FOREWORD

It is a privilege for me to have again been asked to write the foreword to the Faculty of Engineering Handbook. The occasion is unusual in that, although Dean at the time of writing, I will no longer be at the University when the 1975 academic year commences. Nevertheless I extend a warm welcome to all students of the Faculty who are returning to commence another year of studies.

I offer a special welcome to new students who have chosen engineering as the profession they wish to follow. As you will no doubt discover, the task you have chosen is a formidable one, and one which will require much time and energy on your part. In this regard members of the Faculty of Engineering will do everything possible to make your work both interesting and enjoyable, and with ample opportunities to work with students in other Faculties. It is noteworthy that over the last five years the structures of our engineering courses have moved steadily in the direction of greater flexibility, so that students may select work programmes most suited to their needs. Furthermore, staff members will be happy to discuss problems with you and to give advice on the selection of programmes.

Nineteen seventy-five will also be significant in that the Departments of Civil, Electrical and Mechanical Engineering will cease to offer Stage 2 of the Bachelor of Science (Engineering) courses, as these courses will be progressively phased out. The 1980 requirements of The Institution of Engineers, Australia for acceptable professional courses in engineering have to a large extent influenced the policy of the Faculty Board towards a single degree, the Bachelor of Engineering degree, which may be undertaken on a full-time basis, a part-time basis, or some combination of these. There is also a simple provision for students who wish to transfer from the BSc (Eng) course to the BE course. Should students wish to obtain further information on this development, they are invited to interview the Dean or the Head of their Department.

Another matter of some significance is the further development of the Faculty's combined degree programme in that all Departments have arranged programmes for combined degree courses in Commerce and Engineering. These combined degree courses involve a five-year programme and will provide an excellent basic education for people who wish to specialise in management, industrial engineering or construction management.
The work and facilities of the four Departments which comprise the Faculty continue to develop to an extent where they are making major contributions in teaching and research. It is also of interest that the 1974 Conference of The Institution of Engineers, Australia was centred at this University. This Conference proved to be most successful and the University facilities were greatly appreciated by the delegates.

Again, students are invited to take advantage of the opportunities which arise to talk to members of staff and to make full use of the many facilities provided for their benefit. The Dean would be most grateful for any feedback of a constructive nature from the student body.

A. J. Carmichael
Professor Emeritus
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A. J. Carmichael
Professor Emeritus
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Dean
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Sub-Dean
K. R. Bridger

Faculty Secretary
J. S. Boydell

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P. W. Kleeman, BE(Adelaide), FSASM

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J. G. Fryer, BSurv, PhD(New South Wales), LS, MISAust
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Margaret J. Hanley

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Vacant

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                            MTS(Dordrecht), ASTC, MRINA

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O. J. Scott, BE

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

1. Definitions
In these Requirements, unless the contrary intention appears: “the Faculty” means the Faculty of Engineering and “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 course in which the candidate is enrolled.

2. Grading of Degrees
(a) (i) The degree of Bachelor of Engineering may be conferred either as a pass degree or as a degree with honours.
(ii) 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.
(iii) In each department of the Faculty, the most distinguished of the candidates being awarded First Class Honours may be awarded a University Medal.
(b) The degree of Bachelor of Science (Engineering) may be conferred either as a pass degree or as a degree with merit.

3. Approval of Enrolment
In any year a candidate shall enrol only in those subjects in which his enrolment has been approved by the Dean or a nominee of the Dean on the recommendation of the Head of the Department in which the candidate is enrolled.

4. Timetable Requirements
A candidate may not enrol in any year in any combination of subjects which is incompatible with the requirements of the timetable for that year.

5. A Subject
(a) To complete a subject qualifying towards a degree, hereinafter called a subject, a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written work as the department offering the subject shall require.
(b) To pass a subject, a candidate shall satisfy the requirements of subclause (a) of this clause to the satisfaction of the examiners and pass such examinations as the Faculty Board shall require.
(c) Subjects for which the course of instruction extends over the first half of the academic year only; the second half of the academic year only; the whole or the substantially greater part of the academic year; shall be classified as Type A, Type B and Type AB subjects respectively.

6. Annual Examinations
The Annual Examination for each subject may be held at any time after the end of the course of instruction in that subject as the Faculty Board may determine. Such Examination may be written, oral or practical, or any combination of these, and may be supplemented by progressive assessments made during the course of instruction.

7. Special Examinations
A candidate may be granted special or deferred examinations in accordance with the provisions of By-law 5.9.3.

8. Examination Grades
(a) The results of successful candidates at Annual Examinations and Special Examinations shall be classified: Pass, Credit, Distinction, High Distinction.
(b) The result of a successful candidate at a Deferred Examination shall be classified only as a Pass.

9. Withdrawal
(a) A candidate may withdraw from a subject or course only by notifying the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification in writing.
(b) A candidate who after:
   the eighth Monday in First Term, in the case of a Type A subject;
   the sixth Monday in Second Term, in the case of a Type AB subject;
   the second Monday in Third Term, in the case of a Type B subject;
withdraws from any subject shall be deemed to have failed in that subject, unless granted permission by the Dean to withdraw without penalty.

10. Unsatisfactory Progress
A candidate whose progress is unsatisfactory will be dealt with under the provisions of By-laws 5.4.1, 5.4.2 and 5.4.3.

11. Relaxing Clause
In order to provide for exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any requirement.

12. Prerequisites and Corequisites
A candidate may not without the permission of the Dean acting on the recommendation of the Head of Department enrol in any subject unless he has satisfied the requirements for prerequisites and has enrolled in or has already passed, the corequisites prescribed for that subject.

13. Standing
(i) A candidate may be granted credit in subjects prescribed for the course in which he is enrolled in recognition of work completed in this University or another tertiary institution subject to the provisions of By-law 5.8.1.3.
(ii) A candidate may be granted standing in elective subjects for subjects not offered in this University.

14. To qualify for admission to the degree of Bachelor of Engineering, a candidate shall satisfy the requirements of one of the following courses, as prescribed in the Schedules appended to these Requirements and satisfy the industrial experience requirements as prescribed by the Faculty Board.

Bachelor of Engineering in Chemical Engineering — Schedule 1.1
Bachelor of Engineering in Civil Engineering — Schedule 1.2
Bachelor of Engineering in Electrical Engineering — Schedule 1.3
Bachelor of Engineering in Industrial Engineering — Schedule 1.4
Bachelor of Engineering in Mechanical Engineering — Schedule 1.5
Bachelor of Engineering in Naval Architecture — Schedule 1.6
Bachelor of Engineering in Computer Engineering — Schedule 1.7

15. (a) To qualify for admission to the degree of Bachelor of Science (Engineering) a candidate shall satisfy normally by part-time study, the requirements of one of the following courses as prescribed in the Schedules appended to the Requirements and satisfy the industrial experience requirements prescribed by the Faculty Board.

Bachelor of Science (Engineering) in Chemical Engineering — Schedule 3.1
Bachelor of Science (Engineering) in Civil Engineering — Schedule 3.2
Bachelor of Science (Engineering) in Electrical Engineering — Schedule 3.3
Bachelor of Science (Engineering) in Industrial Engineering — Schedule 3.4
Bachelor of Science (Engineering) in Mechanical Engineering — Schedule 3.5
Bachelor of Science (Engineering) in Naval Architecture — Schedule 3.6

16. To qualify for admission to the degree of Bachelor of Science (Engineering) a candidate shall satisfy normally by part-time study, the requirements of one of the following courses as prescribed in the Schedules appended to the Requirements and satisfy the industrial experience requirements prescribed by the Faculty Board.

Bachelor of Science (Engineering) in Chemical Engineering — Schedule 3.1
Bachelor of Science (Engineering) in Civil Engineering — Schedule 3.2
Bachelor of Science (Engineering) in Electrical Engineering — Schedule 3.3
Bachelor of Science (Engineering) in Industrial Engineering — Schedule 3.4
Bachelor of Science (Engineering) in Mechanical Engineering — Schedule 3.5
Bachelor of Science (Engineering) in Naval Architecture — Schedule 3.6
(b) The following additional requirements shall apply to the Bachelor of Science (Engineering) courses in Civil, Electrical, Mechanical and Industrial Engineering and in Naval Architecture:

(i) No candidate shall be permitted to enrol or re-enrol in these courses unless he was enrolled in the course prior to the 1st January, 1974.

(ii) A candidate who was enrolled in the course prior to the 1st January, 1974, may Either

(a) transfer to the Bachelor of Engineering course with the transition arrangements as set out in Appendix B to the Requirements Or

(b) continue in the course for as long as he has passed sufficient subjects in the course to enable him to complete all requirements for admission to the degree before the end of the 1979 academic year.

16. Elective Requirements
The Elective subjects included in the courses shall be selected in accordance with the Elective Requirements as set out in Appendix A to these requirements.

17. (i) A candidate for the Bachelor of Science (Engineering) degree in the University may with the permission of the Dean transfer to the Bachelor of Engineering course with such standing as may be approved by the Dean.

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

(iii) Only in exceptional circumstances will a student be permitted to transfer from one course to another more than once.

18. Progression
(i) Progression in the course shall be by subject.

(ii) Except with the permission of the Dean a candidate may not enrol for a programme having a greater work load than a normal year’s programme as set out in the Schedules attached.

19. Combined Degree Course
A candidate may complete the Requirements for the Bachelor of Engineering degree in any specialisation in conjunction with a Bachelor of Arts, Bachelor of Commerce or Bachelor of Science degree by completing a combined course approved by the Faculty Board of the Faculty of Engineering and the Faculty Board, Faculty of Arts, Faculty of Economics and Commerce or Faculty of Science as appropriate: provided that:

(i) Admission to a combined course shall normally be at the end of the first year and shall be subject to the approval of the Deans of the two Faculties concerned,

(ii) Admission to combined courses will be restricted to students with an average of Credit level.

(iii) The Deans of both Faculties, after consultation with the Head(s) of Department(s) concerned, shall certify that the work in the combined degree is no less in quantity and quality than if the two degrees were taken separately.

(iv) A combined course leading to the degrees of Bachelor of Arts and Bachelor of Engineering shall include in addition to the Requirements for the Bachelor of Engineering five Arts subjects which must include not less than one Part III and one Part II subject and at least four of which shall be selected from Group I of the Schedule of Engineering Subjects included in the Requirements for the degree of Bachelor of Arts.
APPENDIX A—ELECTIVE REQUIREMENTS

Elective units must be selected in accordance with the following rules. Where a student elects to take an Industrial Experience unit the responsibility for organising the necessary facilities shall rest entirely with the student, subject to the approval of the arrangements by the Head of Department concerned. The University can accept no responsibility for organising suitable employment.

1. DEPARTMENT OF CHEMICAL ENGINEERING

Elective I
Students must take Chemistry I as Elective I.

Elective II
Elective II requires the completion of topics rated at not less than five units selected from the following list. Not less than three units must be selected from Group A.

