric measurement.

Prescribed Texts
As for CE241.

Reference Texts
Clark, D.: Plane and Geodetic Surveying Vol. 2
(Higher Surveying) Constable
Crone, D. R.: Elementary Photogrammetry Arnold

CE350J  SEMINAR
Preparation and presentation by students of lectures and discussions on a range of topics of historical, social and technological significance.

CE435  PROJECT
Literature review, analytical and/or experimental investigation, or design of one or more civil engineering problems.

CE451  TRANSPORTATION ENGINEERING
Elements of planning, design and engineering of transportation facilities; including estimates of demand, data collection, route and terminal design and control. Highway location and design and construction; pavements, drainage, economic aspects. Railway engineering; elements of flight transportation.

Prescribed Text

Reference Texts
Hay, W. W., An Introduction to Transportation Engineering Wiley
Sherrard, H. M.: Australian Road Practice, Melbourne University Press

ELECTIVES

ELECTIVE SUBJECTS WITHIN THE DEPARTMENT OF CIVIL ENGINEERING
(In all electives, prescribed and reference texts will be advised by the Lecturer unless indicated below.)

CE415A  STRUCTURAL ANALYSIS — Continua
CE415B  STRUCTURES — Plasticity
CE415C  STRUCTURES — Advanced Design
CE415D  STRUCTURES — Foundation Engineering
CE435A  FLUID MECHANICS—Theoretical Hydrodynamics
CE435B  FLUID MECHANICS — Open Channel Flow

Prescribed Text

Reference Text
As for CE332.

CE435C  FLUID MECHANICS — River and Coastal Engineering
CE436  WATER RESOURCES ENGINEERING
CE426A  ADVANCED MATERIALS
CE426B  CONCRETE TECHNOLOGY
CE426C  SOIL MECHANICS

Reference Texts

CE434  SURVEYING
CE454  HIGHWAY ENGINEERING
CE470  Reserved for Special Topics
CE471  Reserved for Special Topics
CE161  LAND SURVEYING I
Historical review of surveying methods and instruments, geodesy, cartography and astronomy. Introduction to modern aspects. Cartographic drawing and equipment. Surveying methods and instruments. Computations.

Prescribed Texts
Greenhood, D.: Mapping Phoenix Science Series University of Chicago, pss 521 1965
Seven-Figure Mathematical Tables Chambers 1958

Reference Texts
Mitchell, H. C.: Definitions of terms used in Geodetic and other Surveys U.S. Coast & Geodetic Survey Sp. Pub. 1948
Whyte, W. S.: Basic Metric Surveying Butterworths 1969

CE262  LAND SURVEYING II
Introduction to errors of observation. Engineering Surveys; investigation and setting out surveys including height determination by barometric, trigonometric and differential levelling. Plane triangulation, traversing, contours, areas, volumes. Horizontal and vertical curves, hydrographic surveying. Cartography; topographical surveys, atlas map projections, map reproduction. Geometrical optics, lens systems and thick lenses, aberrations of optical systems, applications.

Prescribed Texts
Bannister, A. & Raymond, S.: Surveying Pitman 1959
Von Vega, Baron G.: Logarithmic Seven Place Tables of Numbers and Trigonometric Functions Hafner

Reference Texts
Mitchell, H. C.: Definition of Terms used in Geodetic and other Surveys U.S. Coast and Geodetic Survey Sp. Pub. 242 1948
Sandover, J. A.: Plane Surveying Arnold 1961

CE261  SURVEYING COMPUTATIONS I

Prescribed Text
Von Vega, Baron, G.: Seven Place Logarithmic Tables of Numbers and Trigonometric Functions Hafner
Seven Figure Mathematical Tables Chambers 1958
Tables of Natural Sines etc. to every 10 seconds D.M.R. 1949
Natural Trigonometric Tables, Six Figures Government Printer, Pretoria

Reference Text
Richardus P.: Project Surveying North Holland 1966

CE201  ENGINEERING FOR SURVEYORS
Materials, structures and design of instruments. Aspects of hydraulics, hydrology and soil mechanics.

Prescribed Text
To be advised.

Reference Text
To be advised.
Electrical Engineering is a rapidly expanding branch of engineering. It includes such fields as computer and information science, the theory and design of automatic control systems, electronics, and the study of electrical power generation and distribution.

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.

During the early stages of the undergraduate 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. Advanced students study specialised subjects on power, control or electronics in their final year. Final year students may also broaden their knowledge by taking courses such as Industrial Law, Production Control, Economics or Accounting.

Towards the end of his final year, the full-time undergraduate prepares a report covering some aspect of a supervised project, and delivers a seminar paper on a selected topic.

Postgraduate students are prepared for the degrees of Master of Engineering, Master of Engineering Science and Doctor of Philosophy. Their work includes formal lecture courses, seminars and research in both practical and theoretical aspects of their specialisations.

COURSE OUTLINES

DEPARTMENT OF ELECTRICAL ENGINEERING

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 IN ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
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<td>Engineering Technology</td>
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</tr>
<tr>
<td>IV</td>
<td>ELECTRICAL ENGINEERING IVA</td>
<td>17</td>
</tr>
<tr>
<td>IV</td>
<td>Elective II†</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

During the course each full-time student should complete periods of practical experience acceptable to the Faculty Board totalling 20 weeks before 31st January in the year in which the degree is to be awarded.

† See Elective Requirements.

### BACHELOR OF SCIENCE (ENGINEERING) IN ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Average Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Engineering I</td>
<td>6</td>
</tr>
<tr>
<td>I</td>
<td>MATHEMATICS I</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>II</td>
<td>Chemistry IS</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>Engineering Technology</td>
<td>3</td>
</tr>
<tr>
<td>II</td>
<td>PHYSICS IA</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>III</td>
<td>ELECTRICAL ENGINEERING IIIA</td>
<td>3</td>
</tr>
<tr>
<td>III</td>
<td>Electrical Engineering IIB</td>
<td>6</td>
</tr>
<tr>
<td>III</td>
<td>Mathematics IIB Part I</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>IV</td>
<td>ELECTRICAL ENGINEERING IVA</td>
<td>3</td>
</tr>
<tr>
<td>IV</td>
<td>Electrical Engineering IIIB</td>
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<tr>
<td>IV</td>
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<tr>
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<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td>V</td>
<td>ELECTRICAL ENGINEERING IVA</td>
<td>4‡</td>
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<tr>
<td>V</td>
<td>Electrical Engineering IIIB</td>
<td>4‡</td>
</tr>
<tr>
<td>V</td>
<td>Elective II†</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>12</strong></td>
</tr>
</tbody>
</table>

During the course each part-time student should complete periods of practical experience acceptable to the Faculty Board totalling three years before 31st January in the year in which the degree is to be awarded.

† See Elective Requirements.
### BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

In the combined course set out below the Arts subjects shall be chosen from the approved Schedule of Subjects offered for the degree of Bachelor of Arts.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IS</td>
<td>3</td>
</tr>
<tr>
<td>Engineering I</td>
<td>6</td>
</tr>
<tr>
<td>Engineering Technology</td>
<td>3</td>
</tr>
<tr>
<td>MATHEMATICS I</td>
<td>6</td>
</tr>
<tr>
<td>Physics IA</td>
<td>6</td>
</tr>
<tr>
<td><strong>YEAR I</strong></td>
<td><strong>24</strong></td>
</tr>
<tr>
<td>Arts Subject Part I</td>
<td>6</td>
</tr>
<tr>
<td>Electrical Engineering IIA</td>
<td>3</td>
</tr>
<tr>
<td>MATHEMATICS IIB</td>
<td>6</td>
</tr>
<tr>
<td>Physics II</td>
<td>6</td>
</tr>
<tr>
<td><strong>YEAR II</strong></td>
<td><strong>21</strong></td>
</tr>
<tr>
<td>Arts Subject Part II</td>
<td>6</td>
</tr>
<tr>
<td>Arts Subject Part I or Part II</td>
<td>6</td>
</tr>
<tr>
<td>Electrical Engineering IIC</td>
<td>3</td>
</tr>
<tr>
<td>ELECTRICAL ENGINEERING IIA</td>
<td>6</td>
</tr>
<tr>
<td><strong>YEAR III</strong></td>
<td><strong>21</strong></td>
</tr>
<tr>
<td>Arts Subject Part III</td>
<td>10</td>
</tr>
<tr>
<td>Arts Subject Part I or Part II or Part III</td>
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<tr>
<td>ELECTRICAL ENGINEERING IIID OR ELECTRICAL ENGINEERING IIIE</td>
<td>6</td>
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<td><strong>YEAR IV</strong></td>
<td><strong>22</strong></td>
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<td>Electrical Engineering IIIF (if candidate completed IIID) OR Electrical Engineering IIIG (if candidate completed IIIE)</td>
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<td>ELECTRICAL ENGINEERING IVA</td>
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<td><strong>YEAR V</strong></td>
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</tr>
</tbody>
</table>

### BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IS</td>
<td>3</td>
</tr>
<tr>
<td>Engineering Technology</td>
<td>3</td>
</tr>
<tr>
<td>Engineering I</td>
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<tr>
<td>MATHEMATICS I</td>
<td>6</td>
</tr>
<tr>
<td>Physics IA</td>
<td>6</td>
</tr>
<tr>
<td><strong>YEAR I</strong></td>
<td><strong>24</strong></td>
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<tr>
<td>MATHEMATICS IIA</td>
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<tr>
<td>Physics II</td>
<td>6</td>
</tr>
<tr>
<td>Mathematics IIC</td>
<td>6</td>
</tr>
<tr>
<td>Electrical Engineering IIA†</td>
<td>3</td>
</tr>
<tr>
<td><strong>YEAR II</strong></td>
<td><strong>21</strong></td>
</tr>
<tr>
<td>(a) Mathematics IIB</td>
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</tr>
<tr>
<td>PHYSICS IIIA</td>
<td>12</td>
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<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>(b) Mathematics IIB</td>
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</tr>
<tr>
<td>Mathematics IIIA</td>
<td>6</td>
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<tr>
<td>Selected Labs. and lectures from PHYSICS IIIA</td>
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<td><strong>YEAR III</strong></td>
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<td>ELECTRICAL ENGINEERING IIA†</td>
<td>6</td>
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<tr>
<td>Electrical Engineering IIIB†</td>
<td>6</td>
</tr>
<tr>
<td>Electrical Engineering IIIC†</td>
<td>6</td>
</tr>
<tr>
<td><strong>YEAR IV</strong></td>
<td><strong>18</strong></td>
</tr>
<tr>
<td>ELECTRICAL ENGINEERING IVA†</td>
<td>17</td>
</tr>
<tr>
<td>Elective II†</td>
<td>3</td>
</tr>
<tr>
<td><strong>YEAR V</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

† Same as B.E. Course, with GE391 replaced by three elective units.
DETAILED REQUIREMENTS

PREPARATION OF PROGRAM

Each student will be assigned an academic advisor from among the teaching staff. The student is expected to arrange his own program subject to the requirements stated below and the approval of his advisor. Minor variations from the stated requirements will be considered upon application to the head of the department, provided the application has received support of the advisor. Any such variations will have to receive the approval of the Dean of the Faculty.

DEFINITION OF UNITS

Individual topics (or subject units) are given a quantitative rating by defining 1 unit to be 42 attendance hours. Thus topics which meet 3 hours a week for half a year are rated at 1 unit and those which meet 3 hours a week for a full year are rated at 2 units. Topics which are given in the first half year are indicated by *, in the second half year by **, and for the full year by ***.

ELECTIVE REQUIREMENTS

The 12 elective units in the full-time B.E. course and the 13 elective units in the part-time B.Sc.(Eng.) course are to be selected by the student, with the advice and approval of his advisor, subject to the following restrictions.

1. At least 6 units must be taken within the Faculties of Engineering, Mathematics, Science and Applied Science.
2. At least 4 of the units in (1) must be taken within the Faculty of Engineering.
3. At least 2 of the units in (2) must be taken from outside the Electrical Engineering Department.
4. One first year Arts subject or the equivalent must be taken in a non-technical area. It will ordinarily be regarded as four units of elective material.
5. If a student elects to do a topic at one level which is required at a later level, the later requirement is to be replaced with elective units.
6. The first digit in the number of a topic is not to be interpreted as the year in which the topic must be taken. In particular, students are encouraged to elect EE400 topics at any level in their program subject to pre- and co-requisite requirements.

The 8 elective units in the B.Sc./B.E. course are unrestricted.

A first-year subject in the Faculties of Arts or Science taken as an elective is normally equivalent to 4 units. Half a first-year subject in these Faculties is normally equivalent to 2 units.
### BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

**Units**  
(1 unit = 42 hours)

#### SECOND YEAR (14 Units)
- **MATHEMATICS IIIB** (Topics B, C, D, E) 4***
- **PHYSICS II** 4***
- **ELECTRICAL ENGINEERING IIA**
  - EE201 Principles of Electrical Engineering 1*
  - EE202 Principles of Electrical Engineering 1**
- **ELECTRICAL ENGINEERING IIB**
  - Four elective units† 4

#### THIRD YEAR (14 Units)
- **ELECTRICAL ENGINEERING IIIA**
  - EE311 Machines 1*
  - EE321 Electronics 1*
  - EE331 Circuits 1*
  - EE341 Control 1*
- **ELECTRICAL ENGINEERING IIIB**
  - Three of the following—
    - EE313 Power Systems 1**
    - EE322 Electronics (prereq. 321, coreq. 323L) 1***
    - EE332 Circuits (prereq. 331) 1***
    - EE342 Control (prereq. 341) 1***
    - EE351 Fields 1***
  - One of the following—
    - EE312L Machines Laboratory 1*
    - EE323L Electronics Laboratory (prereq. 321, coreq. 322) 1***
- **ELECTRICAL ENGINEERING IIIC**
  - GE391 Mathematics for Electrical Engineers (Topic H plus one of A, F, or G) 2***
  - Two elective units† (including additional topics from Electrical Engineering IIIB if desired) 2
- **ELECTIVE I**
  - Two elective units† 2

#### FOURTH YEAR (13 Units)
- **ELECTRICAL ENGINEERING IVA**
  - CE350J Seminar 1***
  - EE491 Seminar 1***
  - EE480 Project/Directed Reading 1***
  - Six EE400 topics 6
  - Two elective units† 2
- **ELECTIVE II**
  - Two elective units† 2

During the course each full-time student should complete periods of practical experience acceptable to the Faculty Board totalling 20 weeks before 31st January in the year in which the degree is to be awarded. Each student should hand in a report concerning his practical experience to the department secretary by the end of the third week in April.

† See Elective Requirements

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### BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

**Units**  
(1 unit = 42 hours)

#### SECOND YEAR (14 Units)
- **ARTS SUBJECT PART I**
  - **ELECTRICAL ENGINEERING IIA** 2
    - EE201 Principles of Electrical Engineering 2
    - EE202 Principles of Electrical Engineering 2
  - **MATHEMATICS IIIB** (Topics B, C, D, E) 4***
  - **PHYSICS II** 4***

#### THIRD YEAR (14 Units)
- **ARTS SUBJECT PART II**
  - **ELECTRICAL ENGINEERING IIIC**
    - Two elective units 2
    - **ELECTRICAL ENGINEERING IIID** 4
      - **ELECTRICAL ENGINEERING IIIE** 4

#### FOURTH YEAR (14 Units)
- **ARTS SUBJECT PART III**
  - **ELECTRICAL ENGINEERING IVA**
    - Six EE400 Topics 6
    - Two elective units† 2

#### FIFTH YEAR (14 Units)
- **ELECTRICAL ENGINEERING IIF** (if candidate completed IIID) 3
  - **ELECTRICAL ENGINEERING IIIG** (if candidate completed IIIE) 3

During the course each full-time student should complete periods of practical experience acceptable to the Faculty Board totalling 20 weeks before 31st January in the year in which the degree is to be awarded. Each student should hand in a report concerning his practical experience to the department secretary by the end of the third week in April.