Group A

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information</td>
<td>1</td>
</tr>
<tr>
<td>OR</td>
<td>EE203 Introduction to Electrical Information and 2</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>EE204 Introduction to Electrical Energy</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td>EE203 Introduction to Electrical Information</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td>EE41* - EE42 Automatic Control</td>
<td></td>
</tr>
<tr>
<td>CE202</td>
<td>Materials and Structures</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td>ME241 Properties of Materials</td>
<td>1</td>
</tr>
<tr>
<td>OR</td>
<td>Approved Topics in Metallurgy</td>
<td>2</td>
</tr>
<tr>
<td>ME266</td>
<td>Automatic Control</td>
<td>1</td>
</tr>
<tr>
<td>OR</td>
<td>Approved topics in Chemistry II, IIIA, IIIIB to not more than 3 units</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>Extra topics in Mathematics II or III to not more than 3 units</td>
<td></td>
</tr>
</tbody>
</table>

Group B

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME401</td>
<td>Systems Analysis</td>
<td>1</td>
</tr>
<tr>
<td>ME402</td>
<td>Systems Planning, Organisation &amp; Control</td>
<td>1</td>
</tr>
<tr>
<td>ME487</td>
<td>Operations Research — Deterministic Models</td>
<td>1</td>
</tr>
<tr>
<td>AND</td>
<td>Operations Research — Deterministic Models</td>
<td></td>
</tr>
<tr>
<td>ME488</td>
<td>Operations Research — Probabilistic Models</td>
<td>2</td>
</tr>
</tbody>
</table>

INDUSTRIAL EXPERIENCE ELECTIVES

One Elective unit will accrue for each year's satisfactorily reported experience of adequate technical content. At least two reports will be required for each year. A maximum of four units will be allowed and may be equated to Elective III or to Group B units from Elective II. Adequate specialised experience may be considered as equating to appropriate Group A units.

2. DEPARTMENT OF CIVIL ENGINEERING

Elective I
Elective I may consist of any subject or two half subjects of satisfactory level, subject to the approval of the Head of Department and the Head(s) of the Department(s) whose department offers the chosen subject or half subject. However, Chemistry I or Chemistry IS must be taken sometime during the course. If Geology I is taken, the subject CE223J Engineering Geology must be replaced by a one unit subject offered by an Engineering department.
Other Electives
Electives may consist of subjects or part subjects offered within the Faculty or by other faculties, subject to the approval of the Heads of the Department of Civil Engineering and of any other department responsible for the subject or part-subject and subject to the following conditions:
(i) at least one of the units must be taken within the Department of Civil Engineering; and
(ii) up to three units of Industrial Experience may be taken as Electives after completion of the First Year of the course or its equivalent. Any student wishing to receive credit for three units must complete the third unit during his final year of enrollment.

3. DEPARTMENT OF ELECTRICAL ENGINEERING
BACHELOR OF ENGINEERING IN ELECTRICAL OR COMPUTER ENGINEERING

The sixteen units of electives shall be chosen in accordance with the following rules.
1. Eight elective units must be taken in the Faculty of Engineering, at least two must be from outside the Department of Electrical Engineering and at least two from within the Department.
2. Eight elective units must be taken outside the Faculty of Engineering, and must include one first-year Arts subject or the equivalent in a non-technical area. The latter will be counted as four elective units.
3. If a student elects to do a subject at one level which is required at a later level, the later requirement is to be replaced with elective units.
4. A first-year subject in another faculty taken as an elective is normally equivalent to two units.
5. Any student enrolled in the Faculty of Engineering who is required, or who elects, to take Economics I as part of his course must take the two subjects: Microeconomics and Economic History I with the exception of those students whose courses do not include Mathematics II, Topic H. Such students may replace Economic History I by Economic Statistics I. However a student taking this combination will not be allowed to take Mathematics II, Topic H at a later stage and count it towards his degree.
   Examples of two-unit Electives are:—
   Microeconomics or Economic History I
6. Chemistry I may be taken in lieu of Chemistry IS and two non-engineering electives and Physics II in lieu of PH221 and two non-engineering electives.

7. Students enrolled in the Bachelor of Engineering in Computer Engineering must include EM2F Numerical Analysis as one of the Elective Units in Year II or III of the course.
8. For the Bachelor of Arts/Bachelor of Engineering degree in Electrical Engineering, the rules are as for the Bachelor of Engineering degree save that the eight elective units to be taken outside the Faculty of Engineering must all be applied to Arts subjects.
   As the student is required to take a Part III Arts subject in the Arts year, one of the subjects taken as an Elective must be a Part II subject.
9. For the Bachelor of Science/Bachelor of Engineering degree in Electrical Engineering, the rules are as for the Bachelor of Engineering degree save that the eight elective units to be taken outside the Faculty must be applied to four units of Arts, two units towards Physics II, and two units of second year Mathematics topics.
10. In any year, except the first year of the course, when a student enrols on a part-time basis, one year of industrial experience may be substituted for one elective unit up to a total of five elective units. Not more than four such units may be substituted for non-engineering units and not more than four such units may be substituted for units within the eight engineering elective units. A first year Arts subject or the equivalent in a non-technical area must still be taken. To earn this substitution, the student must submit a report concerning his practical experience for the year to the department secretary by the 31st October of the year for which the substitution is being sought and such other reports as may be required.

BACHELOR OF SCIENCE (ENGINEERING) IN ELECTRICAL ENGINEERING

The twelve elective units in the B.Sc.(Eng.) course are to be selected by the student, with the advice and approval of his academic advisor, subject to the following requirements:
1. A minimum of four elective units are to be taken within the Faculty of Engineering, at least two of which must be from outside the Department of Electrical Engineering.
2. One first-year Arts subject or the equivalent must be taken in a non-technical area. It will be counted as four elective units.
3. If a student elects to do a subject at one level which is required at a later level, the later requirement is to be replaced with elective units.
4. 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 programme subject to pre- and corequisite requirements.
5. A first-year subject in another faculty taken as an elective is normally equivalent to four units. Half a first-year subject in these faculties is normally equivalent to two units.
6. Any student enrolled in the Faculty of Engineering who is required, or who elects, to take Economics I as part of his course must take the two subjects:

Microeconomics and Economic History I

with the exception of those students whose courses do not include Mathematics II, Topic H. Such students may replace Economic History I by Economic Statistics I. However a student taking this combination will not be allowed to take Mathematics II, Topic H at a later stage and count it towards his degree.

Students enrolling for Electives which are normally three hours per week only, may enrol in Microeconomics or Economic History I.

4. DEPARTMENT OF MECHANICAL ENGINEERING

1. Chemistry I consisting of four units may be substituted for Chemistry IS and the two first year elective units in the Bachelor of Engineering courses.

2. The two elective units of the first-year Bachelor of Engineering degree course must be taken in faculties other than the Faculty of Engineering.

3. At least three of the six elective units taken in Year IV of the Bachelor of Engineering degree courses must be selected from the list of Departmental Technical Electives.

4. In the case of persons in full employment proceeding as part-time students, each year of appropriate employment that is supervised and approved by the Head of the Department is credited as one unit of elective. A maximum of five such units are allowed, described as:

- ME092 Industrial Experience 1 unit
- ME093 Industrial Experience 1 unit
- ME094 Industrial Experience 1 unit
- ME095 Industrial Experience 1 unit
- ME096 Industrial Experience 1 unit

These elective units may be used to meet any elective requirements in Clauses 2 and 3 above, except the Departmental Technical Elective requirement in Clause 3.

5. Three elective units in the Bachelor of Arts/Bachelor of Engineering courses and in the Bachelor of Science/Bachelor of Engineering courses must be selected from the list of Departmental Technical Electives.

APPENDIX B — TRANSITION ARRANGEMENTS 1974

(a) DEPARTMENT OF CIVIL ENGINEERING

Any student currently enrolled for the degrees of Bachelor of Engineering (Civil) or Bachelor of Science (Engineering) (Civil) and who has not completed requirements for the award of those degrees by the end of 1973 shall be deemed to be enrolled thereafter for the new degree courses introduced in 1974, with credit for all subjects passed in the old courses, subject to the following condition:

Any student who has passed or has been granted standing in the subject or part subject shown in the first column shall be given standing in the subject shown in the second column:

<table>
<thead>
<tr>
<th>ME121 Workshop Practice</th>
<th>ME121 Workshop Practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE101 Introduction to Electrical Engineering</td>
<td></td>
</tr>
<tr>
<td>EE101</td>
<td>EE203</td>
</tr>
<tr>
<td>EE201</td>
<td>EE204</td>
</tr>
<tr>
<td>CE350J General Studies Seminar</td>
<td>GE350 Seminar</td>
</tr>
<tr>
<td>ME481 Engineering Administration</td>
<td>CE352 Civil Engineering Systems</td>
</tr>
<tr>
<td>Chemistry IS</td>
<td>2 units of Elective I</td>
</tr>
</tbody>
</table>

(b) DEPARTMENT OF ELECTRICAL ENGINEERING

(i) Students continuing in their present course

Any student who in 1973 or any earlier year was enrolled in the Bachelor of Engineering or Bachelor of Science (Engineering) in Electrical Engineering and wishes to continue in the same course shall be granted standing for the same number of years or stages in the new course as he has completed in the old course.

Where a student has completed part of a year or stage, standing will be granted for the equivalent subjects, or, if taken as electives, for the equivalent number of elective units.

(ii) Students transferring from the Bachelor of Science (Engineering) in Electrical Engineering to the Bachelor of Engineering in Electrical Engineering.

Any student who in 1973 or any earlier year was enrolled for the Bachelor of Science (Engineering) in Electrical Engineering and elects to transfer to the new Bachelor of Engineering in Electrical Engineering, shall be granted standing on the following basis:

<table>
<thead>
<tr>
<th>Stage Completed</th>
<th>Standing to be granted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage 1</td>
<td>Mathematics I, Engineering I</td>
</tr>
<tr>
<td>Stages 1-2</td>
<td>Year I</td>
</tr>
<tr>
<td>Stages 1-3</td>
<td>Year I plus EE203, EE204, EE231</td>
</tr>
<tr>
<td>Stages 1-4</td>
<td>Mathematics II Part I, Chemistry IS</td>
</tr>
<tr>
<td>Stages 1-5</td>
<td>Year I and II</td>
</tr>
<tr>
<td>Stages 1-6</td>
<td>Year II plus EE311, EE321, EE331, EE341 and six elective units</td>
</tr>
<tr>
<td>Stages 1-6</td>
<td>Years I-III plus two electives</td>
</tr>
</tbody>
</table>

Where a student has completed part of a stage he will be granted standing for stages completed in accordance with the above table plus standing for any additional subjects passed.

In addition to the standing set out above, a student may, subject to the approval of the Head of Department, be granted standing in one elective unit for each year spent in appropriate employment.
Students enrolled for the Bachelor of Arts/Bachelor of Engineering and Bachelor of Science/Bachelor of Engineering degrees

Standing will be granted in the Bachelor of Engineering part of the course on the same basis as in (i) above.

Where a subject for which standing has been granted has been transferred to a year or stage of the course still to be completed, such subject shall be replaced by elective units.