† See Elective Requirements
SECOND YEAR (14 Units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATHEMATICS IIA</td>
<td>4***</td>
</tr>
<tr>
<td>PHYSICS II</td>
<td>4***</td>
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<tr>
<td>MATHEMATICS IIC</td>
<td>2</td>
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<tr>
<td>ELECTRICAL ENGINEERING IIA</td>
<td>1*</td>
</tr>
<tr>
<td>EE201 Principles of Electrical Engineering</td>
<td>1**</td>
</tr>
<tr>
<td>EE202 Principles of Electrical Engineering</td>
<td>1**</td>
</tr>
</tbody>
</table>

THIRD YEAR (12 Units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>MATHEMATICS IIB</td>
<td>4***</td>
</tr>
<tr>
<td>PHYSICS IIIA or MATHEMATICS IIIA</td>
<td>4***</td>
</tr>
<tr>
<td>SELECTED LABS &amp; LECTURES FROM PHYSICS IIIA</td>
<td>4***</td>
</tr>
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FOURTH YEAR (12 Units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
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<tbody>
<tr>
<td>ELECTRICAL ENGINEERING IIIA</td>
<td>4</td>
</tr>
<tr>
<td>EE301 Machines</td>
<td>1*</td>
</tr>
<tr>
<td>EE321 Electronics</td>
<td>1*</td>
</tr>
<tr>
<td>EE331 Circuits</td>
<td>1*</td>
</tr>
<tr>
<td>EE341 Control</td>
<td>1*</td>
</tr>
<tr>
<td>ELECTRICAL ENGINEERING IIIB</td>
<td>1**</td>
</tr>
<tr>
<td>THREE of the following —</td>
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</tr>
<tr>
<td>EE313 Power Systems</td>
<td>1**</td>
</tr>
<tr>
<td>EE322 Electronics (prereq. 321, coreq. 323L)</td>
<td>1**</td>
</tr>
<tr>
<td>EE332 Circuits (Prereq. 331)</td>
<td>1**</td>
</tr>
<tr>
<td>EE342 Control (Prereq. 341)</td>
<td>1**</td>
</tr>
<tr>
<td>EE351 Fields</td>
<td>1**</td>
</tr>
<tr>
<td>ONE of the following —</td>
<td></td>
</tr>
<tr>
<td>EE312L Machines Laboratory</td>
<td>1**</td>
</tr>
<tr>
<td>EE323L Electronics Laboratory (prereq. 321, coreq. 322)</td>
<td>1**</td>
</tr>
<tr>
<td>ELECTRICAL ENGINEERING IIIC</td>
<td>1***</td>
</tr>
<tr>
<td>Four elective units †</td>
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</tr>
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</table>

FIFTH YEAR (13 Units)

<table>
<thead>
<tr>
<th>Course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELECTRICAL ENGINEERING IVA</td>
<td>11</td>
</tr>
<tr>
<td>EE491 Seminar</td>
<td>1***</td>
</tr>
<tr>
<td>EE480 Project/Directed Reading</td>
<td>1***</td>
</tr>
<tr>
<td>CE302 Seminar</td>
<td>6</td>
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<tr>
<td>Six EE400 topics</td>
<td>1***</td>
</tr>
<tr>
<td>Two elective units †</td>
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</tr>
<tr>
<td>ELECTIVE II</td>
<td>2</td>
</tr>
<tr>
<td>Two elective units †</td>
<td></td>
</tr>
</tbody>
</table>

†See Elective Requirements
FIFTH STAGE (8 Units)

ELECTRICAL ENGINEERING PVA
Two units listed under PIVA not taken in Fourth Stage 2
One elective unit † 1

ELECTRICAL ENGINEERING PVB
Two units listed under PIVB not taken in Fourth Stage 2
One elective unit † 1

ELECTIVE II
Two elective units † 2

SIXTH STAGE (8 Units)

ELECTRICAL ENGINEERING PVIA
CE350J Seminar 1***
Four EE400 topics 4
Three elective units † 3

During the course each part-time student should complete periods of practical experience acceptable to the Faculty Board totalling three years before 31st January in the year in which the degree is to be awarded. Each student should hand in a report concerning his practical experience to the department secretary by the end of the third week in April.

†See Elective Requirements

DESCRIPTION OF TOPICS

DEPARTMENT OF ELECTRICAL ENGINEERING

Topics (subject units) offered by the Department are listed below. All are 1 unit (42 hours) unless otherwise stated. The contents and units may be varied from time to time without prior notification. Topics given in the first half of the year are indicated by *, in the second half by **, and for the full year by ***.

One unit is defined as 42 hours of attendance in lecture, laboratory, design, and tutorial classes. As a guide to private study and preparation, a student should allow approximately 1½ hours of outside work for each hour of lecture, and one hour for each hour of laboratory, design or tutorial attendance.

Each topic has an identifying number whose middle digit indicates the field of study, according to the following code:

<table>
<thead>
<tr>
<th>Indicating Numerals</th>
<th>Field of Study</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE-0-</td>
<td>General Electrical Engineering</td>
</tr>
<tr>
<td>EE-1-</td>
<td>Electrical Machines or Power Systems</td>
</tr>
<tr>
<td>EE-2-</td>
<td>Electronics</td>
</tr>
<tr>
<td>EE-3-</td>
<td>Electrical Circuit Theory or Measurements</td>
</tr>
<tr>
<td>EE-4-</td>
<td>Control or Communication Systems</td>
</tr>
<tr>
<td>EE-5-</td>
<td>Field Theory</td>
</tr>
<tr>
<td>EE-6-</td>
<td>Computer Science or Automata Theory</td>
</tr>
<tr>
<td>EE-8-</td>
<td>Project/Directed Reading</td>
</tr>
<tr>
<td>EE-9-</td>
<td>Seminar</td>
</tr>
</tbody>
</table>

†See Elective Requirements
INTRODUCTION TO ELECTRICAL ENGINEERING***

A course of lectures and tutorial work.
The systems concept in electrical engineering; relay communication systems, components of satellite relays, typical control systems, instrumentation systems. System building blocks, signal wave forms, signal processing for information transmission, amplitude modulation and other forms of modulation. Electromechanical devices.


Reference Texts
Cruz/Van Valkenburg: Introductory Signals and Circuits .... .... Blaisdell
Karbowiak/Huey: Information, Computers, Machines and Humans .... .... .... .... Wiley

PRINCIPLES OF ELECTRICAL ENGINEERING*

A course of lectures, tutorial and laboratory work.
Analysis: basic problems in electrical engineering and role of analytical approach. Review of fundamental laws. Generalization of network analysis; nature of network response, initial and final conditions, exponential excitation, steady state a.c. circuits, power in a.c. circuits and three phase circuits.

Introduction to network functions and two port networks. Application of these analytical techniques to electronics, power systems and machine. Electrical-Mechanical analogs.

Measurements: basic electrical engineering laboratory practice. Oscilloscopes, electrical components, transducers and d.c. power sources. Basic d.c. and a.c. measuring instruments including bridges and potentiometer, electrodynamic instruments and wattmeters.

Laboratory: oscilloscope and its uses; measurements of resistance; Kirchhoff's laws, superposition and Thevenin's theorem; electrical measuring instruments; transients in capacitive and inductive circuits; series-parallel A-C steady-state, three-phase circuits.

Prerequisite EE101, Mathematics I, Physics IA.

Prescribed Texts
If EE201 is not a Terminating Topic

If EE201 is a Terminating Topic
EITHER
Fitzgerald, Higginbotham, Grabel: Basic Electrical Engineering (3rd Ed.) .... .... .... .... McGraw-Hill
OR
R. J. Smith: Circuits, Devices and Systems (2nd Ed.) .... .... .... .... Wiley

Reference Texts
Cruz and Van Valkenburg: Introductory Signals and Circuits .... .... .... .... Blaisdell
N. Balabanian: Fundamentals of Circuit Theory .... .... .... .... .... Allyn & Bacon
W. Kidwell: Electrical Instruments and Measurements .... .... .... .... McGraw-Hill
EE202 PRINCIPLES OF ELECTRICAL ENGINEERING**
A course of lectures, tutorial and laboratory work.
Laboratory: transients in RLC circuits; unbalanced three-phase circuits; measurement of inductance and capacitance; mutual inductance; resonant circuit; magnetic testing.
Prerequisite EE201
Prescribed Texts

EE311 ELECTRICAL MACHINERY *
A course of lectures and tutorial work.
Power transformers; D.C. Machine; Induction motors; synchronous machines; 3-phase Commutator Machines
Prerequisite EE201
Prescribed Text
Say: The Performance and Design of Alternating Current Machines Pitman
Reference Texts
Fitzgerald and Kingsley: Electrical Machinery McGraw-Hill
Clayton & Hancock: The Performance and Design of Direct Current Machines Pitman

EE312L ELECTRICAL MACHINERY LABORATORY *
An essentially practical course, with some lectures.
A course of seven or eight experiments in heavy current electrical engineering dealing with the power transformer, d.c. machines, induction motor, synchronous machines, including tutorial problems based on the experiments.
Prerequisite EE201
Prescribed Text
Say: The Performance and Design of Alternating Current Machines Pitman
Reference Texts
Fitzgerald and Kingsley: Electrical Machinery McGraw-Hill
Charles S. Siskind: Direct-Current Machinery McGraw-Hill
Clayton & Hancock: The Performance and Design of Direct Current Machines Pitman

EE313 POWER SYSTEMS **
A course of lectures, tutorial and laboratory work.
Prerequisite EE202
Prescribed Text
Reference Texts
Westinghouse Transmission and Distribution Reference Book
Say: The Performance and Design of Alternating Current Machines Pitman
J. & P. Switchgear Book.

EE321 ELECTRONICS*
A course of lectures, tutorial and laboratory work, taken as an introduction to EE322 and EE323L.
Physics of semiconductor devices; physics of thermionic devices; characteristics of semiconductor and thermionic devices commonly used in electronic systems.
Prerequisite Physics IA and EE201
Prescribed Text
Reference Text

EE322 ELECTRONICS **
A course of lectures and tutorial work.
Introduction to Active Circuits. Basic electronic amplifiers; applications of feedback, negative and positive; power supplies for electronic equipment; elements of pulse circuitry.
Prerequisite EE201, EE321
Corequisite EE323L or consent of Instructor
Prescribed Text
J. Angelo: Electronics BIT'S, FET'S & Microcircuits McGraw-Hill
Reference Text
EE323L ELECTRONICS LABORATORY **
An essentially practical course, complementing EE322. A course of laboratory exercises requiring the application of Active Circuits theory to the solution of specific problems.
Prerequisite EE321
Corequisite EE322

EE331 CIRCUIT THEORY*
A course of lectures, tutorial and laboratory work.
Review of time and frequency domain analysis through Fourier series and resonant circuits; network topology; two-port networks; network functions; poles and zeros and their use in network analysis; frequency response plots; singularity functions; impulse response and its use in general network analysis; super-position integral; state-space equations of electric networks.
Prerequisite EE202
Prescribed Text
Desoer and Kuh: Basic Circuit Theory .... McGraw-Hill
Reference Texts
P. H. Roe: Networks and Systems .... Addison and Wesley
B. C. Kuo: Linear Networks and Systems .... McGraw-Hill

EE332 CIRCUIT THEORY **
A course of lectures, tutorial and laboratory work.
Terminated two-port networks; matching, attenuators and equalizers; constant-k filters.
Transmission lines: transient travelling waves; steady-state analysis of lossless and lossy transmission lines; radio-frequency and power-frequency lines; impedance charts and matching with stubs.
Prerequisite EE202
Prescribed Text
W. C. Johnson: Transmission Lines and Networks .... .... .... .... .... .... McGraw-Hill
Reference Texts
Potter and Fich: Theory of Networks and Lines .... .... .... .... .... .... Prentice-Hall
Ware and Reed: Communication Circuits .... .... .... .... Wiley

EE341 AUTOMATIC CONTROL *(Also see ME 361)
A course of lectures, tutorial, and laboratory work.
Mathematical models of systems and components: linear differential equations, block diagrams, Laplace transforms, state-space formulation.
Prerequisite Mathematics II, topics D and E or consent of instructor.
Prescribed Text
To be determined.
Reference Texts
Raven: Automatic Control Engineering .... McGraw-Hill
Melsa & Schultz: Linear Control Systems .... McGraw-Hill
Gupta & Hasdorff: Fundamentals of Automatic Control .... .... .... .... .... .... Wiley
Ogata: Modern Control Engineering .... Prentice-Hall
Desoer: Notes for a Second Course in Linear Systems .... .... .... .... .... Van Nostrand Reinhold

EE342 AUTOMATIC CONTROL AND LINEAR SYSTEMS THEORY **
Continuation of EE341.
Prerequisite EE341 or consent of instructor.

EE351 FIELD THEORY **
A course of lectures, tutorial and experimental work. Maxwell's equations, Wave propagation in unguided and guided configuration, Elementary Antenna Theory.
Experimental work on field plotting and microwave measurements.
Prerequisite Physics II, Mathematics IIB, EE201 or consent of instructor.
Prescribed Text
Reference Text
G. W. Carter: The Electromagnetic Field and its Engineering Aspects .... .... .... .... .... Longmans

EE380 PROJECT/DIRECTED READING
units by arrangement
Private work of laboratory, literature search or theoretical nature requiring the preparation of a report. Taken under the direction of a supervisor with whom the topic should be negotiated.
EE411 MACHINERY *
A course of lectures and tutorial work.
More advanced work on d.c. machines, synchronous machines, polyphase induction motors, fractional-horsepower A-C motors. The standard is that of Part III Fitzgerald & Kingsley.
Prerequisite EE311, EE312L.
Prescribed Text
Reference Text
Say: The Performance and Design of Alternating Current Machines Pitman

EE412 ADVANCED TOPICS IN HEAVY CURRENT ELECTRICAL ENGINEERING **
A course of lectures and tutorial work with some laboratory assignments.
Electromechanical Energy Conversion. Transient and steady-state performance of idealized machines involving the dq-transformation, and by means of transfer functions and block diagrams.
Prerequisite EE411, EE413L
Prescribed Text

EE413L ELECTRICAL MACHINERY LABORATORY **
A course of seven or eight more advanced experiments in heavy current electrical engineering dealing with synchronous machines, the induction motor, a.c. commutator machines, including tutorial problems based on the experiments.
This course complements EE411, but also includes some tutorial and lecture time.
Prerequisite EE311, EE312L

EE415 POWER SYSTEMS *
A course of lectures, tutorial and laboratory work.
Prerequisite EE311, EE332
Prescribed Text
Stevenson: Elements of Power System Analysis
2nd Ed. McGraw-Hill
Reference Texts
Westinghouse Transmission and Distribution Reference Book
Waddicor: Principles of Electric Power Transmission
5th Ed. Chapman & Hall
J. & P. Switchgear Book

EE421 ELECTRONICS *
A course of lectures and tutorial work taken in conjunction with EE423L.
Prerequisite EE322, EE323L
Corequisite EE421
Prescribed Text
J. Angelo: Electronics BJT’s FET’S & Microelectronics McGraw-Hill
Reference Text
S.E.E.C. Series Volumes 1 to 7.

EE423L ELECTRONICS LABORATORY *
An essentially practical course, complementing EE421.
Circuit development projects individually assigned.
Prerequisite EE322, EE323L
Corequisite EE421
EE425  DIGITAL ELECTRONICS**
A course of lectures, tutorial, and laboratory work.
Pulse and digital circuits, Boolean algebra, switching theory, design of computer hardware.
Prerequisite EE421—EE423L or Physics III and consent of instructor.
Prescribed Text
Sifferlen and Vartanian: Digital Electronics with Engineering Applications ...... ...... ...... ...... Prentice-Hall
Reference Texts
Hill and Peterson: Introduction to Switching Theory and Logical Design ...... ...... ...... ...... Wiley
Heath: Digital Computer Design ...... ...... Oliver and Boyd

EE441 MODERN CONTROL (Linear Optimal Control Theory)
(Not offered in 1972)
The development of the linear optimal regulator theory via Hamilton-Jacobi theory, its engineering properties and applications to related control problems such as the tracking problem, the singular control problem, and control problem with input disturbances; methods for solving suboptimal systems: methods for solving Riccati equations.
Prerequisite EE341 and EE342
Prescribed Text

EE442 MODERN CONTROL **
(Nonlinear Optimal Control Theory)
A course of lectures, tutorial and laboratory work including computer analysis covering the general area of Optimal Control Theory and in particular Dynamic Programming, the Calculus of Variations and the Pontryagin's Minimum Principle and various iterative numerical techniques for finding optimal controls and trajectories.
Prerequisite EE341 and EE342
Prescribed Text
Reference Text

EE443 OPTIMIZATION TECHNIQUES*
A course including lectures, tutorial and computer analysis. Mathematical background to optimization. Comparison of optimization methods; engineering applications—such as to problems of identification, control, pattern recognition and resource allocation.
Prescribed Text
Reference Text

EE444 COMMUNICATION SYSTEMS **
This course introduces the common forms of analog modulation, as well as pulse modulation systems including pulse code modulation. Performance in the presence of noise is considered.
Prerequisite EE331, EE332 or EE341, EE342 or consent of instructor.
Prescribed Text

EE451 MICROWAVE MEASUREMENTS (not offered in 1972)
A primarily experimental course with some lectures and tutorial work. Generation and modulation of microwave frequencies; measurement of frequency, wavelength and attenuation; use of stubs and other forms of impedance matching.
Prerequisite EE351 or Physics III or consent of instructor.
EE463 COMPUTER ORGANIZATION *
Basic computer elements and peripherals, representation and organization of information, system organization, supervisors and monitors, machine language and assembly language programming.
Lectures will be supplemented with practical assignments using the PDP-11 and ICL 1904a computers.
Prerequisite Mathematics I or knowledge of elementary programming and consent of instructor.
Prescribed Text
Gear: Computer Organisation and Programming
Reference Texts
Maurer: Programming: an Introduction to Computer Languages and Techniques
Wegner: Programming Languages Information Structures, and Machine Organization
PDP-11 Manual (D.E.C.)
Plan Manual (I.C.L.)

EE464 COMPUTER SYSTEMS PROGRAMMING **
Continuation of EE463. System software, structure of assemblers and loaders, symbol tables, searching and sorting, macros, compiling techniques, monitor systems, time-sharing. Various practical assignments will be done on the computers.
Prerequisite EE463

EE480 PROJECT/DIRECTED READING
Minimum 2 units (56 hours)
Topics are to be arranged with individual supervising lecturers. Full time students are normally required to undertake a project. Students should get in touch with a staff member in their field of interest during the first term.

EE491 SEMINAR *** one unit (28 hours)
Talks on various topics of general interest in engineering.

DEPARTMENT OF MECHANICAL ENGINEERING

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 analysis, synthesis and design, thermodynamics, fluid mechanics, automatic control and engineering management.

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

(i) BACHELOR OF ENGINEERING DEGREE COURSE IN MECHANICAL ENGINEERING. The course comprises four years of full-time study. Students are required to gain as much industrial experience as possible by working in industry during long vacations.

(ii) BACHELOR OF SCIENCE (Eng.) DEGREE COURSE IN MECHANICAL ENGINEERING, comprising six years of part-time study, during the whole of which time the student is normally employed in an engineering industry. A minimum of three years of concurrent industrial experience is required. Generally the student is encouraged to attend the University for at least one day per week.

(iii) BACHELOR OF ENGINEERING DEGREE COURSE IN INDUSTRIAL ENGINEERING, comprising four years of full time study. Years I and II of this course are similar to the full-time degree course in mechanical engineering. In the latter years the course is oriented towards the study of production techniques and their control and the application of scientific principles to administration and engineering management. The course is thus designed for those engineers who wish to make their career in the planning, supervision and administration of industrial undertakings. As in the full-time engineering course, students are required to gain industrial experience by working in an appropriate industry during long vacations.