(c) DEPARTMENT OF MECHANICAL ENGINEERING

The following transition arrangements will apply for students who are already enrolled in the Mechanical and Industrial Engineering, and Naval Architecture, Bachelor of Engineering, Bachelor of Arts/Bachelor of Engineering, Bachelor of Science/Bachelor of Engineering and Bachelor of Science (Engineering) courses:

<table>
<thead>
<tr>
<th>Completed in 1973</th>
<th>Subsequent Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) Mechanical and Industrial full-time Bachelor of Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Year I</td>
<td>Years II, III, IV of the new course less ME221</td>
</tr>
<tr>
<td>Year II</td>
<td>Years III, IV of the new course less EE203</td>
</tr>
<tr>
<td>Year III</td>
<td>Year IV of the new course</td>
</tr>
<tr>
<td><strong>(b) Naval Architecture full-time Bachelor of Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Year I</td>
<td>Years II, III, IV of the new course</td>
</tr>
<tr>
<td>Year II</td>
<td>Years III, IV of the new course plus EE204</td>
</tr>
<tr>
<td>Year III</td>
<td>Year IV less GE350</td>
</tr>
<tr>
<td><strong>(c) Full-time Bachelor of Science/Bachelor of Engineering in Mechanical Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Year I</td>
<td>Years II, III, IV and V of the new course less ME221</td>
</tr>
<tr>
<td>Year II</td>
<td>Years III, IV and V of the new course less EE203</td>
</tr>
<tr>
<td>Year III</td>
<td>Years IV and V of the new course less GE350</td>
</tr>
<tr>
<td>Year IV</td>
<td>Year V of the new course</td>
</tr>
<tr>
<td><strong>(d) Full-time Bachelor of Science/Bachelor of Engineering in Industrial Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Year I</td>
<td>Years II, III, IV and V of the new course less ME221</td>
</tr>
<tr>
<td>Year II</td>
<td>Years III, IV and V of the new course plus ME222</td>
</tr>
<tr>
<td>Year III</td>
<td>Years IV and V of the new course less GE350</td>
</tr>
<tr>
<td>Year IV</td>
<td>Year V of the new course</td>
</tr>
</tbody>
</table>

Completed in 1973

<table>
<thead>
<tr>
<th>Subsequent Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(e) Full-time Bachelor of Arts/Bachelor of Engineering in Mechanical Engineering</strong></td>
</tr>
<tr>
<td>Year I</td>
</tr>
<tr>
<td>Year II</td>
</tr>
<tr>
<td>Year III</td>
</tr>
<tr>
<td>Year IV</td>
</tr>
<tr>
<td><strong>(f) Full-time Bachelor of Arts/Bachelor of Engineering in Industrial Engineering</strong></td>
</tr>
<tr>
<td>Year I</td>
</tr>
<tr>
<td>Year II</td>
</tr>
<tr>
<td>Year III</td>
</tr>
<tr>
<td>Year IV</td>
</tr>
</tbody>
</table>

**Individual Subjects**

Standing will be granted for units passed in 1973 and previous years. Students who have completed ME121 and EEIO1 prior to 1974 will be given standing in ME221. Students who have completed EE201 prior to 1974 will be given standing in EE203 and will be required to read EE204 in lieu of EE202.

**TRANSFER FROM PRESENT BACHELOR OF SCIENCE (ENGINEERING) TO THE NEW BACHELOR OF ENGINEERING COURSES**

Students at present enrolled in the part-time Bachelor of Science (Engineering) courses may elect to:

(a) complete the part-time Bachelor of Science (Engineering) course in which they are enrolled  

or

(b) transfer to the corresponding new Bachelor of Engineering course.

*The following arrangements will apply for those who decide to continue the part-time Bachelor of Science (Engineering) course:—*

<table>
<thead>
<tr>
<th>Completed</th>
<th>Subsequent Years</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(a) Mechanical Engineering</strong></td>
<td></td>
</tr>
<tr>
<td>Stage 1</td>
<td>Standing will be given for units completed</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Standing for units completed and exemption from ME221</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Stage 4, 5 and 6 of new course</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Stage 5 and 6 of new course less EE203 plus GE350</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Stage 6 of new course</td>
</tr>
<tr>
<td>Completed in 1973</td>
<td>Subsequent Years</td>
</tr>
<tr>
<td>------------------</td>
<td>------------------</td>
</tr>
<tr>
<td><strong>Industrial Engineering</strong></td>
<td><strong>Subsequent Years</strong></td>
</tr>
<tr>
<td>Stage 1</td>
<td>Standing for subject units completed</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Standing for Year I and exemption from ME221</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Standing in Year I, exemption from ME221 and standing for other units completed</td>
</tr>
<tr>
<td>Stage 4</td>
<td>Standing in Years I and II and exemption from EE203</td>
</tr>
<tr>
<td>Stage 5</td>
<td>Standing in Years I and II, exemption from EE203 and EE204 and standing for other units completed</td>
</tr>
<tr>
<td>Stage 6</td>
<td>Required to read the following Units:</td>
</tr>
<tr>
<td></td>
<td>Project — 4</td>
</tr>
<tr>
<td></td>
<td>Electives — 9</td>
</tr>
<tr>
<td><strong>Naval Architecture</strong></td>
<td><strong>Subsequent Years</strong></td>
</tr>
<tr>
<td>Stage 1</td>
<td>Standing for subject units completed</td>
</tr>
<tr>
<td>Stage 2</td>
<td>Standing for Year I</td>
</tr>
<tr>
<td>Stage 3</td>
<td>Standing for Year I and standing for units completed</td>
</tr>
<tr>
<td>* The satisfactory discharge of requirements relating to ME091, ME092 etc. will be credited as standing in the corresponding number of electives.</td>
<td></td>
</tr>
<tr>
<td><strong>Credit for Industrial Experience</strong> in ME091, ME092 etc. will be granted to students in advanced stages of the course on the satisfactory discharge of requirements as specified by the Head of the Department. As a general basis, this will require the submission of a report by the student covering his industrial activities prior to 1974 and a statement from his employer certifying and setting out details of his experience.</td>
<td></td>
</tr>
<tr>
<td><strong>AWARD OF HONOURS</strong></td>
<td></td>
</tr>
<tr>
<td>(The following statement represents the current policy of the Faculty, but is not part of the formal Degree Requirements)</td>
<td></td>
</tr>
<tr>
<td>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:</td>
<td></td>
</tr>
<tr>
<td><strong>Honours</strong></td>
<td><strong>Class</strong></td>
</tr>
<tr>
<td>Class I</td>
<td>Midway between Distinction and Credit Level</td>
</tr>
<tr>
<td>Class II Division I</td>
<td>Credit level</td>
</tr>
<tr>
<td>Class II Division II</td>
<td>Midway between Credit and Pass level.</td>
</tr>
<tr>
<td>The standard for the Pass with Merit in the degree of Bachelor of Science (Engineering) is to be as for Honours Class II Division I, and the average grade is to be computed in the same general manner as for the Bachelor of Engineering degree.</td>
<td></td>
</tr>
<tr>
<td>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.</td>
<td></td>
</tr>
<tr>
<td><strong>COMBINED DEGREE COURSE</strong></td>
<td></td>
</tr>
<tr>
<td>A student may enrol in the combined courses leading to the Bachelor of Arts/Bachelor of Engineering, Bachelor of Commerce/Bachelor of Engineering or Bachelor of Science/Bachelor of Engineering degree on the successful completion of his first year course. Students wishing to transfer to a combined degree course will be expected to be above average quality and the minimum standard looked for will be credit level. Only in exceptional circumstances will a student be allowed to transfer to a combined degree course during his second year or later.</td>
<td></td>
</tr>
</tbody>
</table>
Students who are considering transferring to a combined course at the end of the first year should familiarise themselves with the requirements for both degrees and pay particular attention to the choice of elective subjects. Students are advised to consult their Student Advisor at an early stage.

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

**Arts/Engineering**

(b) A candidate may, after completing the first year of a course for the degree of Bachelor of Engineering in the Faculty of Engineering enrol in a combined Arts/Engineering course. Subject to the special conditions stated below, a candidate who has enrolled in such a combined course shall qualify for admission to the ordinary degree of Bachelor of Arts if he passes, subsequently to his first enrolment for the degree of Bachelor of Engineering, nine subjects chosen from those listed in the Schedule of the subjects offered for the ordinary degree of Bachelor of Arts. The special conditions above referred to shall be these:

(i) The candidate shall comply with all the provisions of these Requirements other than Clause 12 (c);

(ii) Not more than five of the nine subjects shall be Part I subjects;

(iii) At least three of the nine subjects shall be passed after approval of the candidate’s enrolment in the combined course;

(iv) A candidate whose enrolment in a combined course is withdrawn or otherwise terminated before he has passed the nine subjects required by this section shall not be eligible to qualify for admission to the ordinary degree of Bachelor of Arts under this section;

(v) A candidate enrolled in a combined course may, upon satisfying the Requirements for either the degree of Bachelor of Arts or the degree of Bachelor of Engineering, be admitted to that degree while continuing in the combined course.

Extract from the Requirements for the degree of Bachelor Science:

**Science/Engineering**

A candidate who has enrolled in such a combined course shall complete all requirements for the Bachelor of Engineering in any specialisation and comply with the Requirements for the degree of Bachelor of Science, with the provision that Engineering I is recognised as a Science Part I subject and that a subject taken for the Science degree course may be accepted as Elective III for the Engineering degree course. Normally the requirements for the degree of Bachelor of Science shall be completed before the candidate enrols for the final year of the Engineering degree course.

**Commerce/Engineering**

There are no specific requirements for Commerce/Engineering courses except that the candidate shall meet the requirements for both degrees. Approved or recommended combined courses are set out in the Departmental sections of this Handbook.

INTERPRETATION OF THE ACADEMIC PROGRESS BY-LAWS IN THE FACULTY OF ENGINEERING

By-Law 5.4.1. (2) leaves it open to each particular faculty to decide what constitutes unsatisfactory progress calling for action under sub-headings (a), (b) or (c) of the By-Law. The Faculty Board, Faculty of Engineering, has resolved that failure to pass at least one quarter of the approved programme in the first year of enrolment as a full-time student, or the first two years of enrolment as a part-time student, shall constitute unsatisfactory progress, to be acted on under sub-heading (c) of the By-Law. “Approved programme” means the student’s programme for the whole period in question, and the fraction one-quarter is to be measured by the “units” defined on page 39.

The above requirement is without prejudice to the further requirements laid down in By-Law 5.4.2.

**REQUIREMENTS FOR THE 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. In exceptional circumstances applications will be accepted after that date.

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

   (b) Under no circumstances will a subject qualify for the Diploma for more than ten years from the year in which it is passed.

6. An applicant for registration as a candidate for the Diploma may be granted standing on conditions to be determined by the Faculty Board.

7. The Faculty Board shall approve a programme of studies for each candidate. This programme may be varied only with the approval of the Dean.
8. Withdrawal

(a) A candidate may withdraw from a subject or course only by informing the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification.

(b) A candidate who withdraws from any subject after the sixth Monday in second term shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty.

9. To qualify for the Diploma a candidate shall, in not less than two years of part-time study, or in special cases approved by the Faculty Board, one year of full-time study, complete satisfactorily a course of studies comprising twelve units composed as follows:

Formal Course Work 10 units

(a) Subjects to be selected from schedule of approved subjects in accordance with the requirements of subsections (b) and (c) of this Clause.

ME684D Project 2 units

(b) The approved subjects have been arranged in three Groups. Group I contains subjects required for basic understanding of the principles of Industrial Engineering while Groups II and III contain a wider selection of subjects for those already trained in the subject areas of Group I.

The selection of subjects shall normally be made from those in Group I of the Schedule, unless in order to satisfy the conditions of subsection (c) of this Clause or where a broader training is deemed to be desirable, the Faculty Board on the recommendation of the Head of Department, has prescribed a course of study including subjects from Groups II and III. In any event not more than three units may be selected from Group III.

(c) Notwithstanding the requirements of parts (a) and (b) and except where standing is approved by the Board, no subject shall be included such that in the opinion of the Board, the subject concerned substantially overlaps in content that of a similar subject completed or work presented and for which credit has been given in the award of another degree or diploma.

10. All subjects listed in the Schedule may not necessarily be offered in any one year.

11. 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.

SCHEDULE OF SUBJECTS

| Group I | Subject | Units | Prerequisites*
|--------|--------|------|----------------
| ME381  | Methods Engineering | 1   |                |
| ME382  | Production Engineering | 1  |                |
| ME385  | Accounting & Financial Studies | 1 |                |
| ME401  | Systems Analysis    | 1   |                |
| ME487  | Operations Research — Deterministic Models | 1 |                |
| ME488  | Operations Research — Probabilistic Models | 1 |                |
| ME582D | Industrial Computations | 1 |                |
| ME681D | Industrial Law        | 2   |                |
| ME682D | Case Studies in Industrial Management | 1 |                |
| ME683D | Engineering Economics | 2   |                |

| Group II | Subject | Units | Prerequisites*
|---------|--------|------|----------------
| ME402   | Systems Planning, Organisation & Control | 1  | ME401          |
| ME403   | Resources Planning & Allocation        | 1  | ME401          |
| ME404   | Mathematical Programming               | 1   |                |
| ME407   | Environmental Engineering              | 1   |                |
| ME408   | Industrial Safety Engineering          | 1   |                |
| ME419   | Design of Conveyors & Materials Handling Equipment | 1 |                |
| ME444   | Properties of Materials                | 1   |                |
| ME449   | Reliability Analysis                   | 1   |                |
| ME485   | Tool Design                            | 1   |                |
| ME486   | Industrial Design                      | 1   |                |
| ME489   | Operations Research — Applications in Industry | 1 | ME487, ME488 |
| ME685D  | Industrial Process Control             | 1  | ME401, or equivalent |
| ME686D  | Industrial Psychology                  | 1   |                |
| ME503G  | Design of Experiments for Engineering Research | 2 |                |
| ME505G  | Systems Analysis & Design              | 2   |                |
| ME507G  | Resources Planning & Allocation        | 2   |                |
| ME517G  | Materials Handling & Transportation Systems | 2 |                |
| ME535G  | Vibration & Noise Problems in Industry | 2   |                |
| ME583G  | Modelling of Management Problems       | 1   |                |
| ME584G  | Simulation                            | 1   |                |

| Group III | Subject | Units | Prerequisites*
|-----------|--------|------|----------------
| Subjects approved by the Faculty Board for an individual course but not included in Group I or Group II. The number of units to be assigned to these subjects will be determined by the Board.

* Except where indicated the prerequisites will be those indicated in the Faculty of Engineering Handbook. |
CONDITIONS FOR GRANTING OF STANDING

1. Standing in a subject in the Diploma in Industrial Engineering shall require the approval of the Faculty Board on the recommendation of the Dean of the Faculty of Engineering.

2. A candidate will not be eligible for standing in any subject for which credit has been given for the award of another degree or diploma except as otherwise provided for in succeeding clauses.

3. A candidate from the Master of Engineering Science course of the University of Newcastle who desires to transfer to the Diploma course in Industrial Engineering may be granted standing in those subjects of the Diploma deemed to be equivalent to any of the subjects already completed in the Master's programme.

4. 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 postgraduate course work degree or diploma subjects completed in such university or institution provided that the subjects are equivalent to any of those listed in Groups I and II of the Schedule.

5. Where a candidate has completed the first part-time year of the Diploma course he may be granted standing by the Faculty Board in respect of another subject subsequently passed at another university or approved tertiary institution under the following conditions:
   (a) the subject for which standing is granted shall have a reasonable correspondence with a subject of the Diploma in Industrial Engineering; and
   (b) standing shall not be granted in more than three subject units.

HIGHER DEGREES

INTRODUCTION

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

The Master of Engineering Science degree has the primary aim of increasing the knowledge of the student in a specific and professional area, and therefore places most emphasis on course work; nevertheless it includes project work for its value both in the broadening and consolidation of knowledge, and as an introduction to research.

The Master of Engineering degree has the primary aim of introducing the student to research, and bringing him to the point where he will be able to conduct research effectively under direction. Course work will normally be included in the programme with a normal minimum amount of three postgraduate "units", as defined on page 39, but the quality and standard of work required in the thesis will still be at the high level which should be expected of an Honours Bachelor of Engineering graduate.

In general, students holding an Honours Degree in Engineering will be encouraged to complete the course in the minimum time of one year.

The Doctor of Philosophy degree has the primary aim of producing a man who can initiate, execute and supervise research. Course work will normally be included in the programme with a normal minimum amount of six postgraduate units, but the quality and standard of work required in the thesis will be at the high level appropriate to the title, "Doctor of Philosophy". Remission of up to four units of course work may be granted on account of previous postgraduate work.

The three terms remission referred to in Paragraph 6 of the Requirements will normally be granted to candidates holding a research Master of Engineering degree.

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 the inclusion in the individual programme of advanced work from other faculties equivalent in total to not more than six units and senior undergraduate elective subjects offered within the Faculty of Engineering not exceeding two units provided that the total work allowed under this section shall not exceed six units.

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. **Withdrawal**

   (a) A candidate may withdraw from a subject or course only by notifying the Secretary to the University in writing and the withdrawal shall take effect from the date of receipt of such notification in writing.

   (b) A candidate who after (i) the eighth Monday in first term, in the case of a subject lasting only the first half-year; (ii) the sixth Monday in second term, in the case of a subject lasting the whole year; (iii) the second Monday in third term, in the case of a subject lasting only the second half-year; withdraws from a subject in which he has enrolled shall be deemed to have failed in that subject, unless granted permission by the Dean of the Faculty of Engineering to withdraw without penalty.

12. 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.

13. 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.

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

15. 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.

16. 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.

(iii) A part-time candidate shall, except in special circumstances—
   i. conduct the major proportion of the research or design work in the University; and
   ii. take part in research seminars within the department in which he is working.

(iv) Every candidate shall submit annually a report on his work to his supervisor for transmission to the Higher Degree Committee.

(v) Every candidate shall submit three copies of the thesis as provided under paragraph 6(i). All copies of the thesis shall be double-spaced typescript, shall include a summary of approximately 200 words, and a certificate signed by the candidate to the effect that the work is his own and has not been submitted for a higher degree to any other university or institution. The ORIGINAL copy of the thesis for deposit in the Library shall be prepared and bound in a form approved by the University. The other two copies of the thesis shall be bound in such manner as allows their transmission to the examiners without possibility of their disarrangement.

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

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

8. The course, other than field work, must be carried out in a Department 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 possibility 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 (1965) 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.

COURSE OUTLINES

INTRODUCTION

In the following sections, pp 46 to 205 details of the courses available in each of the four Engineering Departments are given.

From 1.1.74 no new enrolments will be accepted for the Bachelor of Science (Engineering), except in the Department of Chemical Engineering. In other departments these degrees will be phased out over the period 1974 (last year for Stage 2) to 1979. Students wishing to proceed by part-time study may enrol for the normal Bachelor of Engineering course and will take approximately half of the full-time programme each year. Recommended programmes for students proceeding by part-time study are given in each departmental entry.

Industrial Experience

Another feature of the new arrangement is that part-time students in appropriate employment may take units to be known as Industrial Experience to count towards the degree. Students taking these units will be required to satisfy any departmental requirements before credit is granted.

The University can accept no responsibility for finding suitable employment for students wishing to enrol for Industrial Experience units. Any student who completes the course by full-time study will be required to obtain 20 weeks of acceptable industrial experience during the course.

Units

In undergraduate courses, a unit is approximately one-sixteenth of a full-time year or one-eighth of a part-time year. In engineering subjects, one unit involves a total of 42 hours (14 hours per week) of lectures, laboratories, and tutorials. Where subjects from other Faculties form part of an engineering course, Part I subjects each count as four units, Part II subjects as five, and Part III subjects as eight units. Where such a subject may be taken at alternative levels, e.g., Part I or Part II, the number of units assigned to the subject is an appropriate average figure calculated from the figures given above.

In the Master of Engineering Science Requirements a unit is defined as exactly one-twelfth of a full-time year, and in all postgraduate courses, including the Master of Engineering and Doctor of Philosophy the unit is understood to have the same value. This "postgraduate unit" is also defined as a programme which involves a 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.

What the two "units"—undergraduate and postgraduate—have in common is therefore the same 42 "contact-hours" per year. The postgraduate unit is a larger fraction of the year's work than the undergraduate unit because in postgraduate work the student is expected to do more work per contact-hour than he is in undergraduate work.
Classifications

The classifying subject in each year is shown in Bold faced type; the classification of a student, e.g., as second year full-time or third stage part-time, is determined by enrolment in the classifying subject. If a student enrols in more than one classifying subject, then the year or stage of the lower classifying subject applies. If he enrols in no classifying subject, then he is classified in the year or stage of the highest classifying subject he has passed.

FIRST YEAR PROGRAMMES

Students enrolling for the first year of an Engineering course should study the following notes carefully before completing their enrolment form. Your programme will vary slightly according to the Department in which you are enrolling. For details of Engineering I, Electives and ME121 Workshop Practice see the notes below.

Chemical Engineering
- Chemistry I (as Elective I)
- Engineering I
- Mathematics I
- Physics IA or IB
- ME121 Workshop Practice

Civil Engineering
- Engineering I
- Mathematics I
- Physics IA
- Elective I
- ME121 Workshop Practice

(including Mining Engineering)

Electrical Engineering
- Engineering I
- Mathematics I
- Physics IA
- 4 Elective units
- ME121 Workshop Practice

Mechanical Engineering
- Engineering I
- Mathematics I
- Physics IA
- Chemistry IS
- 2 Elective units
- ME121 Workshop Practice

(including Industrial Engineering)

Surveying
- Engineering I
- Mathematics I
- Physics IA
- CE161 Land Surveying I

Part-time students enrol for:
- Engineering I
- Mathematics I
- ME121 Workshop Practice
- (not Surveying)

except in the Department of Chemical Engineering where the first year programme is:
- Engineering I
- Physics IA or IB
- ME121 Workshop Practice

Students are advised to discuss the full course which they propose to take with a departmental representative before completing their enrolment form. By doing so they should be able to avoid difficulties in arranging a programme suitable for their particular needs in the later years of the course.

NOTES

1. Engineering I consists of four units selected from
   (a) EE101 Introduction to Electrical Engineering
   (b) CE111 Statics
   (c) ME111 Graphics
   (d) ME112 Engineering Drawing and Elementary Design
   (e) ME131 Dynamics
   (f) ChE101 Industrial Process Principles

Departmental Requirements are

- Chemical Engineering — (b), (c), (d) and (f)
- Civil Engineering — (b), (c), (d) and (e)
   (including Surveying and Mining Engineering)
- Electrical Engineering — (a) plus any three other units
- Mechanical Engineering — (b), (c), (d) and (e)
   (including Industrial Engineering and Naval Architecture)

2. Elective I or Electives

Subject to the requirements laid down by each department, Elective I or first year Electives consist of any subject or half subjects of satisfactory level offered by any faculty in the University.