(iv) BACHELOR OF SCIENCE (Eng.) DEGREE COURSE IN INDUSTRIAL ENGINEERING, comprising six years of part-time study and, as in (ii) above, a minimum of three years of suitable industrial experience gained concurrently.

(v) BACHELOR OF ENGINEERING DEGREE COURSE IN NAVAL ARCHITECTURE, comprising four years of full-time study. Year I of the course is identical with the full-time courses in Mechanical and Industrial engineering. In the remaining years the course is oriented towards the study of Naval Architecture and is designed to provide professional training for engineering students who are interested in Ship Building, and/or Off-Shore Engineering as a career. Students are required to complete a total of at least twenty weeks industrial experience, by working in shipyard establishments during long vacations.

(vi) BACHELOR OF SCIENCE (Eng.) DEGREE COURSE IN NAVAL ARCHITECTURE, comprising six years of part-time study and as in (ii) above a minimum of three years of suitable industrial experience gained concurrently. The part-time courses (ii), (iv) and (vi) are co-ordinated with the corresponding full-time courses so that students may apply for transfer from one course to the other with appropriate standing in subjects already completed.
for the award of the Degree of Bachelor of Science after satisfying the requirements of the first four years of the course. The course has been designed for those engineers who require a broader base to their education and training programme. This broader base is considered important in present day engineering practice especially where control of people is concerned.

(viii) BACHELOR OF ARTS/BACHELOR OF ENGINEERING DEGREE COURSE in INDUSTRIAL ENGINEERING comprising five years of full-time study in the Faculties of Science and Engineering. Students are required to gain as much industrial experience as possible by working in industry during long vacations. Students will be eligible for the award of the Degree of Bachelor of Arts after satisfying the requirements of the first four years of the course. The course has been designed for those engineers who require a broader base to their education and training programme. This broader base is considered important in the areas of planning, organisation and management.

(ix) BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING DEGREE COURSE IN MECHANICAL ENGINEERING comprising five years of full-time study in the Faculties of Science and Engineering. Students are required to gain as much industrial experience as possible by working in industry during long vacations. Students will be eligible for the award of the Degree of Bachelor of Science after satisfying the requirements of the first three years of the course.

(x) BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING DEGREE COURSE IN INDUSTRIAL ENGINEERING, comprising five years of full-time study in the Faculties of Science and Engineering. Students are required to gain as much industrial experience as possible by working in industry during long vacations. Students will be eligible for the award of the Degree of Bachelor of Science after satisfying the requirements of the first three years of the course.

(xi) POSTGRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING. This is a two-year part-time course for graduates in any branch of Engineering or Applied Science with appropriate experience or for persons otherwise acceptably qualified. The successful completion of the course leads to the award of a postgraduate diploma in Industrial Engineering. Those wishing to enrol in this course should write to the Head of the Department of Mechanical Engineering for further details.

(xii) BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN NAVAL ARCHITECTURE AND BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN NAVAL ARCHITECTURE degree courses are currently under consideration.

COURSE OUTLINES

DEPARTMENT OF MECHANICAL ENGINEERING

Note to Students Re-enroling in 1972

During 1971 small changes were made to the various course curricula. Students whose programmes are seriously affected by these changes should arrange for an interview with the Head of the Department.

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.

(e) Enrolment in individual units of a subject will only be permitted in exceptional circumstances. Examination results for such enrolments will be withheld until all the units comprising the subject have been completed.

(f) Standing in individual subject units for previous reading of a complete subject or of a subject unit will only be granted for a credit or higher grading in the unit.

INDUSTRIAL TRAINING

Students reading for a full-time Bachelor of Engineering degree are normally required to complete periods of practical experience totalling twenty (20) weeks or more, of a type acceptable to the Faculty Board. Students who transfer from part-time to full-time courses or vice versa will be advised individually of their practical training requirements.

Students reading for a part-time Bachelor of Science (Engineering) degree must complete three years of practical experience before the 31st January in the year in which the degree is to be awarded. Otherwise the award of the degree may be deferred.

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### Bachelor of Engineering in Mechanical Engineering

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
<th>YEAR I</th>
</tr>
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<tbody>
<tr>
<td>Chemistry IS</td>
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<td></td>
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<tr>
<td>Engineering I</td>
<td>6</td>
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<tr>
<td>Engineering Technology</td>
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<td>MATHEMATICS I</td>
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<td>ENERGY I</td>
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<tr>
<td>Mathematics IIB</td>
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<td>Mechanics of Materials I</td>
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<td>Chemistry IS</td>
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<td></td>
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<tr>
<td>Engineering Technology</td>
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</tr>
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<td><strong>Year III</strong></td>
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<th>Subject</th>
<th>Average Hours per week</th>
<th>YEAR IV</th>
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<tr>
<td>Mechanics of Materials II</td>
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<td>*Elective III</td>
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<td>Management I</td>
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<td>PROJECT</td>
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<th>Subject</th>
<th>Average Hours per week</th>
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<td></td>
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<tr>
<td>PHYSICS 1A</td>
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<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
<th>STAGE 6</th>
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</table>
| *Electives to be chosen with the approval of the Head of the Department.
<table>
<thead>
<tr>
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<tbody>
<tr>
<td>*Electives II</td>
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<tr>
<td>*Elective III</td>
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<tr>
<td>Management I</td>
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<tr>
<td>DESIGN II</td>
<td>6</td>
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<tr>
<td>Management IA</td>
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BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING

Subject Average Hours per week
28 weeks full-time course

YEAR I
Chemistry IS 3
Engineering I 6
Engineering Technology 3
MATHEMATICS I 6
Physics IA 6

24

YEAR II
Design I 6
ENERGY I 6
Mathematics IIB 6
Mechanics of Materials I 6

24

YEAR III
DESIGN IIA 4½
Industrial Engineering I 6
Industrial Management Studies I 6
Mechanics of Materials II 4½
General Studies Seminar 1½

22½

YEAR IV
Elective (Group A, B or C)* 4½
Elective (Group B only)* 4½
Industrial Management Studies II 6
PROJECT 6

21

*Electives to be chosen with the approval of the Head of the Department.
### Bachelor of Engineering in Naval Architecture

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>28 weeks full-time course</td>
</tr>
</tbody>
</table>

**YEAR I**
- Chemistry IS: 3
- Engineering I: 6
- Engineering Technology: 3
- MATHEMATICS I: 6
- Physics IA: 6

**YEAR II**
- ENERGY I: 6
- Mechanics of Materials I: 6
- Mathematics IIB: 6
- Naval Architecture I: 6

**YEAR III**
- DESIGN IIN: 6
- Naval Architecture II: 6
- Naval Architecture Design I: 6
- Elective I*: 4½
- General Studies Seminar: 1½

**YEAR IV**
- Elective II*: 4½
- PROJECT: 6
- Management IIN: 4½
- Naval Architecture III: 6

* Electives to be chosen with the approval of the Head of the Department.

Candidates for the degree course in Naval Architecture shall complete a total of at least twenty weeks of industrial experience before the 31st January in the year in which the degree is to be awarded.

### Bachelor of Science (Engineering) in Naval Architecture

<table>
<thead>
<tr>
<th>Subject</th>
<th>Average Hours per week</th>
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<tbody>
<tr>
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<td>28 weeks part-time course</td>
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**STAGE 1**
- Engineering I: 6
- MATHEMATICS I: 6

**STAGE 2**
- Chemistry IS: 3
- Engineering Technology: 3
- PHYSICS IA: 6

**STAGE 3**
- Mathematics IIB: 6
- MECHANICS OF MATERIALS I: 6

**STAGE 4**
- ENERGY I: 6
- Naval Architecture I: 6

**STAGE 5**
- DESIGN IIN: 6
- Naval Architecture II: 6

**STAGE 6**
- Naval Architecture Design I: 6
- NAVAL ARCHITECTURE III: 6
**BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING**

In the combined course set out below the Arts subjects shall be chosen from the approved Schedule of Subjects offered for the degree of Bachelor of Arts.

<table>
<thead>
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<th>Subject</th>
<th>Average Hours per week</th>
<th>28 weeks full-time course</th>
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</thead>
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<tr>
<td>YEAR I</td>
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</tr>
<tr>
<td>Chemistry IS</td>
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<tr>
<td>Engineering I</td>
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<td></td>
</tr>
<tr>
<td>Engineering Technology</td>
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</tr>
<tr>
<td>MATHEMATICS I</td>
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<tr>
<td>Physics IA</td>
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</tr>
<tr>
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<tr>
<td>ENERGY I</td>
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<tr>
<td>Mathematics IIB</td>
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<td></td>
</tr>
<tr>
<td>Mechanics of Materials I</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>ARTS Subject Part I or Part II</td>
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<tr>
<td>Design I</td>
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<tr>
<td>MECHANICS OF MATERIALS II</td>
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<td></td>
</tr>
<tr>
<td>ARTS Subject Part III</td>
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<td>8 *</td>
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<tr>
<td>ENERGY II</td>
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<td>YEAR IV</td>
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<tr>
<td>Design I</td>
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<tr>
<td>Management I</td>
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<tr>
<td>PROJECT</td>
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**BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING**

In the combined course set out below the Arts subjects shall be chosen from the approved Schedule of Subjects offered for the degree of Bachelor of Arts.

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* Hours shown for Physics II take account of a laboratory concession of 3 hours per week.
† Approval may be given for Physics III to be taken in lieu of Mathematics IIIA.
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### BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING

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<td></td>
<td></td>
</tr>
<tr>
<td>ME453</td>
<td>Fluid Mechanics</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

162 163
Elective programmes must be chosen in the following manner.

Group A

Group B (Departmental Technical)

Each elective is to consist of three subject units chosen from the following list.

* SUBJECT UNITS (42 hrs/unit)

- ME401 Systems Analysis
- ME402 Systems Planning, Organization & Control
- ME403 Resources Planning & Allocation
- ME404 Mathematical Programming
- ME413 Design of Crankshafts, Flywheels & other Rotating Members
- ME414 Design of Hydraulic & Pneumatic Power Systems
- ME415 Design of Crane & Hoist Equipment
- ME416 Design of Pressure Vessels, High Pressure Pipelines, Plates & Shells
- ME417 Design of Worm & Special Purpose Gear Reducers
- ME418 Design of Thermal Units Components
- ME419 Design of Conveyors & Mats, Handling Equipment
- ME434 Advanced Kinematics & Dynamics of Machines
- ME444 Properties of Materials
- ME445 Mechanics of Solids
- ME446 Introduction to Plastic Analysis
- ME447 An Introduction to Experimental Analysis
- ME448 Introduction to Photomechanics
- ME449 Reliability Analysis for Mechanical Systems
- ME453 Fluid Mechanics
- ME454 Turbomachinery
- ME473 Thermodynamics
- ME474 Heat Transfer
- ME485 Tool Design
- ME486 Industrial Design
- ME487 Operations Research — Deterministic Models
- ME488 Operations Research — Probabilistic Models
- ME489 Operations Research — Applications in Industry

Group C (General)

- Accounting I
- Education IIA
- Economics I
- Geography I
- Geology I
- Physics I
- Elective Mathematics

Any subject or subjects of satisfactory level in the Faculty of Engineering

Any subject or subjects of satisfactory level in the Faculty of Applied Science or Faculty of Architecture.

Should other Departments or Faculties select three or more of the Group B subject units to form a subject, the subject so formed shall be called MECHANICAL ENGINEERING III.

Elective programmes must be approved by the Head of the Department.

* Availability of individual subject units will depend on student demand.

† This course is intended for students with no previous knowledge of German.

‡ Requires Higher School Certificate pass or equivalent, except for special courses in Greek I and Latin I.
ELECTIVES — GROUP B

Preferred combinations of subject units to form Group B Electives are set out below. Students should carefully consider these combinations before seeking any variation. All elective combinations are of $3 \times 42 = 126$ hours’ duration.

<table>
<thead>
<tr>
<th>Combination</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME401 Systems Analysis</td>
<td>Mathematics</td>
</tr>
<tr>
<td>ME402 Systems Planning, Organization &amp; Control</td>
<td>IIB &amp; ME361</td>
</tr>
<tr>
<td>ME403 Resources Planning &amp; Allocation</td>
<td></td>
</tr>
<tr>
<td>ME487 Operations Research — Deterministic Models</td>
<td>Mathematics</td>
</tr>
<tr>
<td>ME488 Operations Research — Probabilistic Models</td>
<td>IIB</td>
</tr>
<tr>
<td>ME489 Operations Research — Applications in Industry</td>
<td></td>
</tr>
<tr>
<td>ME402 Systems Planning, Organization &amp; Control</td>
<td>Mathematics</td>
</tr>
<tr>
<td>ME403 Resources Planning and Allocation</td>
<td>IIB</td>
</tr>
<tr>
<td>ME404 Mathematical Programming</td>
<td></td>
</tr>
<tr>
<td>ME444 Properties of Materials</td>
<td></td>
</tr>
<tr>
<td>ME445 Mechanics of Solids</td>
<td>Mechanics of Materials II</td>
</tr>
<tr>
<td>ME416 Design of Pressure Vessels, High Pressure Pipelines, Plates &amp; Shells</td>
<td></td>
</tr>
<tr>
<td>ME453 Fluid Mechanics</td>
<td></td>
</tr>
<tr>
<td>ME454 Turbomachinery</td>
<td>Energy II</td>
</tr>
<tr>
<td>ME414 Design of Hydraulic &amp; Pneumatic Power Systems</td>
<td></td>
</tr>
<tr>
<td>ME473 Thermodynamics</td>
<td></td>
</tr>
<tr>
<td>ME474 Heat Transfer</td>
<td>Energy II</td>
</tr>
<tr>
<td>ME418 Design of Thermal Unit Components</td>
<td></td>
</tr>
<tr>
<td>ME434 Advanced Kinematics &amp; Dynamics of Machines</td>
<td></td>
</tr>
<tr>
<td>ME449 Reliability Analysis of Mechanical Systems</td>
<td>Design II</td>
</tr>
<tr>
<td>ME413 Design of Crankshafts, Flywheels and other Rotating Members</td>
<td>or IIA</td>
</tr>
<tr>
<td>ME446 An Introduction to Plastic Analysis</td>
<td>Mechanics of Materials II</td>
</tr>
<tr>
<td>ME447 An Introduction to Experimental Analysis</td>
<td></td>
</tr>
<tr>
<td>ME448 An Introduction to Photomechanics</td>
<td></td>
</tr>
<tr>
<td>ME415 Design of Crane &amp; Hoist Equipment</td>
<td></td>
</tr>
<tr>
<td>ME417 Design of Worm and Special Purpose gear reductions</td>
<td>Design II</td>
</tr>
<tr>
<td>ME419 Design of Conveyors and Materials Handling equipment</td>
<td>or IIA</td>
</tr>
<tr>
<td>ME486 Industrial Design</td>
<td></td>
</tr>
<tr>
<td>ME485 Tool Design</td>
<td>Design IIA</td>
</tr>
<tr>
<td>ME444 Properties of Materials</td>
<td>or IIA</td>
</tr>
</tbody>
</table>

NOTE: The electives to be offered in any one year will depend upon the extent of student demand.

POSTGRADUATE DIPLOMA IN INDUSTRIAL ENGINEERING

Subjects and Courses | Average Hours per week |
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PRODUCTION MANAGEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>ME585D Accounting &amp; Financial Studies</td>
<td>2</td>
</tr>
<tr>
<td>ME583D Production Engineering</td>
<td>1 ½</td>
</tr>
<tr>
<td><strong>INDUSTRIAL ENGINEERING I</strong></td>
<td></td>
</tr>
<tr>
<td>ME582D Industrial Computations</td>
<td>1 ½</td>
</tr>
<tr>
<td>ME584D Operations Research</td>
<td>1 ½</td>
</tr>
<tr>
<td><strong>INDUSTRIAL ENGINEERING II</strong></td>
<td></td>
</tr>
<tr>
<td>ME683D Engineering Economics</td>
<td>3</td>
</tr>
<tr>
<td>ME684D Project</td>
<td>3</td>
</tr>
<tr>
<td><strong>INDUSTRIAL MANAGEMENT</strong></td>
<td></td>
</tr>
<tr>
<td>ME681D Industrial Law</td>
<td>2</td>
</tr>
<tr>
<td>ME682D Case Studies in Industrial Management</td>
<td>1 ½</td>
</tr>
</tbody>
</table>
DESCRIPTION OF SUBJECT UNITS

DEPARTMENT OF MECHANICAL ENGINEERING

Subjects offered in the Faculty of Engineering, as listed in the course outlines, are made up of subject units which are described in the subsequent section. Both subject content and unit content may be varied from time to time without prior notification.

Each subject unit has an identification number with prefixed letters indicating the Department responsible for the unit, CE for Civil Engineering, EE for Electrical Engineering, and ME for Mechanical Engineering. The first numeral generally indicates the Year of the full-time course in which the unit is normally taken; the second numeral indicates the field of study, the third numeral indicates the level, or sequence in the field. A suffix letter J indicates that the course is offered jointly by several departments.

The hours shown for each subject unit are the total attendance hours for lectures, laboratory, design and tutorial classes. As a guide to private study and preparation, students should allow, on the average about 1 hour for each hour of lectures and one hour for each hour of laboratory, design or tutorial attendance. The note Arr. indicates that the unit is elective for which the hours are fixed by arrangement.

Indicating Numerals for Mechanical Engineering

ME-0- General courses
ME-1- Analysis and Design
ME-2- Mechanical Engineering Practice
ME-3- Machines
ME-4- Materials
ME-5- Fluid Mechanics
ME-6- Automatic Control
ME-7- Thermodynamics
ME-8- Industrial Engineering
ME-9- Project and Seminar

Indicating Numerals for Naval Architecture

NA-0- General courses
NA-1- Analysis and Design
NA-2- Shipbuilding practice
NA-3- Machines
NA-4- Applications
NA-5- Resistance and Propulsion
NA-6- Industrial Engineering
NA-7-
NA-8- Industrial Engineering
NA-9- Project and Seminar

MECHANICAL AND INDUSTRIAL ENGINEERING

ME111 GRAPHICS

A study of communication and analysis by pictorial means.