The choice of the elective is subject to the approval of the Head of the Department in which the student is enrolled and the Head(s) of the Department(s) offering the subject or two half subjects chosen.

Students who may be considering transfer to a combined degree course at the end of first year should pay particular attention to the choice of Elective I or first year Electives.
Departmental requirements are

Chemical Engineering
Students must enrol in Chemistry I this being the prerequisite for Chemistry IIA which is a compulsory subject for the second year of the course.

Civil Engineering
Unless the student has completed studies in Chemistry to a level at least equivalent to 2F in the Higher School Certificate he must take Chemistry I or Chemistry IS.

If the student takes Geology I he will be required to replace CE223J Engineering Geology (Year II of the course) by a one unit subject offered by an Engineering Department.

Electrical Engineering
First year Electives must be selected in accordance with the Elective Requirements given on page 18.

Mechanical Engineering (including Industrial Engineering)
The two elective units of the first year course must be taken in faculties other than the Faculty of Engineering.

Chemistry I may be substituted for Chemistry IS and the two elective units.

The following subjects are suggested as Elective subjects for first year students in the Faculty of Engineering:

Full Subjects
Chemistry I
Biology I
Psychology I
Geology I
Philosophy I
Geography I
Economics I
Materials Science I

Half Subjects
Chemistry IS
Microeconomics
Engineering Metallurgy
Logic and Scientific Method
Economic History I
Materials Science IS

3. MEI21 Workshop Practice

In the Department of Chemical Engineering MEI21 Workshop Practice must be taken in the first year. In the Departments of Civil and Electrical Engineering MEI21 Workshop Practice may be taken either in Year I or II if enrolment is full-time or in Stage 1 or 2 if enrolment is part-time.

In the Department of Mechanical Engineering all students must enrol for MEI21 Workshop Practice in Year I or Stage 1. This is followed by a second unit of Workshop Practice (ME221) in Year II or Stage 2 for those students enrolled for the Bachelor of Engineering in Mechanical and Industrial Engineering.

Workshop Practice classes are held at the Technical College, Tighes Hill. Students are requested to indicate a preference for nominated class periods when enrolling. This should be done after you have arranged your Physics Laboratory period. Allocation of class times will be advised early in first term.

FACULTY POLICIES

The Faculty Board has laid down policies in relation to certain matters. These policy statements are reproduced here for the guidance of students.

Publication of Faculty Board Minutes
A copy of Faculty Board decisions on matters of general interest will be displayed on all Departmental Notice Boards, in the Library, the University Union and the Staff House.

Decisions in relation to individual students, personal staff matters and other items which are of a confidential nature will not be included in the published list.

Use of Electronic Calculators in Examinations
The Faculty of Engineering favours the use of unprogrammed electronic calculators in examinations provided that the calculators used are noiseless and self-contained. However, the final decision whether calculators may be used in a particular examination is a matter for the examiner. If calculators are to be permitted, the examiner should take precautions in setting the examination and in invigilation to ensure that there is no undue advantage for any student using such equipment. In particular, the calculators are not to be used as a means of bringing information into the examination room, e.g. in the form of programmed cards, unless permission to do so is explicitly given by the examiner.

Submission of Project Reports
All Undergraduate Project reports must be submitted no later than the Friday which follows the 47th Monday of the year. All Master of Engineering Science Project reports must be submitted up to, but not later than the Wednesday of the fourth week of the year in which the candidate wishes to graduate.

Replacement of Subjects Failed in First-half Year by Second Half-year Subjects
A student who fails one or more first half-year subjects will be permitted to take up to two additional second half-year units provided that he has the prerequisite requirements. He cannot, however, replace compulsory first-half-year units by optional second-half-year ones. He will be required to repeat the compulsory subjects the following year.

Special Consideration/Special Examinations
Senate has ruled that a student may apply for special consideration or special examination for mid-year examinations. This will also apply to assignments and term quizzes which are considered in assessing the student's final grading.
Consequently, any student who is prevented by illness or other circumstances from sitting a mid-year examination or quiz or from submitting an assignment should submit a request for special consideration, accompanied by a medical certificate where appropriate, to the Secretary of the University.

*Industrial Experience Units*

To be eligible for an Industrial Experience Unit, the student must be in approved employment on the 1st November preceding the year in which the unit is to be taken. The approved employment must continue for one calendar year, i.e. until the 30th October of the year in which the unit will be counted. Normally no Industrial Experience unit will be allowed in the first year of enrolment.

Students must attend lectures, seminars etc. and submit such reports as the Head of Department may require. All reports will be retained by the Department.

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**Guide to Subject Entries**

*Subject Name*

The name shown is the official name which should be used on all enrolment, re-enrolment and variation forms. For Engineering subjects the name includes the departmental number, e.g. ME121 Workshop Practice, ME221 Workshop Practice.

The six digit number which precedes the name is the *Computer Code Number* for the subject.

*Prerequisites and Corequisites*

Prerequisites are those subjects which the student must have already passed before enrolling in the subject.

Corequisites are those subjects in which the student must enrol concurrently unless he has already passed them.

The Dean, on the recommendation of the Head of Department, may relax pre- and corequisites. Prerequisites in the Department of Mechanical Engineering marked with an asterisk may with the approval of the Head of the Department be read concurrently with the subject unit named.

*Hours*

All subjects in the Faculty of Engineering are based on units of 42 contact hours each. A full explanation of the unit is given on page 39.

The 42 contact hours are spread over a whole year (1-1/2 hours per week for 28 weeks) or over a half year (3 hours per week for 14 weeks). As far as possible this information has been given in the entries but students should check with Departments before completing their timetables.

*Examinations*

Progressive Assessment based on assignments, practical work etc. is used throughout the Faculty and in some subjects the final grade is based entirely on progressive assessment. The hours shown for examinations refer to final examinations only.

However, the method of examination as set out under the various subject headings is tentative and may be varied at the discretion of the Lecturer concerned. Students will be advised of any such variations before the end of the term.
Content
This section gives a general description of the content of the subject and indicates the broad areas covered.

Preliminary Reading is included where applicable. Students should make every effort to complete the preliminary reading before starting the subject.

Texts
Essential books which are recommended for purchase.

References
Students should not restrict their reading to the texts and other references are listed to cover various aspects of the subject. Students may need to read all or part of a reference to gain an appreciation of a particular topic.

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. Chemical Engineers are now being recognised as "process engineers" in the widest sense and are engaged in the preparation and smelting of metaliferous ores, in production, in food-processing and ceramics and as fuel-engineers, as well as in the industries producing conventional "chemicals". The new fields of biochemical and bio-medical engineering apply chemical engineering principles to bacterial processes and to research into the functions of and artificial substitution for such systems as kidneys and other organs. The "energy crisis" is creating a large demand for Chemical Engineers in the fuel processing industry.

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:

Bachelor of Engineering (B.E.) may be read as a four year full-time course or with up to five years part-time and one final year full-time. A course of two years part-time followed by three years full-time is an excellent pattern. The degree is recognised for the full academic requirements of corporate membership of The Institution of Engineers, Australia and The Institution of Chemical Engineers (Great Britain).

Combined Degrees — B.A./B.E., B.Com./B.E., B.Sc./B.E., for honours level students are normally five years full-time. The combined Science degree may be taken with a major in Chemistry, Mathematics, Biology or Geology.

Bachelor of Science (Engineering) is normally a six year part-time degree. The syllabus has been developed to provide for some specialization in the fields of Applied Chemistry, Fuel Technology or Mineral Processing with the objective of professional recognition in these fields. It is recognised by the Royal Australian Chemical Institute and the Institute of Fuel (and for graduates until 1980) by The Institution of Engineers, Australia. The Institution of Chemical Engineers recognises it as exempting from two of their examinations.

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 chemical processes and equipment. Electives are available permitting students to widen their education or deepen their specialist ability by selection from subjects throughout the whole university.

SCHEDULE 1.1

BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year I</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry I (As Elective I)</td>
<td>4</td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IA or IB</td>
<td>4</td>
</tr>
<tr>
<td>ME121 Workshop Practice</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
</tr>
<tr>
<td><strong>Year II</strong></td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering I</td>
<td>6</td>
</tr>
<tr>
<td>Chemistry IIA</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Year III</strong></td>
<td></td>
</tr>
<tr>
<td>Chemical Engineering IIB</td>
<td>4</td>
</tr>
<tr>
<td>2Elective II</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>15</td>
</tr>
</tbody>
</table>

*Electives are available permitting students to widen their education or deepen their specialist ability by selection from subjects throughout the whole university.*
### Subject Units

#### Year IV

- **Chemical Engineering III**: 5
- **Projects II**: 6
- **Elective III**: 4

1. Standing may be granted in all or part of ME121 Workshop Practice on production of a certificate that equivalent training has been obtained.
2. See Elective Requirements on page 16.
3. Mathematics IIB may be taken in two parts each of three terms duration.
4. See Year I programme details on page 40.

#### Subject Units

**Recommended Programme for the Bachelor of Engineering in Chemical Engineering By Part-time Study**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IA or IB</td>
<td>4</td>
</tr>
<tr>
<td>ME121</td>
<td>5</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>9</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry I (as Elective I)</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Elective-Industrial Experience</td>
<td>1</td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry IIA</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics IIB Part 1</td>
<td>2</td>
</tr>
<tr>
<td>Chemical Engineering I Part 1</td>
<td>1</td>
</tr>
<tr>
<td>Elective-Industrial Experience</td>
<td>1</td>
</tr>
<tr>
<td><strong>Stage 4</strong></td>
<td></td>
</tr>
<tr>
<td>Mathematics IIB Part 2</td>
<td>2</td>
</tr>
<tr>
<td>Chemical Engineering I Part 2</td>
<td>5</td>
</tr>
<tr>
<td>Chemical Engineering IIA Part 1</td>
<td>2</td>
</tr>
<tr>
<td>Elective-Industrial Experience</td>
<td>1</td>
</tr>
</tbody>
</table>

#### Subject Units

**Year VI Full Time**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemical Engineering III</td>
<td>5</td>
</tr>
<tr>
<td>Projects II</td>
<td>6</td>
</tr>
<tr>
<td>Elective II (allowing for Industrial units)</td>
<td>2</td>
</tr>
<tr>
<td>Elective III (allowing for Industrial units)</td>
<td>2</td>
</tr>
</tbody>
</table>

1. Standing may be granted in all or part of ME121 Workshop Practice on production of a certificate that equivalent training has been obtained.
2. Any student who is unable to complete Year VI as a full-time student may do so over two part-time years.
3. See Elective Requirements on page 16.