Graphical Presentation and Analysis of Data

Vector diagrams, charts, graphs, plotting and curve fitting Log-log plotting. Graphical differentiation and integration.

Projection

A detailed study of the methods of projection covering: sketching; orthogonal projection of points, lines, planes and solids; lengths of lines, angles and intersections between lines, planes and contoured surfaces; orthographic projection, dimensioning and sectioning; isometric projection; perspective projection.

Prescribed Text

OR
OR
Basic Graphics Luzadder, W. J. (Prentice-Hall 1968)
ME112 ENGINEERING DRAWING AND ELEMENTARY DESIGN

Prescribed Texts
Australian Standard Engineering Drawing Practice
Theory and Problems of Machine Design
Hall, A. S., Holowenko, A. R. & Laughlin, H. G.

( Institution of Engineers, Australia)

ME131 DYNAMICS
A Study of Force and Motion
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.

Newton's laws of motion applied to point masses, rigid bodies and connected bodies moving in straight line 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 and rigid bodies.

Energy and the conservation principle applied to mechanical work, strain energy, kinetic energy, potential energy and friction “losses,” in the context of point masses and rigid bodies.

Prescribed Text
Mechanics—Pt. II Dynamics
Meriam, J. L.
(International Student Edition John Wiley 1966)

Reference Text
Mechanics for Engineers: Mechanics
Beer, F. P. & Johnston, E. R.

ME121 WORKSHOP PRACTICE
A study of the basic methods and processes in the Engineering trades with instruction and practice in the following:

Fitting and machining, welding processes, boilermaking, blacksmithing, patternmaking and foundry work, and die and press work.

Prescribed Text
Trade Technology Notes

Reference Texts
Shop Theory
Materials and Processes in Manufacturing
Manufacturing Processes and Materials for Engineers
Graphics Science & Design

H. Ford Trade School
DeGarmo, E. P.
French & Vierck

(McGraw-Hill)
(MacMillan)
(Prentice-Hall)
(McGraw-Hill 1970)

ME201 LABORATORY MEASUREMENTS
Fundamental units and quantities are discussed as well as the means by which they are measured. Variability in measured data is described and an introduction to error analysis is given. The importance of a correct interpretation of experimental data is emphasised, and simple examples of regression analysis are explained.

Basic methods using mechanical, optical or electrical systems or some combination of these, which are used for the measurement of length, strain, area, pressure, temperature, force, torque, fluid flow, vibration, acceleration and other physical properties, are described. Selected laboratory experiments are also provided.

Prescribed Text
Experimental Methods for Engineers
J. P. Holman
McGraw-Hill 1966

Reference Text
An Introduction to Experimentation
Brinkworth, B. J.
(E.U.P.)
ME212 ENGINEERING DESIGN


**Prescribed Text**

*Theory and Problems of Machine Design*  
Design ...... Hall, A. S., Holowenko, A. R. & Laughlin, H. G.  
(Schaum Publishing)

**Reference Texts**

*Mechanical Engineering Design* ...... Shigley, J. E.  
(McGraw-Hill)

*Fundamentals of Mechanical Design*  
Phelan, R. M.  
(McGraw-Hill)

*Design of Machine Elements* ...... Faires, V. M.  
(Macmillan)

*Mechanical Engineers' Handbook Design and Production* ...... Kent, W.  
(Wiley)

*Mechanical Design on Machines* ...... Siegel, W. J., Maleev, V. L. & Hartmann, J. B.  
(International Textbook Co.)

*Design of Machine*  
Members ...... Doughty, V. L. & Vallance, A.  
(McGraw-Hill)

*Machine Design* ...... Black, P. H. & Adams, A. F.  
(McGraw-Hill)

*Fundamentals of Mechanical Design* ...... Phelan, R. M.  
(McGraw-Hill)

*Design of Machine Elements* ...... Faires, V. M.  
(Macmillan)

ME213 ENGINEERING DESIGN

The design of brakes, clutches, gear box reduction units and power screws for industrial applications. Modern developments in this area will be discussed.

**Prescribed Text**

*Mechanical design of Machines* ...... Siegal, W. J., Maleev, V. L. & Hartmann, J. B.  
(International Textbook Co.)

**Reference Texts**

*Theory and Problems of Machine Design*  
Design ...... Hall, A. S., Holowenko, A. E. & Laughlin, B. G.  
(Schaum Publishing Co.)

*Design of Machine*  
Members ...... Doughty, V. L. & Vallance, A.  
(McGraw-Hill)

*Machine Design* ...... Black, P. H. & Adams, A. F.  
(McGraw-Hill)

*Fundamentals of Mechanical Design* ...... Phelan, R. M.  
(McGraw-Hill)

*Design of Machine Elements* ...... Faires, V. M.  
(Macmillan)

ME222 PROCESS TECHNOLOGY


**Prescribed Text**

*Materials & Processing in Manufacturing* ...... DeGarmo, E. P.  
(Macmillan)

**Reference Texts**

*Manufacturing Processes & Materials for Engineers*  

*Materials, Properties & Manufacturing Processes* ...... Datsko, I.  
(Wiley)

*Processes & Materials in Manufacturing* ...... Campbell, J. S.  
(McGraw-Hill)
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME232</td>
<td>MECHANICAL TECHNOLOGY</td>
<td>42</td>
</tr>
<tr>
<td><strong>Prescribed Text</strong></td>
<td>Materials &amp; Processes in Manufacturing</td>
<td>DeGarmo, E. P. (Macmillan)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Processes &amp; Materials in Manufacturing</td>
<td>Campbell, J. S. (John Wiley)</td>
</tr>
<tr>
<td>ME232</td>
<td>DYNAMICS OF MACHINES</td>
<td>42</td>
</tr>
<tr>
<td></td>
<td>Kinematics and dynamics of simple mechanisms, cams and toothed gearing.</td>
<td></td>
</tr>
<tr>
<td><strong>Prescribed Text</strong></td>
<td>Kinematics &amp; Dynamics of Plane Mechanisms</td>
<td>Hirschhorn, J. (McGraw-Hill)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Dynamics of Machinery</td>
<td>A. R. C. Holowenko (Wiley)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Theory of Machines</td>
<td>Shigley, J. E. (McGraw-Hill)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Cam Design, Design &amp; Accuracy</td>
<td>Rothbart, H. A. (Wiley)</td>
</tr>
<tr>
<td>ME241</td>
<td>PROPERTIES OF MATERIALS</td>
<td>70</td>
</tr>
<tr>
<td></td>
<td>An introductory subject on materials science, structure and properties of materials, strength and failure criteria for materials, material characterisation. The use and selection of materials for durability, static and dynamic loading conditions, electrical applications, and severe environmental conditions. The particular merits of metals, and of ceramic and organic materials are emphasised.</td>
<td></td>
</tr>
<tr>
<td><strong>Text Book</strong></td>
<td>To be advised</td>
<td></td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Engineering Materials Science</td>
<td>Richards, C. W. (Wadsworth)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Mechanical Behaviour of Materials</td>
<td>McClintock &amp; Argon (Addison-Wesley)</td>
</tr>
<tr>
<td><strong>Reference Texts</strong></td>
<td>Elements of Materials Science</td>
<td>Van Vlack, L. H. (Addison-Wesley)</td>
</tr>
<tr>
<td>ME251</td>
<td>FLUID MECHANICS</td>
<td>42</td>
</tr>
</tbody>
</table>
ME271 THERMODYNAMICS


**Prescribed Text**

*Fundamentals of Classical Thermodynamics*

G. J. Van Wylen & R. E. Sonntag

(John Wiley)

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ME301 ENGINEERING COMPUTATIONS


Introduction to linear programming, with engineering applications.

**Prescribed Text**

*Numerical Methods & Fortran Programming* McCracken, D. P. & Dorn, W. S.

(Wiley International)

**Reference Text**

*Introduction to Numerical Analysis* Hildebrand, F. G.

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ME313 ENGINEERING DESIGN

The design of power unit cylinders, reciprocating power elements, cylinder closures, dynamic struts and dynamic levers using work or indicator diagrams as developed from thermodynamics, fluid mechanics or machine tool theory as the basis of horsepower, load and stress calculation. Effects of inertia, dead weight and centrifugal force on piston loads. Inertia bending of struts and bending induced by bearing friction. Stress summation and factor of safety criteria. Special reference to reciprocating engine, compressor and power press units. Manufacturing techniques and material compatibility. Introduction to optimisation techniques and formalised decision making in design.

**Prescribed Text**

*Mechanical Design of Machines* Siegel, W. J., Malev, V. L. & Hartmann, J. B.

(International Textbook Co.)

*Engineering Design* Matousek, R.

(Blackie)

**Reference Texts**

*Mechanical Engineering Design* Shigley, J. E.

(McGraw-Hill)

*Diesel Engine Design* Walshaw

(Newnes)

*Diesel Engine Design* Purday

(Constable)

*Advanced Mechanics of Materials* Seely & Smith

(Wiley)

*Handbook of Stress & Strength* Lipson & Juvinall

(Macmillan)

*Fatigue of Metals* Forrest, P. C.

(Pergamon Press)

*Metal Fatigue* Pope, J. A.

(Chapman & Hall)

*Design of High Speed Diesel Engines* Howarth, M. H.

(Constable)
ME333  DYNAMICS OF MACHINES

Prescribed Texts
- **Mechanical Vibrations**
  Church, A. H.
  (John Wiley)
- **Dynamics of Machinery**
  Phelan, R. M.
  (McGraw-Hill)

Reference Texts:
- **Vibrations—Theoretical Methods**
  Yu Chen
  (Addison-Wesley)
- **Vibration Problems in Engineering**
  Timoshenko, S. & Young, D. H.
  (Von Nostrand)
- **Mechanical Vibrations**
  Seto, W. W.
  (Schaum)

ME342  PROPERTIES OF MATERIALS


Prescribed Text
- **Mechanical Behaviour of Materials**
  McClintock & Argon
  (Addison-Wesley)

Reference Texts
- **Engineering Materials Science**
  C. W. Richards
  (Wadsworth)
- **Strength & Structure of Eng. Materials**
  Polakowski, N. H. & Ripling, E. M.
  (Prentice-Hall of Aust.)
- **Elements of Material Science**
  Van Vlack
  (Addison-Wesley)
- **Mechanics of Metals**
  D'Isa, F.
  (Addison-Wesley)

ME343  MECHANICS OF SOLIDS

Prescribed Text
- **Mechanics of Materials**
  Shanley, F. R.
  (McGraw-Hill)

Reference Texts
- **Mechanics of Materials**
  Higdon, A., Ohlsen, E. H., Styles, B. B. & Weese, J. A.
  (Wiley)
- **Introduction to Mechanics of Solids**
  Popov
  (Prentice-Hall)
- **Introduction to Mechanics of Deformable Solids**
  Drucker, D. C.
  (McGraw-Hill)
- **Experimental Stress Analysis**
  Daily, J. W. & Riley, W. F.
  (McGraw-Hill)

ME352  FLUID MECHANICS
Basic equations for interactions between fluids and moving vanes. Applications to radial flow pumps and fans, and the development of similarity relationships and descriptions of performance. Similar applications to axial flow pumps and fans, turbo-compressors, water turbines, steam turbines, and gas turbines. Study of cavitation as it affects machines handling liquids.

Reference Texts
- **Theory of Turbomachines**
  Cschanady
  (McGraw-Hill)
- **Pumps, Fans & Compressors**
  Kovats, A. & Desmur, G.
  (Blackie)
### ME361 AUTOMATIC CONTROL

**Prescribed Text**
To be advised.

**Reference Texts**
- *Linear Control Systems*  
  Mela & Schultz (McGraw-Hill)
- *Fundamentals of Automatic Control*  
  Gupta & Hasdorff (Wiley)
- *Notes for a Second Course in Linear Systems*  
  C. A. Desoer (Van Nostrand Reinhold)
- *Automatic Control Engineering*  
  F. H. Raven (McGraw-Hill)

### ME372 HEAT TRANSFER
Conduction; steady and unsteady, one and two dimensional, with and without internal heat generation and including convection boundaries. Numerical and analogue solutions.

Convection; laminar and turbulent. Analytical and empirical solutions. Analogy between momentum and heat transfer.


**Prescribed Text**
- *Heat Transfer*  
  Holman, J. P. (McGraw-Hill)

**Reference Texts**
- *Heat Transfer* Vols. 1 & 2  
  Jakob, M. (Wiley)
- *Heat Transmission*  
  McAdams, W. H. (McGraw-Hill)

### ME381 METHODS ENGINEERING

**Prescribed Text**
- *Motion & Time Study*  
  Niebel, B. W. (Irwin)

**Reference Texts**
- *Methods Engineering*  
  Krick, E. V. (Wiley)
- *Motion & Time Study*  
  Barnes, R. M. (Wiley)
- *Production Handbook*  
  Ed. by Alford L. P. & Bangs, J. R. (Ronald)
- *Industrial Engineering Handbook*  
  Ed. by Maynard, H. B. (McGraw-Hill)

### ME382 PRODUCTION ENGINEERING
Production planning, inventory functions, forecasting; scheduling and control of production. Design of a production control system. Quality and quantity control. Production inventory systems.

**Prescribed Text**
- *Production Systems*  
  Riggs, J. L. (Wiley)

**Reference Texts**
- *Management Decision for Production Operations*  
  Brown, R. G. (Holt, Rinehart & Winston)
- *Modern Production Management*  
  Buffa, E. S. (Wiley)
- *Production Planning & Inventory Control*  
- *Computer Modelling & Simulation*  
  Martin, F. F. (Wiley)
- *Production Handbook*  
  Alford, L. P. & Bangs, J. R. (Ronald)
- *Industrial Engineering Handbook*  
  Edited by Maynard, H. B. (McGraw-Hill)
ME383 QUALITY ENGINEERING


Reference Texts

Quality Control and Industrial Statistics Duncan, A. J. (Irwin)


Statistical Quality Control Grant, E. L. (McGraw-Hill)

Statistical Methods in Quality Control Cowden, D. J. (Prentice-Hall)

Production Handbook Edited by Alford, L. P. and Bangs, J. R. (Ronald)

Industrial Engineering Handbook Edited by Maynard, H. B. (McGraw-Hill)

Production Planning & Inventory Control Magee, J. & Boodman, D. M. (E.U.P.)

Quality Control for Managers and Engineers Kirkpatrick, E. G. (Wiley)

ME384 DESIGN FOR PRODUCTION

The application of economics, methods engineering, ergonomics and mechanical engineering to the development and design of a product. Its production (particularly in quantity), distribution and marketing. Operation methods; metrology, tools, jigs and fixtures, assembly and inspection procedures. Plant facilities.

Reference Texts

Principles of Jig & Tool Design Kempster, M. H. A. (E.U.P.)

Introduction to Jig & Tool Design Kempster, M. H. A. (E.U.P.)

Designing for Production Niebel, B. W. and Baldwin, E. N. (Irwin)

Value Engineering in Manufacturing Amer. Soc. of Tool and Mfg. Engs. (Prentice-Hall)

Jigs and Fixtures Colvin, F. H. and Hass, L. L. (McGraw-Hill)

Production Handbook Edited by Alford, L. P. and Bangs, J. R. (Ronald)

Industrial Engineering Handbook Edited by Maynard, H. B. (McGraw-Hill)

Fundamentals of Tool Design Amer. Soc. of Tool & Mfg. Engs. (Prentice-Hall)

Computer Modelling & Simulation Martin, F. F. (Wiley)
ME385  ACCOUNTING & FINANCIAL STUDIES  56
The use of accounting information for various decisions. Basic accounting concepts; the double entry technique; preparation of financial statements; analysis and interpretation of financial statements. Basic cost accounting; management control process; budgeting and budgetary control; standard costing; responsibility accounting; performance evaluation; cost analysis for management decisions including capital expenditure evaluation; capacity utilisation and control; statistical techniques for operational cost control.

Reference Texts
Management Accounting—an information service
Field, J. E. (Butterworths)
Case Problems in Managerial Accounting
Greene, W. C. (Holt, Rinehart, Winston)
Accounting for Management
An Insight into Management Accounting
Sizer, J. (Pelican)

ME401  SYSTEMS ANALYSIS  42

Reference Texts
Finite Graphs and Networks ... Busacker & Saaty (McGraw-Hill 1965)
Engineering Systems Analysis ... Haberman, C. (Merrill 1965)
A Methodology for Systems Engineering ... Hall, A. (Van Nostrand 1962)
Systems Engineering Handbook ... Machol, R. (McGraw-Hill)

ME402  SYSTEMS PLANNING, ORGANIZATION AND CONTROL  42

Reference Texts
Production Planning Analysis & Control Riggs, J. L. (Wiley 1970)
Formal Organisation, A Systems Approach ... Carzo, R. & Yanouzas, J. U. (Irwin Dorsey 1965)
A Concept of Corporate Planning ... Ackoff, R. L. (Wiley 1970)
Network Analysis for Planning & Scheduling ... Battersby, A. (Macmillan)
Production Inventory Systems ... Buffa, E. (Irwin)
A Methodology for Systems Engineering ... Hall, A. (Van Nostrand 1962)
Systems Engineering Handbook ... Machol, R. (McGraw-Hill 1965)
Production Systems. Planning Analysis & Control ... Riggs, J. L. (J. Wiley)
The Critical Path Method ... Shaffer, L. R., Ritter, J. B. & Meyer, W. L. (McGraw-Hill 1965)
Economic Decision Models ... Riggs, J. L. (McGraw-Hill)
ME403 RESOURCES PLANNING & ALLOCATION

Types of resources. Resources availability, approach and classification. Analysis and projection for World, National and Corporate levels of operation. Tactical and strategic problems, conservation of resources.

Generation of resources, Capital and technological resources. The planning, organisation and control of resources, with particular emphasis on long-range planning. The need at all levels for a resources policy. Optimal use of resources and the role of research and development in resources allocation. The importance of mineral resources to Australia. Prediction of resources.

Notions of corporate planning with special reference to the steel industry.

Prescribed Text
To be advised.

Reference Texts

World Resources and Industries .... Zimmerman, E. W. (N.Y. Harper, 1951)


ME404 MATHEMATICAL PROGRAMMING

Non-linear programming—calculus of variations, dynamic programming, principles of optimality, multidimensional processes, use of Lagrange multipliers, integer programming, successive approximation method, non-additive return functions, quadratic programming, geometric programming.

Reference Texts

Introduction to Dynamic Programming .... Nemhauser, G. L. (Wiley 1966)
Non-Linear Programming Kunzi, H. P., Krelle, W. and Oetlli, W. (Blaisdell 1966)
Non-Linear and Dynamic Programming Hadley, G., (Addison-Wesley 1964)


ME413 DESIGN OF CRANKSHAFTS, FLYWHEELS AND OTHER ROTATING MEMBERS

The design of single and multi-throw crankshafts, flywheels cam and eccentric mechanisms for engines, turbines, compressor, pump or machine tool applications, using hypothetical work or indicator diagrams developed from thermodynamics or machine tool theory as the basis of load, turning moment and stress calculations. Inertia, centrifugal force vibration and balancing criteria, stress summation and multi-factor of safety criteria. Material selection and process compatibility and manufacturing methods.

Prescribed Text

Mechanical Design of Machines
Siegel, W. J., Maleev, V. I. & Hartmann, J. B. (International Textbook Co.)

Reference Texts

Mechanical Engineering Design .... Shigley, J. E. (McGraw-Hill)
Diesel Engine Design .... Walshaw (Newnes)
Diesel Engine Design .... Purday (Constable)

Advanced Mechanics of Materials .... Seely & Smith (Wiley)
Handbook of Stress & Strength .... Lipson & Juvinall (Macmillan)
Fatigue of Metals .... Forrest, P. G. (Pergamon Press)
Metal Fatigue .... Pope, J. A. (Chapman & Hull)
Design of High Speed Diesel Engines Howarth M. H. (Constable)
ME414 DESIGN OF HYDRAULIC AND PNEUMATIC POWER SYSTEMS

The design of Hydraulic, Pneumatic and Vacuum Power Units for the provision of power and/or control mechanisms for machine tools, materials handling equipment, etc. Interrelation of load, velocity, acceleration and capacity diagrams in circuit design. Circuit component characteristics. Safety features. Fluid characteristics, fluid flow rates and fluid pressure ratings.

Reference Texts
- Hydraulic Machinery Molloy, E. (Newnes)
- Principles of Hydraulics (Trade & Technical Press Ltd.)
- Hydraulics in Mechanical Handling Fawcett, J. R. (Trade & Technical Press Ltd.)
- Pneumatics Kay, F. X. (Machinery Reference Series)
- Hydraulic Handling Trade & Technical Press Ltd.

ME415 DESIGN OF CRANE AND HOIST EQUIPMENT

The designs of the mechanical components for various types of cranes, hoists and associated equipment with special reference to The Australian Standard Crane Code and Hoist Code, and N.S.W. Department of Labour and Industry requirements. Mechanical Hydraulic and Pneumatic systems. Hydraulic Circuits and Control aspects. Safety and test requirements.

Reference Texts
- Electric Cranes Broughton, H. H. (Spon)
- S. A. A. CB2 Crane & Hoist Code

ME416 DESIGN OF PRESSURE VESSELS, HIGH PRESSURE PIPE LINES PLATES AND SHELLS


Reference Texts
- Industrial Piping Littleton, C. T. (McGraw-Hill)
- Handbook of Industrial Pipework Marton, W. L. (Pitman & Sons)
- A.S.B. 52-1971 Flanges & Bolting for Pipes, Valves & Shells
- S.A.A. Boiler Code, CBI Standards Assn of Aust.

ME417 DESIGN OF WORM AND SPECIAL PURPOSE GEAR REDUCTION UNITS

The design of gear reduction units for industrial requirements with special reference to Australian Standard Code and N.S.W. Department of Labour and Industry requirements. Special reference to vehicle transmission and coupling systems.

Reference Texts
- Gears Spur, Helical Bevel & Worm Houghton, P. S. (The Technical Press Ltd.)
- Design of Worm and Spiral Gears Buckingham, E., Ryffel, H.H. (The Industrial Press Machinery Publishing Co.)
- A.S.B. 61 — 1941 Machine Cut Gears — Helical and Straight Spur
- A.S.B. 62 — 1965 Bevel gears (Machine cut)
- A.S.B. 66 — 1969 Worm Gearing
ME418  DESIGN OF THERMAL UNIT COMPONENTS  42


Reference Texts
Compact Heat
Steam, air and Gas power .... Severns, W. H. & Degler, H. E.  (Wiley — Chapman & Hall)
Steam — its generation and uses The Babcock & Wilcox Co.
Combustion Engineering .... Lorenzi, D.  (Combustion Engineering & Superheater Inc.)
S.A.A. Boiler Code, C.B.I.

Standards Association of Australia

ME419  DESIGN OF CONVEYORS AND MATERIALS HANDLING EQUIPMENT  42

Types of conveyors and materials handling equipment. The design of their mechanical components with special reference to belt, link, screw, vibrating and overhead type conveyors. A review of operational requirements. Loading and unloading devices. Hydraulic power circuits and control aspects. Brief discussion of pneumatic and hydraulic conveying systems.

Reference Texts
Materials Handling .... Stocker, H. E.  (Prentice-Hall)
Conveyors .... Hudson, E. G.  (John Wiley — Chapman & Hall)
Pneumatic Handling of Powdered Materials .... The Engineers' Equipment Association  (Constable)
Conveying Machinery .... Atherton, W. H.  (Technical Press Ltd.)
S.A.A. Crane & Hoist Code C.B. 2
Conveyors & Related Equipment .... Spivakovsky & Dyackkov  (Peace Publishing, Moscow)

ME434  ADVANCED KINEMATICS AND DYNAMICS OF MACHINES  42

Dynamic Motion Analysis; energy distribution method, equivalent mass-and-force method, the rate-of-change-of-energy method.
Advanced Kinematics of the Plane Motion; the inflection circle, Euler-Savary equation, Bobillier's construction, Hartmann's construction. Introduction to synthesis; graphical and analytical methods.

Prescribed Text
Kinematics and Dynamics of Plane Motion .... Hirschhorn, J.  (McGraw-Hill)

Reference Texts
Dynamics of Machines .... Holowenko, A. R.  (Wiley)
Kinematics and Linkage Design .... Hall, A. S.  (Prentice-Hall 1960)
ME444  PROPERTIES OF MATERIALS  42
Dislocation mechanics and fracture mechanics.
Use of composite materials.
Development of filament and whisker reinforcement techniques.
Influence of residual stresses in design. Dynamics, thermal, electrical, magnetic and radiation effects.
Reference Texts
Mechanical Behaviour of Materials
    McClintock & Argon
    (Addison-Wesley)
Engineering Materials Science
    Richards
    (Wadsworth)
Modern Composite Materials
    Broutman & Krock
    (Addison-Wesley)

ME445  MECHANICS OF SOLIDS  42
An introduction to the theory of plates and shells with extensions to thick pressure vessels and creep effects.
Application of numerical (approximate) methods.
Reference Texts
Theory of Plates and Shells
    Timoshenko & Wainowsky-Krieger
    (McGraw-Hill)
Stress Analysis
    Zienkiewicz & Holister
    (Wiley)

ME446  INTRODUCTION TO PLASTIC ANALYSIS  42
Plastic behaviour of materials — idealizations.
Experimental confirmation of laws of plasticity.
    Applications where there exists:
        (i) No elastic-plastic interface;
        (ii) An elastic-plastic interface.
Reference Texts
Advanced Mechanics of Materials
    Ford, H.
    (1st Ed. Longmans 1963)
Plasticity
    Hill, R.
    (Oxford 1950)
Introduction to Plasticity
    Prager, W.
    (Addison-Wesley 1959)

ME447  AN INTRODUCTION TO EXPERIMENTAL ANALYSIS  42
The subject presents a systematic approach to the analysis and design of experiments and the interpretation of experimental results. Particular emphasis is placed on data processing and analysis. Selected experiments involving both physical and computer solutions will be undertaken.
Prescribed Text
Engineering Experimental Design Fundamentals
    Bartee, E. M.
    (Prentice-Hall 1968)
Reference Texts
Experimental Stress Analysis
    Dally, J. W. & Riley, W. F.
    (McGraw-Hill International student Ed. 1965)
Physical Measurements and Analysis
    Cook, N. H. & Rubinowicz
    (Addison-Wesley 1963)
Basic Statistical Methods for Engineers and Scientists
    Neville, A. M. & Kennedy, J. B.
    (International Textbook Co. 1964)

ME448  INTRODUCTION TO PHOTOMECHANICS  42
Model analysis for two and three dimensional problems which may involve static, dynamic or thermal loading conditions.
Calibration of material and solution of disc problem.
Reference Texts
Photoelasticity
    Frocht, M. M.
    Vol. 1 1st Ed. (Wiley 1945)
    Vol. 2 1st Ed. (Wiley 1948)
Introduction to Photomechanics
    Durelli, A. J. & Riley, W. F.
    (Prentice-Hall 1965)
Experimental Stress Analysis
    Dally, J. W. & Riley, W. F.
    (McGraw-Hill 1965)
ME449 RELIABILITY ANALYSIS FOR MECHANICAL SYSTEMS


Reliability Case Studies. Automobile suspension ignition system. Measuring system.

Reference Texts
Probabilistic Reliability. An Engineering Approach
Shooman, M. L. (McGraw-Hill 1968)

Fundamentals for Reliability Theory Polovko, A. M.
(Academic Press 1968)

Engineering Reliability and Long Life Design
Haviland, R. P. (Van Nostrand 1964)

ME453 FLUID MECHANICS

Lectures and laboratory work dealing with a selection from the following topics:
Applications of hydrodynamics
Hydraulic transients
Fractional analysis applications
Cavitation studies
Topics in turbomachinery
One-dimensional compressible flow.

Reference Texts
Applied Hydrodynamics
H. R. Vallentine (Butterworths)

Hydro-electric Engineering Practice
Brown, J. H. Vol. 2 (Blackie)

Hydraulic Transients Streeter, V. L. & Wylie, E. B.
(McGraw-Hill)

ME454 TURBOMACHINERY


Reference Texts

Axial Flow Turbines, Fluid Mechanics & Thermodynamics
Horlock (Bullivants)

ME473 THERMODYNAMICS

Thermodynamic relations; the Maxwell relations; general equations for enthalpy, internal energy and entropy, compressibility factor, equations of state, generalised charts for enthalpy and entropy. Irreversibility and availability: reversible work and irreversibilities, availability concepts and applications.

Mixtures: of ideal gases, gas and vapour mixtures. Refrigeration and air conditioning; simple and multistage vapour-compression cycles, calculation of refrigeration and air conditioning loads, physical aspects of equipment.

Prescribed Texts
Fundamentals of Classical Thermodynamics
Van Wylen, G. J., & Sonntag, R. E. (John Wiley)

Air Conditioning and Refrigeration

Reference Texts
Principles of General Thermodynamics
Hatsopoulos, G. N. & Keenan, J. H. (John Wiley)

Guide and Data Book ASHRAE
Threlkelo, J. L. (Prentice-Hall)
ME474  HEAT TRANSFER  42
Development of the general form of the continuity, momentum and energy equations. Application and solution for various physical situations. Turbulent flow heat transfer. Some advanced conduction and radiation heat transfer studies.

Prescribed Texts

Basic Equations of Engineering
Science  Hughes, W. F. & Gaylord, E. W. (Schaum Publishing Co.)

Reference Texts
Transport Phenomena

Conduction Heat Transfer  Schneider, P. J. (Addison-Wesley)

ME481  ENGINEERING ADMINISTRATION  42

Reference Texts
Organisations Structure & Behaviour  Litterer, J. A. (Wiley)

An Introduction to Management Science  D. Teichroew (John Wiley)

Management Theory & Practice  Dale E. (McGraw-Hill)

Mathematics in Management  A. Battersby (Pelican)

Managing the Industrial Concern  H. G. Hodges & R. J. Ziegler (Houghton Mifflin)

Concepts in Management Science  D. J. Clough (Prentice-Hall)

ME482  ENGINEERING ECONOMICS  42
Economic criteria for engineering decision making
Fixed and variable costs
Equivalent annual costs of plant and equipment
Cost data for decision making
Purchase and replacement economics
Discounted cash flow
Net present value
Cost/benefit analysis
Quantitative methods for decision making
Operations research.

Reference Texts
Principles of Engineering Economy  E. L. Grant & W. G. Ireson (Ronald)

The Finance & Analysis of Capital Projects  A. J. Merritt & A. Sykes (Longmans)

Economic Analysis  Barish, N. N. (McGraw-Hill)

ME485  TOOL DESIGN  42
The design of tools, jigs and fixtures for various material forming and machining processes. The relative economics of jigs, fixtures and special tooling.

Reference Texts

Fundamentals of Tool Design  Amer. Soc. of Tool & Mfg. Engs. (Prentice-Hall)

ME486 INDUSTRIAL DESIGN

The creative process and the factors influencing it—detailed study of the problems associated with product design. The integration of analysis, synthesis and evaluation of product design. Studio assignment associated with the design.

Reference Texts

*Industrial Design* ... ... Van Doren, H. (McGraw-Hill)

*Introduction to Creative Design* ... Edel, D. H. (Ed.) (Prentice-Hall)

*The Roots of Modern Design* ... Schanfer, H. (Studio Vista)

*Machines and Perception in Industrial Design* ... Mayle, W. R. (Studio Vista)

*Art and Industry* ... ... Read, H. (Faber & Feba)

*Designing for Production* Baldwin, E. N. & Niebel, B. W. (Irwin)

*The Nature of Design* ... ... Pye, D. (Studio Vista)

ME487 OPERATIONS RESEARCH — DETERMINISTIC MODELS

Concept of optimisation; Optimisation approaches; Formulation of Models; Linear Programming; Allocation and assignment; Simplex Method; Duality; Theory of Games, Parametric Programming; Integer Programming; Zero-one Programming; Quadratic Programming; Decomposition principle. Network theory; Dynamic Programming. Geometric Programming. Applications.

Reference Texts


*Introduction to Operations Research* ... Hillier, I. S. & Lieberman, G. J. (Halden-Day 1967)

*Principles of Operations Research* ... Wagner, H. N. (Prentice-Hall 1969)


*Readings in Mathematical Programming* Vajda, S. (Pitman 1962)


*Economic Decision Models* ... ... Riggs, J. L. (McGraw-Hill 1968)

*Mathematical Techniques of Operational Research* ... ... Goddard, L. S. (Addison-Wesley)

*Network Analysis for Planning & Scheduling* ... ... ... Battersby, A. (Macmillan 1964)

*Mathematical Methods of Operations Research* ... ... ... Saaty, T. L. (McGraw-Hill 1959)
ME488 OPERATIONS RESEARCH — PROBABILISTIC MODELS

Statistical decision theory; Forecasting methods moving average exponentially smoothed average. Inventory control theory. Fixed order quantity; fixed order cycle systems; Production — inventory systems. Queueing theory; simple queue Multi-server queues. Queues in series. Transients in queues; simulation of systems. Applications.

Reference Texts

Elementary Decision Theory

Statistical Forecasting for Inventory Control
Brown, R. G. (McGraw-Hill 1959)

Smoothing, Forecasting & Prediction of Time Series
Brown, R. G. (Prentice-Hall 1963)

Analysis for Inventory Systems
Hadley, G. & Whitin, T. M. (Prentice-Hall 1963)

Queueing Theory
Panico, J. A. (Prentice-Hall 1969)

Elements of Queueing Theory

Inventory Systems
Naddor, E. (Wiley 1966)

Queues, Inventories & Maintenance
Morse, P. M. (Wiley 1958)

The Art of Simulation
Tocher, K. D. (E.U.P. 1963)

Computer Simulation Techniques

ME489 OPERATIONS RESEARCH — APPLICATIONS IN INDUSTRY

The case study approach to industrial cases.
The application of operations research to industrial problems.

Reference Texts

Exercises in Industrial Management
Eilon, S., Hall, R. I. and King, J. R. (Macmillan 1966)

Cases in Operations Management
McKenny, J. L., and Rosenbloom, R. S.

Casebooks in Production Management
Dooley, A. R., Holstein, W. K., McKenny, J. L.
Rosenbloom, R. S., Skinner, C. W. Thurston, P. H. (Wiley 1968)

Case Analysis and Business Problem Solving
Schnelle, K. E. (McGraw-Hill 1967)

Selected Case Problems in Industrial Management

A Manager's Guide to Operational Research
Rivett, B.H.P., and Ackoff, R. L. (Wiley 1963)

A Guide to Operational Research
Duckworth E. (Methuen 1965)

ME491 TECHNICAL SEMINAR

42

ME492 TECHNICAL AND PROJECT SEMINARS

42

ME496 PROJECT AND REPORT

126
NA101 THEORETICAL NAVAL ARCHITECTURE 42
Hydrostatics, trim and stability, dynamic stability, free surface effects, inclining experiment, launching calculations, use of computers, loading and discharging.

Reference Text
Theory of Naval Architecture A. M. Robb
(Charles Griffin & Co.)

NA121 NAVAL ARCHITECTURE TECHNOLOGY 42
Ships' construction and production methods, framing systems, lofting.