**SCHEDULE 3.1**

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 1</strong></td>
<td></td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IA or IB</td>
<td>4</td>
</tr>
<tr>
<td>ME121</td>
<td>5</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>9</td>
</tr>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry I (as Elective I)</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td></td>
</tr>
<tr>
<td>Chemistry IIA</td>
<td>5</td>
</tr>
<tr>
<td>Mathematics IIB Part 1</td>
<td>2</td>
</tr>
<tr>
<td>Chemical Engineering I Part 1</td>
<td>1</td>
</tr>
<tr>
<td>Elective-Industrial Experience</td>
<td>1</td>
</tr>
<tr>
<td><strong>Stage 4</strong></td>
<td></td>
</tr>
<tr>
<td>Mathematics IIB Part 2</td>
<td>2</td>
</tr>
<tr>
<td>Chemical Engineering I Part 2</td>
<td>5</td>
</tr>
<tr>
<td>Chemical Engineering IIA Part 1</td>
<td>2</td>
</tr>
<tr>
<td>Elective-Industrial Experience</td>
<td>1</td>
</tr>
</tbody>
</table>
Subject | Units
---|---
**Stage 4**
Mathematics IIB Part 2 | 2
Chemical Engineering I Part 2 | 5
Chemical Engineering IIA Part 1 | 2
**Stage 5**
Chemical Engineering IIA Part 2 | 5
Chemical Engineering IIB | 3
Elective IIA | 1
**Stage 6**
Process Engineering | 2
Design Project | 1
Elective IIA | 5
Industrial Experience Units | 3

1 Standing may be granted in all or part of ME121 Workshop Practice on production of a certificate that equivalent training has been obtained.
2 See Elective Requirements on page 16.

**BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING**

The candidate shall complete in the Faculty of Arts five subjects selected as shown below, in addition to the professional requirements for the degree of Bachelor of Engineering in Chemical Engineering (i.e. subjects Chemistry I and II, Mathematics I and IIB, Physics I (A or B), Engineering I and Chemical Engineering I, IIA, IIB and III, together with the industrial experience specified for the B.E. degree).

The five Arts subjects must include not less than one Part III and one Part II subject, and at least four of the five subjects must be selected from Group I of the Schedule of Subjects included in the Requirements for the degree of Bachelor of Arts.

A typical programme for the Department of Chemical Engineering would be:

**Year I**
Chemistry I
Engineering I
Physics I (A or B)
Mathematics I
ME121 Workshop Practice

**Year II**
Mathematics IIB Part 1
Chemistry IIA
Chemical Engineering I
Arts Subject I

**Year III**
Mathematics IIB Part 2
Chemical Engineering IIA Part 1
Chemical Engineering IIB Part 1
Arts Subject II
Arts Subject I or II
Industrial Experience

**Year IV**
Chemical Engineering IIA Part 2
Chemical Engineering IIB Part 2
Arts Subject III
Industrial Experience

**Year V**
Chemical Engineering III
Arts Subject I, II or III
Projects II

**BACHELOR OF COMMERCE/BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme has been approved by the two Faculty Boards:

**Year I**
*Chemistry I (As Elective I) | 4
*Mathematics I | 4
Engineering I | 4
Physics I (A or B) | 4
ME121 Workshop Practice | 1

**Year II**
Chemical Engineering I | 6
Chemistry IIA | 5
Mathematics IIB Part 1 | 2
*Microeconomics | 2
One of
*Economic Statistics I | 2
*Economic History I | 2
*Legal Studies I | 2

---

Subject | Units
---|---
**Year II**
Mathematics IIB Part 1 | 5
Chemistry IIA | 5
Chemical Engineering I | 5
Arts Subject I | 5
**Year III**
Mathematics IIB Part 2 | 5
Chemical Engineering IIA Part 1 | 5
Chemical Engineering IIB Part 1 | 5
Arts Subject II | 5
Arts Subject I or II | 5
Industrial Experience | 5
**Year IV**
Chemical Engineering IIA Part 2 | 5
Chemical Engineering IIB Part 2 | 5
Arts Subject III | 5
Industrial Experience | 5
**Year V**
Chemical Engineering III | 5
Arts Subject I, II or III | 5
Projects II | 5
Subject | Units
--- | ---
**Year III**
Chemical Engineering IIA | 7
*Mathematics IIB Part 2 | 2
*Accounting I | 4
*Macroeconomics | 4
--- | ---
**Year IV**
Chemical Engineering IIB | 3
***Economics and Commerce (3) subjects | 12
Elective II | 3
--- | ---
**Year V**
Chemical Engineering III | 5
Project II | 5
**Economics and Commerce (2) subjects | 8
--- | ---

The subjects which count towards the B.Com. degree are those marked * plus six Engineering units chosen from subjects normally taken in 3rd or 4th year of the full-time Engineering programme which may be counted as one Group C subject.

**BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN CHEMICAL ENGINEERING**

The candidate shall complete all requirements for the Bachelor of Engineering in Chemical Engineering and comply with the requirements of the Faculty of Science for the degree of Bachelor of Science with the provision that Engineering I is recognised as a Science Group I subject and Chemical Engineering I as a Science Group II subject (Clause 10a of the Science degree requirements) and that a subject taken for the Science degree may be accepted as Elective III for the Engineering degree.

A typical course structure would be as follows for a candidate majoring in Chemistry:

**Year I**
- Chemistry I
- Engineering I
- Mathematics I
- Physics IA or IB
- ME121 Workshop Practice

**Year II**
- Chemical Engineering I
- Chemistry IIA
- Mathematics IIB

**Year III**
- Chemistry IIIA
- Chemical Engineering IIA Part 1
- Chemical Engineering IIB Part 1
- Industrial Experience

**Year IV**
- Chemical Engineering IIA Part 2
- Chemical Engineering IIB Part 2
- and one of:
  - Chemistry IIB, IIIA, Geology I, Biology I, Physics II* Industrial Experience

**Year V**
- Chemical Engineering III
- Elective III
- Projects II

*Similar programmes can be made to major in Mathematics, Biology or Geology*

*A candidate must have taken Physics IA to enrol for Physics II as the Science subject.*

**ELECTIVE REQUIREMENTS**

**Elective I** Students must take Chemistry I as Elective I.

**Elective II** requires the completion of topics rated at not less than five units selected from the following list. Not less than three units must be selected from Group A.

**Group A**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information</td>
</tr>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information and OR EE204 Introduction to Electrical Energy</td>
</tr>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information OR EE341* EE342 Automatic Control</td>
</tr>
<tr>
<td>CE202</td>
<td>Materials and Structures</td>
</tr>
<tr>
<td>ME241</td>
<td>Properties of Materials</td>
</tr>
<tr>
<td>ME361</td>
<td>Approved topics in Metallurgy (e.g. Materials Science IS)</td>
</tr>
<tr>
<td>ME361</td>
<td>Approved topics in Chemistry IIB, IIIA, IIIB</td>
</tr>
<tr>
<td>Extra topics in Mathematics II or III</td>
<td>to not more than 3 units. OR Extra topics in Mathematics II or III</td>
</tr>
</tbody>
</table>

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53
DESCRIPTION OF SUBJECT ENTRIES

Indicating Numerals  Field of Study
ChE-0-  General
ChE-1-  Chemical Engineering Science
ChE-2-  Unit Operations
ChE-3-  Engineering Practice

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).

541100 Engineering 1
(i) ME111 Graphics1
(ii) ME112 Engineering Drawing and Elementary Design1
(iii) CE111 Statics1
(iv) ChE101 Industrial Process Principles1

541201 ME121 Workshop Practice2

(iv) S11100 ChE101 Industrial Process Principles

Hours  14 hours per week
Examination  One 3-hour paper

Content
The preparation of process flowsheets. Engineering calculations illustrating material and energy balances, together with pressure, temperature and volume conditions involved in physical or chemical changes. Balancing chemical equations and elementary stoichiometry. Phase rule applications, graphical methods. These principles will be illustrated from such processes as water treatment, metallurgical ore smelting and steel production, cement manufacture, combustion and coal and oil, production of tonnage oxygen, ammonia and acids.

1 For the description of ME111, ME112 and CE111 see the appropriate departmental entry.

2 For the description of ME121 see the entry under Department of Mechanical Engineering.
Text

Reference

512200 Chemical Engineering I

Prerequisites Mathematics I and Physics IA or IB

Hours 9 hours per week

Examination Two 3 hour final examinations and term quizzes

Content
Chemical Engineering I consists of the following units:

Part I
(i) & (ii) ChE201/202 Fuels and Processes

Part II
(iii) ChE203 Laboratory
(iv) & (v) ChE211/2 Fluids and Heat
(vi) ChE221 Stage Separation Processes
(vii) ChE231 Design

Part-time students may take the subject in two parts as indicated.

(i) & (ii) ChE201/202 Fuels and Processes

(i) ChE201 Fuels and Combustion

Hours Approx 42 hours

Content
Origin and composition of the major fossil fuels; processing of natural fuels for gaseous and liquid secondary fuels; the technical requirements of a fuel, specification and testing. Behaviour of fuels on pyrolysis; the nature of flame, flame speed and temperature, explosive mixture limits, ignition temperatures; premix and diffusion flames; excess air requirements and losses; the requirements of mixing and reaction time; burner and combustion chamber construction to meet fuel flame and heat transfer requirements. Combustion of solid fuel; grates and gas producers; pulverised fuel. Calculation of quantities; thermal efficiency.

Text Efficient Use of Fuel (H.M.S.O. 1964)

(ii) ChE202 Industrial Chemical Processes and Equipment

Content
Chemical engineering principles of chemical processing, chemical equilibrium and process selection, process equipment and materials of construction. Major chemical industries discussed include: Water and waste water treatment, Coal chemicals, Industrial gases, Ammonia and methanol, Acids and Chloro-Alkali industries, Phosphate fertilisers, Petroleum refining and Petrochemicals.

Text

Reference
Kent Riegels Handbook of Industrial Chemistry (7th ed. Van Nostrand 1973)

(iii) ChE203 Laboratory

Hours 84 hours

Content
A set of experiments covering measurement and character of fluid flow, heat transfer measurements, gas and fuel properties, gas burner characteristics, and measurement of temperature, viscosity, refractive index, etc. This includes a minor project in which the student is expected to take the initiative in designing an experiment.

Introductory lectures on statistical methods and computer use will be given and throughout the assignments, elementary statistical treatment and interpretation of data are required together with an error analysis.

Texts
Anderson, Durston & Thesis and Assignment Writing (Wiley Aust. Poole 1970)
Crow, Davis & Statistics Manual (Dover Press 1972)
Maxfield

(iv) & (v) ChE211/2 Fluids and Heat

Hours Approx 84 hours

Examination To be advised

(iv) ChE211 Fluid Statics and Dynamics

Content
Concept of a fluid, real fluids and ideal fluids, compressible and incompressible flow. The barometric equation, two fluid manometer, continuous decanter. Concept of streamline and streamtube, continuity, energy equation and momentum equation for fluids. Boundary
layer equations for streamline flow. Flow through pipes and fittings, fluid meters.

(v) ChE212 Heat

Content
Conduction of heat; Fourier's equation, steady state unidirectional and uniform radial flow; surface transfer coefficients, extended surfaces. Heat exchangers, mean convection coefficients. Convection transfer, dimensionless numbers and their significance; natural convection. Relationships between mass, momentum and heat transfer. Condensation film theory; effect of surfaces, of non-condensible gases; boiling nucleate and film; condensers and evaporations. The nature and spectral distribution of thermal radiation; optical and total radiation pyrometry, corrections for grey emitters; exchange areas between black surfaces; simple systems with grey and adiabatic surfaces.

Texts

(vi) ChE221 Stage Separation Processes

Hours
Approx. 21 hours

Content
Introduction to the concept of single and multi-stage separation processes. Definition of an ideal equilibrium stage, stage efficiency and introduction to methods for determining the number of ideal stages required for a given separation. Solid liquid extraction will be used to illustrate the above.

Text

References
— *Basic-Plus Language Manual DEC-II-O RBPA-B-D*

(vii) ChE231 Design (Chemical Engineering I)

Hours

Content
Unfined pressure vessels to code design, design of simple structures and piping systems. Elementary instrumentation.
Texts
Scheid, F. Numerical Analysis (McGraw-Hill 1968)

References

(ii) ChE302 Unit Operations Laboratory
Hours Approx. 84 hours

Content
A number of experiments study in depth the principles of lecture topics. Applied statistical techniques are used to obtain the maximum amount of useful information from raw data. Techniques include curve fittings of empirical equations; analysis of variance and error analyses.

Texts
Crow, Davis & Maxfield Statistics Manual (Dover Press 1972)

(iii) ChE311 Thermodynamics
Hours Approx. 42 hours

Content
Thermodynamics applied to the description of the properties of gases and liquids both ideal and non ideal cases; the expansion and compression processes leading to power generation and cryogenics, to solution equilibria leading to phase and chemical reaction equilibria, to the application of reaction equilibria to corrosion and electrolytic solutions.

Text
Balzhiser, Samuels & Eliassen Chemical Engineering Thermodynamics (Prentice-Hall 1974)

(iv) ChE312 Reaction Engineering
Hours Approx. 42 hours

Content
Design and operation of chemical reactors for homogeneous and heterogeneous reacting systems. Elementary reaction kinetics leading to interpretation of experimental data needed to design batch and continuous reactors. Effect of heat of reaction and changes of temperature and pressure on design, use of catalysts and residence time estimation.

Text
Levenspiel, O. Chemical Reaction Engineering (2nd ed. Wiley 1972)

(v) ChE313 Transport Principles
Hours Approx. 42 hours

Content
Heat and mass transfer in unsteady state conditions, transport theory for momentum, heat and mass transfer in laminar and turbulent flow conditions. Boundary layer theory. The course stresses the application of mathematics to the solution of engineering problems. Analogies between heat mass and momentum transfer.

Text
Bird, R. B. et al Transport Phenomena (Wiley 1960)

(vi) ChE321 Continuous Contacting Processes
Hours Approx. 42 hours

Content
Continuous contact separation processes applied to gas-liquid and to humidification gas absorption and stripping, distillation and liquid-liquid processes. A preliminary study of equipment requirements leads to humidification gas absorption and stripping, distillation and liquid.

Text

(vii) ChE322 Particulate Systems
Hours Approx. 42 hours

Content
Definition of size and shape of solid particles, laws of breakage, analytical description of size distributions, matrix description of breakage and classification operations, crushing and grinding equip-
ment, separation of solids; partition curves; pressure and flow of granular material. Drying operations, movement of moisture in solids; drying systems, drying equipment; design methods. Furnace and kiln analysis by heat and mass balance on well-stirred and parallel flow reactors. Size and solids separation in gas or liquids; action of gravitational and centrifugal fields, design and performance of separation and pollution control equipment under these conditions — settling chambers, gas and liquid cyclones, centrifuges; flocculation, hindered settling, sludge thickening; Flow through fixed beds—Fluidisation—Filtration—analytical and design methods. Agitation and mixing scale-up and shape considerations; Evaporation and crystallisation. Dust and gas removal for environmental control.

Text
Coulson, J. M. & Richardson, J. F. Chemical Engineering Vol. II (Pergamon 1970)

References
Kuni & Levenspiel Fluidization Engineering (Wiley 1968)

513200 Chemical Engineering IIB
Prerequisites Chemical Engineering I
Pre- or Corequisite Chemical Engineering IIA
Hours 4½ hours per week
Examination One 3-hour paper and one 8-hour paper

Content
Chemical Engineering IIB consists of the following units:
(i) ChE314 Process Control
(ii) ChE331 Process Economics
(iii) ChE332 Equipment Design — including materials and corrosion

(i) ChE314 Process Control
Prerequisites Nil
Hours Approx. 42 hours

Content
Introduction to process dynamics, the well stirred vessel, treatment of experimental data, Laplace Transform Applications. Block diagram notation, open loop and closed loop systems, the transfer function; application and limitations. Control modes. Stability of closed loop system, elementary root locus., Bode diagram. Feed forward. Control, cascade control with applications to control of temperature, flow pressure and composition. Laboratory exercises.
2. **Process Vessels** — Process and detail design of tray and packed process vessels — design of high and simple storage vessels to relevant codes.

3. **Process Building and Foundations** — Building types for process equipment — brief review of rigid frame analysis — types of foundations — code design procedures for spread footings, matts, massive foundations — piling — design of spread footing for a free standing process vessel.

4. **Power and Process Reticulation** — Design of process piping systems for steam, air, gas and process fluids — trapping and drainage — design of supports and trestles — insulation — introductory piping flexural analysis.

5. **Materials Handling** — Review of relevant theory, design and selection of the following:
   - Process weighing, process storage, conveyor and elevator systems.

6. **Mechanical Drives** — Design and selection of bearings, shafts, pulleys and belt drives, seals and glands etc.

7. **Miscellaneous** — Outline of types, application, design and selection of the following:
   - Electric motors and turbines, ejectors and vacuum systems, process refrigeration systems, i.e., steam jet, absorption, mechanical compression and cascade systems.

**Texts**
- SAA Codes *Unfired Pressure Vessels AS1210 1972*

**References**
To be advised

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**514100 Chemical Engineering III**

**Prerequisites**
- Chemical Engineering IIA and IIB

**Hours**
- 7 ½ hours per week

**Examination**
- Four 3-hour written papers plus progressive assessment.

**Content**

**Chemical Engineering III** consists of:
(i) & (ii) ChE401/432 Projects II
(iii) ChE402 Seminar
(iv) ChE431 Process Engineering

Not less than 6 topics selected from—
- ChE411 Advanced Combustion
- ChE412 Radiant Heat Transfer
- ChE413 Selected topics in Heat and Mass Transfer
- ChE414 Advanced Reaction Engineering
- ChE415 Advanced Transport Theory
- ChE416 Advanced Process Control
- ChE421 Multicomponent Separations
- ChE422 Particle Mechanics
- ChE432 Environmental Control
- ChE433 Process Evaluation and Optimization

(i) & (ii) ChE401/432 Projects II

**Hours**
- Approx. 84 hours

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

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.

**Texts**
To be advised

**References**
To be advised

(iii) ChE402 Seminar

**Hours**
- Approx. 42 hours

**Content**
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.

(iv) ChE431 Process Engineering

**Hours**
- Approx. 42 hours

**Content**
1. **Plant Location** — Factors influencing the location of process plants with particular reference to Australian conditions — Pollution requirements.
2. **Plant Layout** — Outline of requirements, i.e., safety, operation and maintenance D.L.I. regulations — use of models — selected examples in plant layout for process equipment, utilities and instrumentation.
3. **Project Engineering** — Introduction to the organisation and scheduling of a complete chemical plant — project control — tendering and contracting procedures — Critical path techniques — Drawing office practice, Construction and erection procedures — equipment specification.

4. **Safety in Plant Design** — Hazards, plant layout, mechanical design, Ventilation, pressure relieving devices, Relief and blow down systems, Fire fighting.

5. **Plant Reliability** — Introduction to concept of reliability engineering.


7. Engineering responsibilities in environmental and safety control and labour relationships.

**Text**


**509200 Elective II**

**Content**

Five units selected from the following list, at least three of which must be selected from Group A.

<table>
<thead>
<tr>
<th>Group A</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE203</td>
<td>1</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>EE203</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>EE204</td>
<td>3</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>EE341* — EE342 Automatic Control</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>CE202</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>ME241</td>
<td>1</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>EE341* — EE342 Automatic Control</td>
<td>2</td>
</tr>
<tr>
<td>OR</td>
<td></td>
</tr>
<tr>
<td>ME361</td>
<td>1</td>
</tr>
<tr>
<td>OR Approved topics in Chemistry IIIB, IIIA, IIIB to not more than 3 units.</td>
<td></td>
</tr>
<tr>
<td>OR Extra topics in Mathematics II or III to not more than 3 units.</td>
<td></td>
</tr>
</tbody>
</table>

**Group B**

<table>
<thead>
<tr>
<th>ME401 Systems Analysis</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME402 Systems Planning, Organisation &amp; Control</td>
<td>1</td>
</tr>
<tr>
<td>ME487 Operations Research — Deterministic Models</td>
<td>1</td>
</tr>
</tbody>
</table>

509500 **Elective IIA**

**Content**

ELECTIVE IIA consists of 6 units to be taken between Stage 5 and Stage 6 and may include 2 units of advanced topics in Chemical Engineering III for students who wish to specialise in some particular field of Process Engineering. In this case the remaining units of this elective must be selected appropriately by consultation with the Head of the Department of Chemical Engineering.

**509300 Elective III**

**Content**

Elective III is normally a full 1st year level subject or equivalent material taken in breadth and depth. Alternatives to this unit may be made up of 4 units as approved by the Head of Department.

**Note**

Not all units for either Elective II or Elective III necessarily have to be taken in the same year.
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, railroads, 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 or part-time course), Bachelor of Arts/Bachelor of Engineering in Civil Engineering (full-time course), Bachelor of Science/Bachelor of Engineering in Civil Engineering (full-time course) and Bachelor of Commerce/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 student is required to complete at least 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 Sydney to qualify themselves for the degree of Bachelor of Surveying.

The possibility of the whole Bachelor of Surveying degree course being offered at the University of Newcastle is now under review. It is hoped that the third year of the course will be offered for the first time in 1976 or 1977, but confirmation of these plans depends on the approval of the Australian Universities Commission.

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.

SCHEDULE 1.2

BACHELOR OF ENGINEERING IN CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year I</td>
<td></td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IA</td>
<td>4</td>
</tr>
<tr>
<td>Elective I</td>
<td>4</td>
</tr>
<tr>
<td>ME121</td>
<td>3</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>1</td>
</tr>
<tr>
<td>Year II</td>
<td></td>
</tr>
<tr>
<td>CE222</td>
<td>Concrete Technology</td>
</tr>
<tr>
<td>CE231</td>
<td>Fluid Mechanics I</td>
</tr>
<tr>
<td>5Mathematics II B</td>
<td>4</td>
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<tr>
<td>CE221</td>
<td>Properties of Materials I</td>
</tr>
<tr>
<td>CE212</td>
<td>Mechanics of Solids I</td>
</tr>
<tr>
<td>CE241</td>
<td>Surveying</td>
</tr>
<tr>
<td>CE223 J</td>
<td>Engineering Geology</td>
</tr>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information</td>
</tr>
<tr>
<td>EE204</td>
<td>Introduction to Electrical Energy</td>
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</tbody>
</table>

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## Subject and Units

### Year III

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE332</td>
<td>Fluid Mechanics II 2</td>
</tr>
<tr>
<td>GE350</td>
<td>Seminar 1</td>
</tr>
<tr>
<td>CE324</td>
<td>Soil Mechanics 2</td>
</tr>
<tr>
<td>CE313</td>
<td>Structural Analysis and Design I 4</td>
</tr>
<tr>
<td>CE351</td>
<td>Transportation Engineering 1</td>
</tr>
<tr>
<td>CE333</td>
<td>Water Resources Engineering 2</td>
</tr>
<tr>
<td>CE352</td>
<td>Civil Engineering Systems 1</td>
</tr>
<tr>
<td>ME482</td>
<td>Engineering Economics 1</td>
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<tr>
<td>ME301</td>
<td>Engineering Computations 1</td>
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<tr>
<td>ME271</td>
<td>Thermodynamics 1</td>
</tr>
<tr>
<td>OR</td>
<td>1</td>
</tr>
<tr>
<td>ME212</td>
<td>Engineering Design 4</td>
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</tbody>
</table>

### Year IV

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE425</td>
<td>Earth and Rock Engineering 1</td>
</tr>
<tr>
<td>CE452</td>
<td>Engineering Construction 2</td>
</tr>
<tr>
<td>CE414</td>
<td>Structural Analysis and Design II 4</td>
</tr>
<tr>
<td>CE453</td>
<td>Project 2</td>
</tr>
</tbody>
</table>

### Electives 5

1. See Elective Requirements on page 16.
2. Plus 5-day survey camp
3. ME121 Workshop Practice may be taken in Year I or II
4. Mathematics II B may be taken in two parts each of three terms duration.
5. See Year I course details on page 40.