Reference Text
Know your own ship Walton & Baxter
(Charles Griffin & Co.)

NA141 APPLIED NAVAL ARCHITECTURE 84
Drawing exercises, lines plan, structural drawing, hydrostatic calculations.

NA211 SHIP DESIGN AND CONSTRUCTION 42
Design criteria, tonnage, safety requirements, hull form, general arrangements, propulsion machinery, auxilliary machinery, ships' services. Structural analysis, structural design to the requirements of a classification society.

Prescribed Text
Rules and Regulations for the construction and classification of steel ships
(Lloyds Register of Shipping)

Reference Texts
Strength of ships' structures W. Muckle
(Edward Arnold)

Principles of Naval Architecture
The Society of Naval Architects & Marine Engineers

NA242 APPLIED NAVAL ARCHITECTURE 84
Design and drawing practice relating to ship design and construction and resistance and propulsion of ships.

Reference Text
Principles of Naval Architecture
The Society of Naval Architects & Marine Engineers

NA251 RESISTANCE AND PROPULSION OF SHIPS 42

Reference Texts
Theory of Naval Architecture A. M. Robb
(Charles Griffin & Co.)

The speed and power of ships D. W. Taylor
(U.S. Maritime Administration, Washington, D.C.)

NA302 SPECIAL PURPOSE SHIPS 42
Ships for special cargoes, dredges, tugs, submersibles, offshore structures, supply tenders etc. Design criteria.

NA331 SHIPS' MACHINERY 42
Propulsion machinery, auxilliary machinery, deck machinery, rigging, navigational aids.

NA352 THEORETICAL NAVAL ARCHITECTURE 42
Wave theory, ships dynamics, stabilisers. Sea-going qualities, dynamic positioning.

Reference Texts
Theory of Naval Architecture A. M. Robb
(Charles Griffin & Co.)

Principles of Naval Architecture
The Society of Naval Architects & Marine Engineers

NA381 SHIPYARD PRODUCTION AND MANAGEMENT 42
Pre-fabrication techniques, standardisation, yard lay-out, production planning, contract law, launching arrangements.

NA492 PROJECT AND REPORT 126
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<tr>
<th>Subject</th>
<th>Hours</th>
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<td>ME581D METHODS ENGINEERING</td>
<td>42</td>
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<tr>
<td>The design of manufacturing facilities,</td>
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<td>including the product, equipment selection,</td>
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<td>plant location and layout.</td>
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<td>The use of human and physical resources,</td>
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<td>including motion and time study, incentives,</td>
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<td>work sampling, machine interference; an</td>
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<td>introduction to ergonomics.</td>
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<td><em>Motion and Time Study</em></td>
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<td>Niebel, B. W. (Irwin)</td>
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<td><strong>Reference Texts</strong></td>
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<td><em>Methods Engineering</em></td>
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<td>Krick, E. V. (Wiley)</td>
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<td><em>Motion and Time Study</em></td>
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<td>Barnes, R. M. (Wiley)</td>
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<td><em>Production Handbook</em></td>
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<td>Alford L. P. &amp; Bangs, J. R. (Ronald)</td>
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<td><em>Industrial Engineering Handbook</em></td>
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<td>Ed. by Maynard, H. B. (McGraw-Hill)</td>
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<td>ME582D INDUSTRIAL COMPUTATIONS</td>
<td>42</td>
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<tr>
<td>A review and revision of probability theory,</td>
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<td>random variables and distributions.</td>
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<td>Sampling distributions.</td>
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<td>Confidence interval estimation.</td>
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<td>Standard tests of significance.</td>
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<td>Linear regression and least squares analysis</td>
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<td><em>Introductory Engineering Statistics</em></td>
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<td>Guttman, I. &amp; Wilks, S. S. (Wiley)</td>
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<td><strong>Reference Texts</strong></td>
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<td><em>Statistical Methods for Technologists</em></td>
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<td>Paradine, C. G. and Rivett, B.H.P. (E.U.P.)</td>
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<td><em>Probability and Random Variables</em></td>
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<td>Wadsworth, G. P. and Bryan, J. G.</td>
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<td>(McGraw-Hill)</td>
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<td><em>Facts from Figures</em></td>
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<td>Moroney, M. J. (Pelican)</td>
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<td><em>Introduction to Statistics</em></td>
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<td>Walpole, R. E. (MacMillan)</td>
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<td>ME583D PRODUCTION ENGINEERING</td>
<td>42</td>
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<tr>
<td>Production planning; Inventory functions;</td>
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<td>Forecasting; Scheduling and control of</td>
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<td>production; Design of a production</td>
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<td>control system. Quality and quantity control.</td>
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<td>Production inventory systems.</td>
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<td><em>Production Systems</em></td>
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<td>Riggs, J. L. (Wiley)</td>
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<td><strong>Reference Texts</strong></td>
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<td><em>Management Decision for Production</em></td>
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<td>Operations</td>
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<td>Brown, E. G. (Holt, Rinehart &amp; Winston)</td>
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<td><em>Modern Production Management</em></td>
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<td>Buffa, E. S. (Wiley)</td>
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<td><em>Production Planning &amp; Inventory Control</em></td>
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<td><em>Computer Modelling &amp; Simulation</em></td>
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<tr>
<td>Martin, F. F. (Wiley)</td>
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<td><strong>Production Handbook</strong></td>
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<td>Edited by Alford, L. P. &amp; Banks, J. R.</td>
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<td>(Ronald)</td>
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<td><strong>Industrial Engineering Handbook</strong></td>
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<td>Edited by Maynard, H. B. (McGraw-Hill)</td>
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<tr>
<td>ME584D OPERATIONS RESEARCH</td>
<td>28</td>
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<tr>
<td>The formulation and optimisation of</td>
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<tr>
<td>Mathematical models. The development of</td>
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<td>decision rules. The application of</td>
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<td>Operational Research methods to Industrial</td>
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<td><em>Fundamentals of Operations Research</em></td>
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<td>Ackoff, R. L. and Sasieni, M. W. (Wiley)</td>
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### ME585D ACCOUNTING AND FINANCIAL STUDIES  
56

The use of accounting information for various decisions. Basic accounting concepts; the double entry technique; preparation of financial statements; analysis and interpretation of financial statements. Basic cost accounting; management control process; budgeting and budgetary control; standard costing; responsibility accounting; performance evaluation; cost analysis for management decisions including capital expenditure evaluation; capacity utilisation and control; statistical techniques for operational cost control.

**Reference Texts**

- *Accounting in Business Decisions*  
  Black, H. A., Champion, J. E. & Brown, R. G.  
  (Prentice-Hall)

- *Cost-Effective Information Systems*  
  Cohen, B. J.  
  (A.M.A.)

- *Basic Accounting and Cost Accounting*  
  Grant, E. L. & Bell, L. F.  
  (McGraw-Hill)

- *Australian Business Handbook*  
  Griffiths, N.  
  (McGraw-Hill)

- *Cost Accounting — A Managerial Emphasis*  
  Horngren, C. T.  
  (Prentice-Hall)

- *Accounting for Management Planning and Decision Making*  
  Korn, S. W. & Boyd, T.  
  (Wiley)

- *An Insight into Management Accounting*  
  Sizer, J.  
  (Pelican)

- *Introductory Accounting*  
  Smyth, E. B. & Burke, W. L.  
  (Law Book Co.)

### ME682D CASES IN INDUSTRIAL MANAGEMENT  
42

Studies in organisational and executive action requirements of specific industrial situations, using the case study method.

**Reference Texts**

- *Selected Case Problems in Industrial Management*  
  Holden, P. E. & Shallenberger, F. K.  
  (Prentice-Hall)

- *Management, Analysis, Concepts & Cases*  
  Haynes, W. W. & Massie, J. L.  
  (Prentice-Hall)

- *The World of Work*  
  Dubin, R.  
  (Prentice-Hall)

- *Formal Organisation*  
  Blank, P. M. & Scott, W. R.  
  (Routledge & Keegan)

- *Appraisal of Management*  
  Martinell, I.  
  (Harper-Bros.)

- *Managerial Psychology*  
  Leavitt, H. J.  
  (Chicago University Press)

- *Organisations: Structure & Behaviour*  
  Litterer, J.  
  (Wiley)

### ME683D ENGINEERING ECONOMICS  
84

The structure of the Australian economy. The theory of the firm, selection of processes and equipment. Decision theory. The application of engineering economic analysis to industrial operations and engineering projects.

**Reference Texts**

- *Principles of Engineering Economy*  
  Grant, E. L. & Ireson, E. G.  
  (Ronald)

- *The Finance & Analysis of Capital Projects*  
  Merritt, A. J. & Sykes, A.  
  (Longmans)

- *Economics*  
  P. A. Samuelson  
  (McGraw-Hill)

### ME684D PROJECT  
84
MASTER OF ENGINEERING SCIENCE
(M.Eng.Sc.) Degree Course

GENERAL

The Faculty of Engineering offers a group of subjects which comprise the major part of the Master of Engineering Science formal Master's degree programme.

The Master of Engineering Science degree course is offered on both a part-time and full-time basis in order to give graduate engineers the opportunity to update themselves in technological areas of interest.

This degree course is flexible in that candidates for the degree may select from a large number of subject combinations which may span one or more engineering Departments. Some undergraduate materials may be taken outside the Faculty of Engineering as credit for the degree, provided that such material is relevant to the programme as a whole. This possibility offers the advantage of advanced training and education which is broad in scope. The course supplements existing Master of Engineering and Doctor of Philosophy programmes which are usually of a research nature.

SCOPE OF COURSE

Subject units will be offered on a Faculty-wide basis in areas of existing academic specialisation. If a candidate has a first degree in, say, Civil Engineering, he will normally select his M.Eng.Sc. programme in conjunction with the Head of the Department of Civil Engineering. It will then be necessary for the Dean, as administrative head of the Faculty, to approve this programme.

In general the basic "unit" specified in the Degree Requirements is a programme which involves the student in a total of approximately 120 hours' work. This total includes all formal course work plus assignments and study. If the "unit" is a formal instructional course the 120-hour total includes 42 hours of lectures or the equivalent. A number of the topics offered consist of two units. A complete M.Eng.Sc. programme normally consists of ten units of formal course work and two units of project work although in special cases the size of the project may be increased to three or four units, with a corresponding reduction in the formal course work.

Under normal circumstances, the course may be completed in one year when taken on a full-time basis, and two years when taken on a part-time basis.

The subjects to be offered during 1972 are listed in the following pages. Subjects which are given in the first half year are indicated by *, in the second half year by **, and for the full year by ***.

DEPARTMENT OF CHEMICAL ENGINEERING

MASTER OF ENGINEERING SCIENCE COURSES

TOPICS AVAILABLE

LECTURE COURSES (subject to adequate enrolment) (All 3 hours/week)

<table>
<thead>
<tr>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
</tr>
<tr>
<td>Process Optimization</td>
</tr>
<tr>
<td>Furnace Engineering</td>
</tr>
<tr>
<td>Advanced Problems in Mass Transfer and Reaction Engineering</td>
</tr>
</tbody>
</table>

TUTORIAL COURSES

Units of directed reading and computation under tutorial guidance may be arranged in the fields of

Particulate Separations
Comminution
Reaction Engineering
DEPARTMENT OF CHEMICAL ENGINEERING

MASTER OF ENGINEERING SCIENCE COURSES

DESCRIPTION OF TOPICS AND TEXTS

RADIATIVE HEAT TRANSFER

A study of fundamentals of and computational methods for radiative transfer, particularly for grey lambert surfaces and non-luminous gases.

Text

FURNACE ENGINEERING +

(Pre-requisite “Radiative Heat Transfer” or evidence of equivalent).
Application of combustion and transfer principles to the investigation, development and design of heating, boiler and refining furnaces; Materials for furnace construction, practical design methods.

COMBUSTION +

A detailed study of the nature of industrial flames and their behaviour in furnace enclosures — the chemical reaction involved, mixing aerodynamics of jets, flames and combustion system; prediction of flame length, shape and radiative properties.

AIR POLLUTION — INDUSTRIAL CONTROL

The general problem; present legislative controls; combustion and other processes producing gaseous or gas carried effluents; control methods; practice and fundamental principles of gas washing, settlement filtration, cycloning and electrostatic precipitation, reaction methods and by-product recovery.

CONTROL OF INDUSTRIAL LIQUID EFFLUENTS +

The general problem; statutory requirements; practice, fundamental principles and automatic control characteristics of neutralization and other chemical recovery methods, flocculation, sedimentation, biological digestion, ion-exchange and molecular sieves. By-product recovery.

ADVANCED PROBLEMS IN MASS TRANSPORT +

Principles and design methods for multi-component distillation and absorption, ion-exchange equipment etc.

ADVANCED MASS TRANSFER +

Review of generalized surface transport mechanisms; boundary layer conditions and detailed study of particular problems in jetted systems and two-phase (boiling) systems.

PROCESS OPTIMIZATION

Lectures and computational exercises in various techniques of analysing Chemical Processes and Process plants for optimum Operating and Design Conditions.

Text

References
D. J. Wilde: Optimum Seeking Methods Prentice-Hall N.Y. 1964

CHEMICAL PROCESS CONTROL

Primarily a laboratory course for chemical engineers with some fundamental knowledge of control theory. Prerequisites ME361 or EE541.

+Note Text books will be advised by the lecturer. Most reference material will be in current journal references.

TUTORIAL COURSES — SELECTED TOPICS

In a number of fields of particle mechanics, comminution or reaction engineering, there are particular skills either within the Department or available from specialists in the Newcastle area and guided-reading tutorial courses may be arranged for students with specific interests in the fields of ore, coal, or other solid feed separation and preparation, or in Reaction Engineering.
DEPARTMENT OF CIVIL ENGINEERING

MASTER OF ENGINEERING SCIENCE COURSES

LECTURE COURSES

<table>
<thead>
<tr>
<th>Course</th>
<th>Hrs./week</th>
<th>Units</th>
<th>When offered</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE551G</td>
<td>3</td>
<td>2</td>
<td>1973</td>
</tr>
<tr>
<td>ME588G</td>
<td>3</td>
<td>2</td>
<td>1972</td>
</tr>
<tr>
<td>ME585D</td>
<td>2</td>
<td>1</td>
<td>1972</td>
</tr>
<tr>
<td>CE521G</td>
<td>3</td>
<td>2</td>
<td>1972</td>
</tr>
<tr>
<td>ME681D</td>
<td>4</td>
<td>2</td>
<td>1972</td>
</tr>
</tbody>
</table>

The offering in 1973 is dependent on student demand and on the needs of those completing the construction course.

OTHER COURSES OFFERED IN 1972 ARE:

- CE531G: Advanced Fluid Mechanics
- CE511G: Advanced Structural Analysis and Design
- CE512G: Prestressed Concrete Design

The offering in 1973 is dependent on student demand and on the needs of those completing the construction course.

DESCRIPTION OF TOPICS AND TEXTS

CE511G ADVANCED STRUCTURAL ANALYSIS AND DESIGN ***
This course is oriented towards the analysis and design of steel structures. Two topics from the following will be selected.
(a) Instability of beams, columns, and frames, including analysis of thin walled sections in torsion.
(b) Matrix analysis of structures, including finite element methods.
(c) Advanced plastic analysis including linear programming methods of analysis and design, and the provision of SAA CA1.

Reference Texts
Galambos, T. V.: *Structural Members and Frames* Prentice-Hall 1968

CE512G PRESTRESSED CONCRETE DESIGN ***
Review of design procedures of statically determinate prestressed concrete structures, design of indeterminate prestressed concrete structures. Study of the effects of creep and shrinkage. Detailed study of anchorage zones in pre- and post-tensioned members.

Prescribed Texts
Guyon, Y.: *Prestressed Concrete* Vols. I and II Wiley
Leonhardt, F.: *Prestressed Concrete Design and Construction* Wilhelm Ernst & Sohn

CE531G ADVANCED FLUID MECHANICS (CIVIL) ***
After a grounding in theoretical hydrodynamics, this course will cover topics in advanced hydraulics that are relevant to civil engineering design problems, mainly in the field of steady and unsteady open channel flow, pipe systems, and the design and performance of hydraulic structures.

Prescribed Text

Reference Texts
Vallentine, H. R.: *Applied Hydrodynamics* Butterworths
CE521G MATERIALS OF CONSTRUCTION ***


2. Construction Materials
   (a) Steel: Metallurgy; precautions in fabrication, corrosion protection, brittle fracture prevention, structural properties and uses.
   (b) Structural Aluminium: types of alloys and their properties, fabrication, typical uses.
   (c) Plastics: types and uses, composite materials.
   (d) Timber: Structural properties, connections, laminated members.
   (e) Asphaltic Materials: properties, specification, construction techniques.
   (f) Concrete: Special cements, aggregates, admixtures, determination of target strength for mix design, mix design theories, design applications for special requirements, statistical analysis of test results, special construction techniques.
   (g) Site Investigation: methods, sampling, field tests, material location, special techniques.
   (h) Construction with soil: foundations, excavations.
   (i) Field Instrumentation: types, installation, use in design.
   (j) Compaction: roadwork, foundations, dams, equipment, control.

Prescribed Text

Reference Texts
To be advised.

CE551G CONSTRUCTION PLANNING AND CONTROL ***

1. Engineering Economics: Economic comparisons, pretender or contract planning, tendering procedures, philosophy of tendering.

2. Construction Planning: Network analysis, organisation charts for labour, materials and plant, cost and time control.

3. Planning Assignment: Example of major project planning involving planning for construction, estimating and submission of tender.

Prescribed & Reference Texts
To be advised.

DEPARTMENT OF ELECTRICAL ENGINEERING

MASTER OF ENGINEERING SCIENCE COURSES

TOPICS

EE516 Computer-Aided Analysis of Power Systems (not offered in 1972)
EE541 Modern Control (not offered in 1972)
EE542 Modern Control **
EE544 Communication Systems **
EE545 Communications Systems ** (Optimal Estimation and Detection)
EE561 Logical Design and Switching Theory**
EE562 Automata and Computing Machines (not offered in 1972)
EE563 Computer Organization *
EE564 Computer Systems Programming **
EE565 Pattern Recognition *
EE566 Optimization Techniques *
EE567 Computer Process Control (not offered in 1972)
EE580 Thesis/Project
EE590 Seminar***

* Topics given in the first half of the year.
** Topics given in the second half of the year.
*** Topics given for the full year.
### DESCRIPTION OF TOPICS AND TEXTS

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours</th>
<th>Description</th>
<th>Prerequisite</th>
<th>Text</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE516</td>
<td>42</td>
<td>COMPUTER-AIDED ANALYSIS OF POWER SYSTEMS (not offered in 1972)</td>
<td></td>
<td>Stagg and El-Abiad: <em>Computer Methods in Power System Analysis</em></td>
</tr>
<tr>
<td>EE541</td>
<td>42</td>
<td>MODERN CONTROL (Linear Optimal Control Theory) (Not offered in 1972)</td>
<td>EE341 and EE342</td>
<td>B. D. Anderson and J. B. Moore: <em>Linear Optimal Control</em> Prentice-Hall 1971</td>
</tr>
<tr>
<td>EE544</td>
<td>42</td>
<td>COMMUNICATION SYSTEMS **</td>
<td>EE331, EE332 or EE341, EE342 or consent of instructor</td>
<td>H. Taub and D. L. Schilling: <em>Principles of Communication Systems</em> McGraw-Hill 1971</td>
</tr>
<tr>
<td>EE545</td>
<td>42</td>
<td>COMMUNICATION SYSTEMS (Optimal Estimation and Detection)</td>
<td></td>
<td>Van Trees: <em>Detection, Estimation and Modulation Theory</em> Parts I and II McGraw-Hill</td>
</tr>
<tr>
<td>EE561</td>
<td>42</td>
<td>LOGICAL DESIGN AND SWITCHING **</td>
<td>EE421 - EE423L or Physics III and consent of instructor</td>
<td>Sifferlen &amp; Vartanian: <em>Digital Electronics with Engineering Applications</em> Prentice-Hall</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hill and Peterson: <em>Introduction to Switching Theory and Logical Design</em> Wiley</td>
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<tr>
<td></td>
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<td></td>
<td></td>
<td>Heath: <em>Digital Computer Design</em> Oliver &amp; Boyd</td>
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<td></td>
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<td></td>
<td>Malmstadt &amp; Enke: <em>Digital Electronics for Scientists</em> Benjamin New York</td>
</tr>
</tbody>
</table>
### EE562 AUTOMATA AND COMPUTING MACHINES

42

(Not offered in 1972)

This is a course of lectures and tutorial work giving an introduction to the theory of finite and infinite computation, and to logic machines.

**Prerequisite** Maths I

**Reference Texts**

- F. Hennie: *Finite State Models for Logical Machines*  
  John Wiley
- Michael Arbib: *Brains, Machines and Mathematics*  
  McGraw-Hill
- M. Minsky: *Computation (Finite and Infinite Machines)*  
  Prentice-Hall

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### EE563 COMPUTER ORGANIZATION*

42

Basic computer elements and peripherals, representation and organization of information, system organization, supervisors and monitors, machine language and assembly language programming.

Lectures will be supplemented with practical assignments using the PDP-11 and ICL-1904a computers.

**Prerequisite** Maths I or knowledge of elementary programming and consent of instructor.

**Prescribed Text**

Gear: *Computer Organisation and Programming*  
(McGraw-Hill)

**Reference Texts**

- Maurer: *Programmings an Introduction to Computer Languages and Techniques*  
  Holden-Day
- Wegner: *Programming Languages Information Structures, and Machine Organization*  
  McGraw-Hill

PDP-11 Manual (D.E.C.)

*Plan Manual* (ICL)

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### EE564 COMPUTER SYSTEMS PROGRAMMING**

42

Continuation of EE563. System software, structure of assemblers and loaders, symbol tables, searching and sorting, macros, compiling techniques, monitor systems, time-sharing.

Various practical assignments will be done on the computers.

**Prerequisite** EE563.

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### EE565 PATTERN RECOGNITION*

(Previously EE563)

42

A course of lectures and tutorial work, with some laboratory use of the computer in pattern recognising systems. Theory of trainable pattern — classifying systems; fourier — optical methods. Machines that learn with and without a teacher. Current research results obtained in the department, will be included.

**Prerequisite** Maths IIB

**Reference Texts**

- K. S. Fu: *Sequential Methods in Pattern Recognition and Machine Learning*  
  Academic Press 1968
- J. Nilsson: *Learning Machines*  
  McGraw-Hill
- Uhr: *Pattern Recognition*  
  Wiley 1966
- G. Sebestyen: *Decision-making Processes in Pattern Recognition*  
  Macmillan Book Co. N.Y. 1962

### EE566 OPTIMIZATION TECHNIQUES*

42

A course including lectures, tutorial and computer analysis. Mathematical background to optimization. Comparison of optimization methods; engineering applications such as to problems of identification, control, pattern recognition and resource allocation.

**Prescribed Text**

Masanao Aoki: *Introduction to Optimization Techniques (Fundamentals and Applications of Nonlinear Programming)*  
Macmillan New York 1971

**Reference Text**

Donald Pierre: *Optimization Theory with Applications*  
Wiley New York 1969

### EE567 COMPUTER PROCESS CONTROL

42

(Not offered in 1972)

Modeling the automated process — physical and economic models. Optimization of both well defined and poorly defined processes. Computer simulation languages. Analog computation.

**Reference Texts**

  Wiley 1968
- R. E. Stephenson: *Computer Simulation for Engineers*  
  Harcourt Brace and Jovanovich 1971
EE580  THESIS/PROJECT
Multiples of 42 hours
Topics to be arranged with individual supervisors.

EE590  SEMINAR
A series of seminars for full-time postgraduate students.
Each student will prepare approximately one seminar per semester on a technical or theoretical subject.
Each student will also attend EE491 seminars.

DEPARTMENT OF MECHANICAL ENGINEERING

MASTER OF ENGINEERING SCIENCE COURSES
The following topics are nominated by the Department of Mechanical Engineering as part of the Faculty M.Eng.Sc. formal course programme. The actual programme will depend on student demand.

<table>
<thead>
<tr>
<th>Average Hours per week</th>
<th>28 weeks course</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>*ME503G Design of Experiments for Engineering Research</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME506G Mathematical Programming</td>
<td>2</td>
<td>1½</td>
</tr>
<tr>
<td>ME511G Experimental and Theoretical Stress Analysis</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME515G Advanced Design Concepts in Mechanical Engineering</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME535G Vibration and Noise Problems in Industry</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME536G Advanced Dynamics of Machines</td>
<td>2</td>
<td>1½</td>
</tr>
<tr>
<td>ME546G Elasticity, Plasticity and Application</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME555G Advanced Turbomachinery</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME588G Operations Research and Decision Theory</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>ME689G Advanced Operations Research</td>
<td>3</td>
<td>2</td>
</tr>
</tbody>
</table>

* Not available during 1972.
ME503G DESIGN OF EXPERIMENTS FOR ENGINEERING RESEARCH ***

A systematic approach to the analysis and design of experiments and the interpretation of experimental results. The course has been divided into three approximately equal parts as follows:

1. Statistical methods for the design and evaluation of experiments.
2. Model analysis, use of true and distorted models as well as analogues. Use of dimensional analysis.

Reference Texts
- Introduction to Scientific Research... Bright-Wilson
- Experimental Statistics... Handbook 91 (U.S. National Bureau of Standards)
- Mathematics Handbook for Scientists & Engineers... Korn & Korn (McGraw-Hill)
- Methods of Correlation Analysis & Regression Analysis... Ezekiel & Fox (Wiley)
- Physical Measurements and Analysis... Cook & Rabinowicz

ME506G MATHEMATICAL PROGRAMMING

An introduction to modern computational techniques for the solution of optimisation problems in Industrial Engineering and Plant Management.

ME511G EXPERIMENTAL AND THEORETICAL STRESS ANALYSIS

An introduction to the experimental and theoretical analysis of complex components with emphasis on the use of computer techniques. Theoretical and experimental applications of the use of strain gauge, photoelastic and modelling methods will be covered. Certain aspects of simulation techniques will also be given.

ME515G ADVANCED DESIGN CONCEPTS IN MECHANICAL ENGINEERING

The application of systems analysis principles to the solution of problems associated with the design of mechanisms Formalising of the design process. Fundamental concepts of reliability. Reliability analysis. Methods of improving the reliability of Systems. Computer programming for Mechanical Design Applications. The Optimum Design of typical mechanical components.

Reference Texts
- Engineering Design... Matouseki, R. (Blackie)
- Engineering Design... Morrison, D. (McGraw-Hill)
- Optimum Design of Mechanical Elements... Johnson, R. C. (Wiley)
- Fundamentals for Reliability Theory... Polovko, R. M. (Academic Press 1968)
- Engineering Reliability and Long Life Design... Haviland, R. P. (Van Nostrand 1964)
- The Use of Computers in Engineering Design... Furman, T. T. (E.U.P.)
ME535G VIBRATION AND NOISE PROBLEMS IN INDUSTRY

The course presents a systematic study of both noise and vibration problems which are of common occurrence in Industrial Plants and structures. The course is divided into two parts, as follows:


Prescribed Texts
- *Fundamentals of Vibrations* ... Anderson, R. A. (Macmillan)
- *Noise Reduction* ... Beranek (McGraw-Hill)

Reference Texts

ME536G ADVANCED DYNAMICS OF MACHINES

Dynamic motion analysis: the energy distribution method, equivalent mass-and-force method, the rate-of-change-of-energy method.

Advanced kinematics of the Plane Motion: the inflection circle. Euler-Savary equation, Bobilliers construction, Hartmann's construction. Introduction to synthesis; graphical methods, analytical methods.

Prescribed Text
- *Kinematics & Dynamics of Plane Motion* ... Hirschhorn, J. (McGraw-Hill)

Reference Text
- *Dynamics of Machinery* ... Holowenko, A. R. (Wiley)
- *Kinematics and Linkage Design* ... Hall, A. S. (Prentice-Hall 1960)

ME546G ELASTICITY, PLASTICITY AND APPLICATIONS

Development of theories of elasticity and plasticity. Application of these theories to elastic, elasto-plastic and plastic problems.

Use of approximate methods of solution.

Application of slip-line field solutions to certain plasticity problems.

Use of experimental methods.

Reference Texts
- *Stress Analysis* ... Zienkiewicz & Holister (Wiley)
- *Applied Elasticity* ... Wang (McGraw-Hill)
- *The Mathematical Theory of Plasticity* ... R. Hill (Oxford)
- *Advanced Mechanics of Materials* ... Ford (Longmans)

ME555G ADVANCED TURBO-MACHINERY

More advanced study of the fluid mechanics and thermodynamics of flow in cascades and three-dimensional guiding surfaces, leading to the design study of a selected turbomachine.

Reference Text
- *Theory of Turbomachines* ... Csanady, G. T. (McGraw-Hill 1964)

ME588G OPERATIONS RESEARCH AND DECISION THEORY


Reference Text
- *Principles of Operations Research* ... Wagner, H. M. (Prentice-Hall)

Reading
- *Mathematical Programming* ... Vadja, S. (Pitman)

ME689G ADVANCED OPERATIONS RESEARCH

The application of the Operational Research Methods and techniques to tactical and strategic industrial problems. Analysis and simulation of production — inventory control systems, queueing systems, investment and replacement, quality control and reliability.
SUBJECTS TAUGHT IN
THE FACULTY OF ARTS

PSYCHOLOGY
A course of lectures, laboratory work and tutorials to include social psychology, quantitative psychology and the study of perception.

INDUSTRIAL PSYCHOLOGY
This course of lectures and tutorial work is intended for students who have passed at least the psychology section of the Management Science course. The course will concentrate on social relations in industry but will also deal with aspects of personnel work and organisational psychology.

SUBJECTS TAUGHT IN
THE FACULTY OF ECONOMICS
AND COMMERCE

MICROECONOMICS
This subject deals with the theory of value and distribution. The course begins with a brief introductory account of the major problems of economics and the methods of economic analysis. It then reviews the theory of individual and market demand. After an analysis of the production function and costs of production, it examines the theory of firms' price and output policies in different market situations, paying attention to the results of both theoretical and empirical studies. The final section is concerned with the analysis of pricing and employment of factor services.

INDUSTRIAL LAW
A general conspectus of the legal system; elements of the law of contract.
A study of industrial law commencing with the master-servant relationship at common law; the concept of vicarious liability; the employer's duty of care at common law and his statutory duties; the employer's defences to an employee's action. The torts of "inducing breach of contract", "conspiracy" and "intimidation". Workers' Compensation law. Brief history of industrial arbitration and trade union legislation; the present systems of industrial legislation (Federal and State) and their operation. Covenants in restraint of trade. Restrictive trade practices law.

ACCOUNTING AND FINANCIAL STUDIES
The use of accounting information for various decisions. Basic accounting concepts; the double entry technique; preparation of financial statements; analysis and interpretation of financial statements.
Basic cost accounting; management control process; budgeting and budgetary control; standard costing; responsibility accounting; performance evaluation; cost analysis for management decisions including capital expenditure evaluation; capacity utilisation and control; statistical techniques for operational cost control.
SUBJECTS TAUGHT IN THE FACULTY OF MATHEMATICS

MATHEMATICS I
A subject of four lectures and two tutorial hours per week for three terms comprising the following topics. Summaries of these topics will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

Topic
AN Real Analysis
AL Algebra
CA Calculus
NM Numerical Mathematics

Prescribed Texts

PART II SUBJECTS
The following topics are among those offered by the Mathematics Department. Certain combinations of these topics specified below will comprise the group II subjects offered by the Department: each topic consists of about 27 lectures and 13 tutorials. A pass in Mathematics I is a prerequisite for entry to each Part II subject given by the Department; in addition some topics will require other topics as a corequisite or prerequisite as shown. Summaries of these topics will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

Topic Corequisite or Prerequisite Topic
A Analysis of metric spaces .......... C
B Complex analysis .......... .......... C
C Calculus and vector calculus .......... C
D Linear algebra .......... .......... —
E Differential equations and integral transforms .......... —
F Numerical analysis and computing .......... —
G Fourier series, partial differential equations and special functions .......... —
H Probability and statistics .......... —
I Topic in statistics, e.g., nonparametric methods .......... —
J Topic in applied mathematics e.g., finite mathematics .......... —
K Topic in pure mathematics e.g., group theory .......... —
L Topic in pure mathematics e.g., differential geometry .......... —

Prescribed Texts
Topic A—Analysis of Metric Spaces
   Real Analysis .......... .......... .......... A. J. White
   (Addison-Wesley 1968)

Topic B—Complex Analysis
   OR (Schaum 1964)
   Complex Variables .......... .......... N. Levinson & R. M. Redheffer
   (Holden-Day 1970)

Topic C—Calculus and Vector Calculus
   (Ginn Blaisdell 1969)

Topic D—Linear Algebra
   Linear Algebra .......... .......... .......... S. Lipschutz
   (Schaum 1968)

Topic E—Differential Equations and Integral Transforms
   (N.Y. Wiley 1969)

Topic F—Numerical Analysis and Computing
   Elementary Numerical Analysis .......... .......... S. D. Conté
   (McGraw-Hill 1965)


Topic G—Fourier Series, Partial Differential Equations and Special Functions
   AND (Blaisdell 1965)
   Fourier Series .......... .......... .......... I. N. Sneddon
   (Routledge 1961)

Topic H—Probability and Statistics
   Introduction to Mathematical Statistics .......... .......... P. G. Hoel
   (3rd Edition N.Y. Wiley 1963)

Topic I—Topic in Statistics
   Nonparametric Statistical Inference .......... .......... J. D. Gibbons
   (McGraw-Hill 1968)

Topic J—Topic in Applied Mathematics
   Introduction to Combinatorial Mathematics .......... .......... C. L. Liu
   (McGraw-Hill 1968)
SUBJECTS TAUGHT IN THE FACULTY OF SCIENCE

CHEMISTRY I

A subject comprising about 90 lectures and 90 hours of tutorial and laboratory classes covering the following topics:

Inorganic Chemistry (30 lectures)

- Atomic structure; chemical bonds; shapes of molecules; simple crystal structures; radiochemistry and geochemistry; chemistry of the main group elements.

Physical Chemistry (30 lectures)

- Chemical equilibria and energetics; ionic equilibria; chemical kinetics.

Organic Chemistry (30 lectures)

- The place of organic chemistry; isolation, purification; characterization of organic compounds; structural principles; nomenclature; reactions of mono-functional compounds.

The annual examination will consist of two papers, each of three hours duration.

CHEMISTRY IS

(For Civil, Electrical and Mechanical Engineering Students)

A subject comprising about 60 lectures and 30 hours of tutorials, computational classes and student participation demonstrations on selected principles of chemistry developed against an engineering background. The central theme is the contribution of chemistry to the control and exploitation of man's environment with special reference to energy and material resources. Among the topics included are the following:

- The chemical nature of natural resources; chemical energetics in relation to combustion; ionic and phase equilibria against a background of water usage, treatment and beneficiation; electrochemistry in relation to corrosion and related phenomena; structural chemistry of engineering materials; organic chemistry with special reference to petrochemistry, polymers, fuels and lubricants.

The annual examination will consist of one paper of three hours duration.
CHEMISTRY II

A subject comprising about 90 lectures and 180 hours of tutorial and laboratory classes covering the following topics.

Inorganic Chemistry (25 lectures)
  Maximum symmetry of electron pair theory; co-ordination chemistry; chemistry of the elements of the first transition series; crystal chemistry.

Physical Chemistry (25 lectures)
  Thermodynamics; phase equilibria; kinetics and photo-chemistry.

Organic Chemistry (25 lectures)
  Polyfunctional compounds including amino acids, proteins and carbohydrates; condensation reactions; aromatic compounds; reaction mechanisms.

Analytical Chemistry (15 lectures)
  Principles of physical methods; solutions; elementary aspects of spectroscopic determination of molecular structure.

The annual examination will consist of two papers, each of three hours duration.

CHEMISTRY IIIA

A subject comprising about 90 lectures and 270 hours of tutorial and laboratory classes covering the following topics:

Analytical Chemistry (15 lectures)—Principles of modern analytical techniques.

Inorganic Chemistry (25 lectures)—Introductory quantum chemistry; chemistry of elements not dealt with in Chemistry I and II; recent chemistry of non-metals; recent chemistry of metals.

Physical Chemistry (25 lectures)—Surface chemistry and catalysis; electrochemistry; statistical thermodynamics.

Organic Chemistry (25 lectures)—Stereoelectronic methods of predicting chemical behaviour, free radicals and photochemistry; chemistry of simple heterocyclic systems; approach to chemical synthesis.

The annual examination will consist of not less than two papers, each of three hours duration.

ENGINEERING GEOLOGY (for students in Engineering)

A subject of one lecture and two laboratory hours per week for 14 weeks together with two days field work.

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

PHYSICS IA

A subject for students who may wish to proceed to Physics II, for students in the Faculty of Applied Science, and for all students in the Faculty of Engineering except Chemical Engineering. (Some students in Chemical Engineering may be advised to take Physics IB).

The subject is presented as a rigorous, mathematically based discipline with emphasis on the unifying principles which link together different areas of the subject. Physics taken as part of the High School science course to 2F standard or better will be of considerable help in understanding the subject.

The subject will comprise 3 lectures and 3 hours of laboratory work per week. Lectures will cover mechanics, wave motion, electromagnetism, thermal physics, geometrical optics, physical optics, and quantum physics. The treatment throughout will assume some knowledge of calculus.

The examination will be conducted in three two hour papers. Each paper will examine the work covered in one term and will be held shortly after the end of that term.

PHYSICS IB

A subject for students who in general do not intend to proceed with further studies in Physics. (A credit pass or better in Physics IB will normally be required for entry to Physics II). Physics taken as part of the High School science course to a 2S standard or better will be of considerable help in understanding the subject.

The subject will comprise 3 lectures, and 3 hours of laboratory work or demonstrations and practice periods per week. The examinations will be similar in structure to Physics IA. The treatment will require a minimum of mathematics and will involve an experimental approach throughout. The coverage of the subject will be somewhat broader than in Physics IA.
PHYSICS II*

A course of three lectures and six laboratory hours per week, examined by two three-hour papers. The following topics will be covered:

- Mechanics
- Thermal Physics
- Quantum Physics
- Electromagnetism
- Electromagnetic Field Theory
- Physical Optics.

Physics II for students in the Department of Electrical Engineering and all students enrolled for the combined degree of B.Sc./B.E. will be identical with Physics II for the B.Sc. course except that there will be only three hours of laboratory work per week.

A pass in Physics II by an Electrical Engineering or combined degree student will qualify as a prerequisite for Physics IIIA.

* Physics II is also a Group C Elective.

MECHANICAL AND INDUSTRIAL ENGINEERING

GROUP A ELECTIVES
TAUGHT IN THE FACULTY OF ARTS

CLASSICAL CIVILISATION

A course of four lectures per week and one tutorial class per week.

The syllabus comprises, (a) an outline of Greek History with special reference to geographical and socio-economic factors and a similar survey of Roman History (b) a survey of Greek philosophy with particular reference to the impact of contemporary religious, linguistic and technical notions, and (c) the reading and discussion of certain Greek and Latin literary works in translation.

There will be two 3,000 word essays set, one for first term and one for second term. Marks will be included from these and the two tutorial papers per year prepared by each student as well as those derived from one three hour examination. It is anticipated that 70% will be allotted to the examination, 10% to each essay, and 5% to each paper.

* Physics II is also a Group C Elective.
Prescribed Books

A. GREEK AND ROMAN HISTORY AND BACKGROUND WORKS
W. K. C. Guthrie, The Greeks and Their Gods (Methuen, University Paperbacks)
W. K. C. Guthrie, The Greek Philosophers (Methuen, Home Study Books)
M. Cary, A History of Rome (Macmillan)
R. W. Hutchinson, Prehistoric Crete (Penguin)
C. M. Bowra, Landmarks in Greek Literature (Penguin)
J. P. V. D. Balsdon, Roman Civilisation (Penguin)
R. H. Barrow, The Romans (Penguin)
R. H. Scullard, The Roman World (Penguin)

B. GREEK AUTHORS IN TRANSLATION
Homer, The Iliad tr. E. V. Rieu (Penguin Classics)
Sophocles, The Theban Plays tr. E. F. Watling (Penguin Classics)
Aeschylus, The Orestean Trilogy (Penguin Classics)
Euripides, The Bacchae and Other Plays tr. P. Vellacott (Penguin Classics)
Thucydides, The Peloponnesian War tr. Rex Warner (Penguin Classics)
Plato, The Last Days of Socrates tr. H. Tredennick (Penguin Classics)
Plato, Protagoras and Meno tr. W. K. C. Guthrie (Penguin Classics)
Aristophanes, The Frogs and Other Plays (Penguin Classics)

Prescribed Books (Continued)

C. LATIN AUTHORS IN TRANSLATION
Virgil, The Aeneid tr. W. Jackson Knight (Penguin Classics)
Horace, The Odes tr. J. L. Michie (Penguin Classics)
Livy, The Early History of Rome tr. A de Selincourt (Penguin Classics)
Terence, The Brothers and Other Plays tr. B. Radice (Penguin Classics)
Seneca, Letters from a Stoic tr. R. Campbell (Penguin Classics)
Tacitus, On Imperial Rome tr. M. Grant (Penguin Classics)
Petronius, The Satyricon tr. J. Sullivan (Penguin Classics)

ENGLISH 1

(2 hours lectures, 1 hour tutorial per week)
The course comprises the following sections:
1. Modern Drama
2. Modern Novel
3. Modern Poetry
4. English Language Studies

FRENCH 1
This is intended both as a terminal subject and as a preparation for the further study of French at University level. It concentrates on the development of proficiency in the reading, writing and speaking of French. Regular assignments form an integral part of the subject and of the annual assessment.

(i) Literary and linguistic analysis of a number of works of French prose.
(ii) A survey of French poetry from the Middle Ages to the present day.
(iii) Training in linguistic competence (grammar, translation, the theory and practice of phonetics; reading aloud and conversation; dictation).

GERMAN for students not yet qualified for entry to GERMAN 1.
Three patterns of study are offered.

Pattern A Classes will be held before 5 p.m.; Pattern B & C after 5 p.m.
The Course prescribed for Pattern C is specifically designed for students from outside the Faculty of Arts.

GERMAN (Introductory) and GERMAN I
(Pattern A; 8 hours per week including language laboratory and progressive testing).

This pattern is designed for students of proven linguistic ability wishing to pursue their study of the subject further in as short a time as possible.
Credit: 2 Units
### Hours per week

#### TERM I

1. Introduction to Literary Criticism (together with German I)  
2. Language Laboratory (exercises keyed to course)  
3. Weekly progress test (also used for revision)  
4. Elementary Course work

#### TERM II

1. Introduction to Literary Criticism (from Week 5: Problems in Literary Criticism together with GI)  
2. Language Laboratory  
3. Advanced course work, revision, translation  
4. Detailed study of simpler literary texts

#### TERM III

1. Remains as for Term II  
2. Remains as for Terms I and II  
3. Detailed study of more difficult literary texts  
   a. alone  
   b. with GI  
4. Translation (together with GI)

**Examination:** Same as GERMAN I with separate grading for performance in GERMAN (Introductory)

### GERMAN (Introductory)

(Pattern B; 5 hours per week plus progressive testing).

This pattern is designed for students who will study the language with emphasis on literature and linguistics because of its general value as a useful element of an Arts Degree or because it supplements study in another language.  

**Credit:** 1 Unit.

#### TERMS I and II

1. Language Laboratory (exercises keyed to course)  
2. Fortnightly tests  
3. Elementary Course work

#### TER III

1. Text study  
2. Language Laboratory  

**Examination:** two 3-hour papers at end of year.

### GERMAN I

(5 hours per week including language laboratory work).

This course is intended for students with a pass in German at the Higher School Certificate or the equivalent.  

**Examination:**  
LANGUAGE  
   1. 3-hr. Language Paper;  
   2. Oral test.  
LITERATURE  
   1. 3-hr. Texts Paper;  
   2. 2-hr. Theory of Criticism Paper
GREEK I

Two alternative courses requiring a similar standard of achievement but providing scope for wider reading for those with matriculation Greek, and grammatical training for those without it. Each course needs 4 hours per week.

HISTORY I — The History of Western Civilization

(Three hours per week, plus a weekly seminar, compulsory for full-time students, voluntary for part-time students).

A survey course designed to give students some knowledge of the main issues involved in the development of modern society, and to introduce them to some of the problems and techniques of historical interpretation with which they will be concerned in later courses. The course will be presented in three units: "The Problem of Political Organisation"; "The Dominant Intellectual, Cultural and Religious Themes"; and "The Problem of Livelihood". Each unit will be treated as a separate whole, and will occupy roughly one term; each will cover the whole period from the Ancient World to the present day, although no attempt will be made to present a chronological narrative. The emphasis throughout will be upon significant issues, movements and ideas rather than upon mere dates and events.

LATIN I

A course of five hours per week comprising prose composition, and the study of three prescribed texts. In addition there are classes in the Greek Background to Latin literature and the elements of Latin versification.

PHILOSOPHY I

Section 1: Introduction to Philosophy (1½ hours weekly)

This section is an introduction to Philosophy, and is divided into two parts. The first part is concerned with Plato's theory of education, political authority, the nature of the soul and its immortality, and universals. The second part is concerned with Descartes' quest for infallible knowledge, and his attempts to provide the foundations of science, and to prove the existence of God and the immaterial character of the soul.

Section 2: Logic and Scientific Method (1½ hours weekly)

Both traditional and modern logic are introduced in this course, which is adapted to students with no previous acquaintance with formal logic. The use of sound rules of inference and of methods of natural deduction is studied. Such topics as classification, division and definition link the traditional logic with an introduction to scientific method, and in this segment of the course questions relating to the testing of hypotheses and to induction are also considered.

Some lecture notes will be provided, and a text and reference list will be issued at the beginning of the course.

TUTORIALS

Some tutorial assistance will be provided. Details of the tutorial programme will be published at the beginning of first term.

For texts etc. see Arts Handbook or the Department.

PSYCHOLOGY I

Psychology I consists of three lectures, one one-hour practical session and one one-hour tutorial per week. The final examination consists of one three-hour paper plus an assessment of the practical work carried out by the student throughout the year.

The subject is a general introduction to psychology and includes learning theory, motivation, developmental psychology, physiological psychology, comparative psychology, theory of measurement and descriptive statistics and statistical analysis of data.

GROUP B ELECTIVES

TAUGHT BY THE DEPARTMENT OF MECHANICAL ENGINEERING

See page 166.
GROUP C ELECTIVES
TAUGHT IN THE FACULTY OF ARTS

EDUCATION IIA
An introduction to education as a function of society. The course will include a study of the history of education in Western Europe and major philosophical contributions, and an examination of the relations between society and education in England, the United States, of America, Australia, and other selected countries.

(3 hours, 1 hour tutorial)

GEOGRAPHY I
Six hours per week (2 hours lectures, 1 hour tutorial, and 3 hours practical work).

Four days of field work are an integral part of the course.

The subject is designed to introduce students to the cultural aspects of geography, with reference to the broad geographical distribution of culture complexes, and the examination of processes involved in the evolution of culture patterns and culture systems.

Practical courses to extend and enrich this study are also designed to enable students to gain proficiency in and understanding of, the tools of geographical analyses. Methods in the cartographic and statistical organisation of geographical data will be studied.

GROUP C ELECTIVES
TAUGHT IN THE FACULTY OF ECONOMICS AND COMMERCE

ACCOUNTING I
A theoretical analysis of the accounting function in the social structure; accounting as an information system including the classification, recording and verification of financial data with emphasis on control techniques; automatic processing of accounting data and the computer; analysis and interpretation of financial statements; management uses of accounting information; various budgetary controls; an introduction to business finance; a brief survey of the law and practice of the taxation of income derived from Australian sources.

ECONOMICS I
(i) Microeconomics
This subject deals with the theory of value and distribution. The course begins with a brief introductory account of the major problems of economics and the methods of economic analysis. It then reviews the theory of individual and market demand. After an analysis of the production function and costs of production, it examines the theory of firms' price and output policies in different market situations, paying attention to the results of both theoretical and empirical studies. The final section is concerned with the analysis of pricing and employment of factor services.

READING LIST
Preliminary Reading (Intended mainly for students who have not studied Economics before)

Books Recommended for Purchase
Mansfield, E.—Microeconomics, Theory and Applications (Norton) together with one of the following:
Ferguson, C. E. & Maurice, S. C.—Economic Analysis (Irwin)
Leftwich, R. H.—The Price System and Resource Allocation (Holt, Rinehart & Winston)
Bain, J. S.—Price Theory (Holt, Rinehart & Winston)
More Advanced Texts
Bilas, R. A.—Microeconomic Theory — a Graphical Analysis
Friedman, M.—Price Theory — a Provisional Text (Aldine Press)
Ryan, W.—Price Theory (Macmillan)
American Economic Association—Readings in Price Theory (Allen & Unwin)
American Economic Association—Readings in Industrial Organisation (Allen & Unwin)
Becker, G. S.—Economic Theory (Alfred A. Knopf)

AND EITHER

(ii) Elementary Economic Statistics
This is an introductory course beginning with an examination of the place of, and need for, statistics in a modern society and the collection, classification and presentation of statistical data. Methods of describing statistical data, including measures of central tendency and measures of dispersion, are then dealt with.

Other topics covered are simple linear regression and correlation, the analysis of time series, including trend and seasonal variation, and the computation of index numbers. There is also an introduction to the theory of probability and to sampling and sampling errors.

Preliminary Reading
Moroney, M. J.—Facts from Figures (Pelican)

Text Book
Shao, Stephen P.—Statistics for Business and Economics (Merrill)

OR

(iii) Applied Economics
This course consists of two main segments (1) Comparative Economic Systems (2) An Introduction to the Australian Economy.

The first segment considers the nature and classification of economic systems and examines and compares the main features of selected modern economies, e.g. U.S.S.R., Yugoslavia. The second segment includes the following areas of study: post-war government economic objectives and policy; the relative performance of major producing sectors; foreign investment and protection; case studies of main Australian industries; wage determination and trade unions.

Preliminary Reading

Text Book
THE UNIVERSITY OF NEWCASTLE
Fees — Effective 1st January, 1972

1. GENERAL SERVICES FEE:
(a) Students Proceeding to a Degree or Diploma
All registered students must pay a General Services fee of $42.00 per annum which includes a Library Fee. In addition, students joining the University of Newcastle Union for the first time, are required to pay an entrance fee of $12.00. This fee must be paid by the prescribed time in First Term.
(b) Non-Degree Student
Payment of the General Services Fee by a non-degree student is optional. A student cannot elect to pay portion of this fee.

2. UNDERGRADUATE COURSE FEE:
Full-time
- Faculties of Arts, Economics/Commerce, Mathematics...
- All other Faculties...
Part-time Course
- All Faculties...
- Non-Degree Subject...

3. POSTGRADUATE DIPLOMA COURSE FEES:
Full-time...
Part-time...

4. FEES FOR DEGREE OF MASTER:
(a) Research and Thesis
Registration Fee...
Course & Supervision Fee (full-time)...
Course & Supervision Fee (part-time)...
Final Examinations & Graduation Fee...

(b) Course Work and Dissertation or Formal Study Courses.
Registration Fee...
Course & Supervision Fee (full-time)...
Course & Supervision Fee (part-time)...
Final Examination & Graduation Fee...

5. FEES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY:
Qualifying Examination Fee (if applicable)...
Registration Fee...
Course & Supervision Fee (full-time)...
Course & Supervision Fee (part-time)...
Final Examination & Graduation Fee...

6. RESUBMISSION OF THESIS:
A candidate required to re-submit a thesis will not be required to pay further fees unless laboratory work is involved, in which case the new appropriate course and supervision fee will be payable on a term basis. These fees are appropriate to the degree course in which the students are enrolled at the commencement of each year.
Where subjects are common to different degrees, e.g. Arts and Science, full-time fees will be assessed on the degree sought. Should a student subsequently transfer from one degree course to another which would result in a different full-time fee level being applicable, fees will be re-assessed retrospective to the commencement of the academic year (i.e. first term).
A student enrolled in a combined course leading to the award of two degrees shall, where there is a difference in the fees for the ordinary courses leading to the award of those degrees, pay the higher fee.

7. LATE FEES:
(1) Late payment fee.
Payable if fees due are not paid within stipulated times approved by the Vice-Chancellor...
Plus a further penalty if the fees are not paid within an extended time approved by the Vice-Chancellor...

(2) Late Re-enrolment fee where a continuing student fails to lodge an enrolment form by the date approved by the Vice-Chancellor...

(3) Where a student who has been granted an extension of time in which to pay fees does not do so by the prescribed time, late fees in accordance with 7(1) and 7(2) shall be payable.

(4) When an application to sit for examination is accepted after closing date...

8. OTHER FEES:
(1) Deferred examinations, per subject...
(2) Examination under special supervision, per paper...
(3) Review of examination results, per subject...
(4) Statement of matriculation status...
(5) Laboratory Kits: (per kit)...

November, 1971.
G. W. WALKER.
Accountant.