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

### Recommended Programme for the Bachelor of Engineering in Civil Engineering By Part-time Studies

#### Stage 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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<tr>
<td>Engineering I</td>
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<tr>
<td>Mathematics I</td>
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<tr>
<td>ME121 Workshop Practice</td>
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#### Stage 2

<table>
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<td>Physics IA</td>
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<tr>
<td>Elective I</td>
<td>4</td>
</tr>
</tbody>
</table>

1. See Elective Requirements below
2. Plus 5-day survey camp
3. ME121 Workshop Practice must be taken in Stage 1 or 2
4. Any student who is unable to complete Year VI as a full-time student may do so over two part-time years.
Elective Requirements

Elective 1 may consist of any subject or two half subjects of satisfactory level, subject to the approval of the Head of Department and the Head(s) of the Department(s) whose department offers the chosen subject or half subject. However, Chemistry I or Chemistry IS must be taken as an elective subject at some time during the course. If Geology I is taken, the subject CE223J Engineering Geology must be replaced by a one unit subject offered by an Engineering Department.

Other Electives may consist of subject or part subjects offered within the Faculty or by other faculties, subject to the approval of the Heads of the Department of Civil Engineering and of any other department responsible for the subject or part-subject and subject to the following conditions:

(i) at least one of the units must be taken within the Department of Civil Engineering; and

(ii) up to three units of Industrial Experience may be taken as Electives after completion of the First Year of the course or its equivalent. Any student wishing to receive credit for three units must complete the third unit during his final year of enrolment.

For Industrial Experience requirements see under Description of Subjects.

SCHEDULE 3.2

BACHELOR OF SCIENCE (ENGINEERING) IN CIVIL ENGINEERING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
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<tr>
<td><strong>Stage 1</strong></td>
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</tr>
<tr>
<td>Engineering I</td>
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</tr>
<tr>
<td>Mathematics I</td>
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</tr>
<tr>
<td><strong>Total</strong></td>
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<tr>
<td><strong>Stage 2</strong></td>
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</tr>
<tr>
<td>Physics IA</td>
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</tr>
<tr>
<td>Elective I</td>
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<tr>
<td><strong>Total</strong></td>
<td>8</td>
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<tr>
<td><strong>Stage 3</strong></td>
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</tr>
<tr>
<td>Mathematics IIB Part I (Topics C &amp; E)</td>
<td>2</td>
</tr>
<tr>
<td>CE221 Properties of Materials I</td>
<td>3</td>
</tr>
<tr>
<td>CE212 Mechanics of Solids I</td>
<td>2</td>
</tr>
<tr>
<td>CE241 Engineering Geology</td>
<td>1</td>
</tr>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>17</td>
</tr>
</tbody>
</table>

OR any other Departmental Elective subject to satisfaction of prerequisites.

1 See Elective Requirements on page 16.
2 Plus 5-day survey camp
3 Stages 1 and 2 will not be offered after 1974.

BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN CIVIL ENGINEERING

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme is recommended:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year 1</strong></td>
<td></td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IA</td>
<td>4</td>
</tr>
<tr>
<td>Elective I</td>
<td>4</td>
</tr>
<tr>
<td>ME121 Workshop Practice</td>
<td>1</td>
</tr>
</tbody>
</table>

72
### Year II

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts Subject Part I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics IIB</td>
<td>4</td>
</tr>
<tr>
<td>CE221 Properties of Materials I</td>
<td>3</td>
</tr>
<tr>
<td>CE212 Mechanics of Solids I</td>
<td>1</td>
</tr>
<tr>
<td>CE231 Fluid Mechanics I</td>
<td>2</td>
</tr>
<tr>
<td>CE22 Concrete Technology</td>
<td>1</td>
</tr>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1</td>
</tr>
<tr>
<td>EE204 Introduction to Electrical Energy</td>
<td>1</td>
</tr>
</tbody>
</table>

### Year III

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts Subject Part II</td>
<td>5</td>
</tr>
<tr>
<td>Arts Subject Part I or Part II</td>
<td>4&lt;br&gt;4</td>
</tr>
<tr>
<td>CE313 Structural Analysis and Design I</td>
<td>2&lt;br&gt;1</td>
</tr>
<tr>
<td>ME301 Engineering Computations</td>
<td>1</td>
</tr>
<tr>
<td>SOIL MECHANICS</td>
<td>2</td>
</tr>
<tr>
<td>Surveying I</td>
<td>1</td>
</tr>
<tr>
<td>Thermal Energy</td>
<td>1</td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>1</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>1</td>
</tr>
<tr>
<td>Geology I</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics IIA</td>
<td>8</td>
</tr>
<tr>
<td>Mathematics IIIA</td>
<td>16</td>
</tr>
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</table>

### Year IV

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Analysis and Design II</td>
<td>4</td>
</tr>
<tr>
<td>Fluid Mechanics II</td>
<td>2</td>
</tr>
<tr>
<td>Project</td>
<td>2</td>
</tr>
<tr>
<td>Water Resources Engineering</td>
<td>2</td>
</tr>
<tr>
<td>Transportation Engineering</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Construction</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>3</td>
</tr>
<tr>
<td>Electives</td>
<td>16</td>
</tr>
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</table>

### Year V

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Analysis and Design I</td>
<td>4</td>
</tr>
<tr>
<td>Soil Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>Fluid Mechanics II</td>
<td>2</td>
</tr>
<tr>
<td>Surveying I</td>
<td>2</td>
</tr>
<tr>
<td>Water Resources Engineering</td>
<td>2</td>
</tr>
<tr>
<td>Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Computations</td>
<td>1</td>
</tr>
<tr>
<td>Civil Engineering Systems</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Economics</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Design</td>
<td>1</td>
</tr>
<tr>
<td>Thermodynamics</td>
<td>17</td>
</tr>
</tbody>
</table>

If an Arts subject Part II is taken in Year IV, a unit from Year V may be transferred to Year IV.

1. Select 3 units from:
   - CE425 Earth and Rock Engineering (1)
   - CE352 Civil Engineering Systems
   - ME482 Engineering Economics (1)
   - AND the list of Departmental Electives.

2. Plus 5-day survey camp

3. Mathematics IIB may be taken in two parts each of three terms duration.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE414</td>
<td>Structural Analysis and Design II</td>
</tr>
<tr>
<td>CE452</td>
<td>Engineering Construction</td>
</tr>
<tr>
<td>CE351</td>
<td>Transportation Engineering</td>
</tr>
<tr>
<td>CE425</td>
<td>Earth and Rock Engineering</td>
</tr>
<tr>
<td>CE453</td>
<td>Project</td>
</tr>
<tr>
<td>1Electives</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
</tr>
</tbody>
</table>

1 See Elective Requirements on page 16.
2 Plus 5-day survey camp

**BACHELOR OF COMMERCE/BACHELOR OF ENGINEERING IN CIVIL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme has been approved by the two Faculty Boards:

**Year I**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Engineering</td>
<td>4</td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>Workshop Practice</td>
<td>1</td>
</tr>
<tr>
<td>Microeconomics</td>
<td>2</td>
</tr>
<tr>
<td>Economics History I</td>
<td>2</td>
</tr>
<tr>
<td>Legal Studies I</td>
<td>1</td>
</tr>
<tr>
<td>Economic Statistics I</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>17</td>
</tr>
</tbody>
</table>

**Year II**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics IIB</td>
<td>4</td>
</tr>
<tr>
<td>Chemistry IS</td>
<td>2</td>
</tr>
<tr>
<td>CE221</td>
<td>Properties of Materials I</td>
</tr>
<tr>
<td>CE212</td>
<td>Mechanics of Solids I</td>
</tr>
<tr>
<td>CE231</td>
<td>Fluid Mechanics I</td>
</tr>
<tr>
<td>Accounting I</td>
<td>4</td>
</tr>
<tr>
<td>1Microeconomics</td>
<td>4</td>
</tr>
<tr>
<td>Total</td>
<td>18</td>
</tr>
</tbody>
</table>

1. Subjects marked 1 are counted towards the thirteen subjects required for the B.Com degree.
2. The basic B.E. (Civil) course is modified as follows:
   (a) The combination, Economics IE — Economics History I (i.e., Economics I see Engineering Handbook p. 40) replaces Elective I in 1st year.
   (b) The following subjects are deleted from the B.E. course:
       GE250 Seminar
       ME482 Engineering Economics
   (c) The 5 units of Electives in final year are replaced by one departmental elective plus two Economics & Commerce subjects.

3 Plus 5 day survey camp
### BACHELOR OF SURVEYING

#### Full-time Course

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year I</td>
<td></td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Engineering I</td>
<td>4</td>
</tr>
<tr>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>CE161</td>
<td>4</td>
</tr>
<tr>
<td>Land Surveying</td>
<td>4</td>
</tr>
<tr>
<td>Year II</td>
<td></td>
</tr>
<tr>
<td>CE261</td>
<td>Surveying Computations</td>
</tr>
<tr>
<td>Mathematics IIB</td>
<td>4</td>
</tr>
<tr>
<td>Town Planning A</td>
<td>1</td>
</tr>
<tr>
<td>GE350</td>
<td>Seminar</td>
</tr>
<tr>
<td>CE201</td>
<td>Engineering for Surveyors</td>
</tr>
<tr>
<td>CE262</td>
<td>Land Surveying II</td>
</tr>
<tr>
<td>EE203</td>
<td>*Introduction to Electrical Information</td>
</tr>
<tr>
<td>EE322</td>
<td>**Electronics</td>
</tr>
</tbody>
</table>

**University of New South Wales Subjects**

| Stage 1 | Mathematics I | 4 |
|         | Engineering I | 4 |
|         | Geodesy I | 6 |
|         | Astronomy I | 3 |
|         | Photogrammetry I | 6 |
|         | Land Studies I | 2 |
|         | Land Studies Project | 3 |

**Semester 5**

- 8.712 Engineering for Surveyors | 3
- 29.103 Surveying III | 7
- 29.152 Surveying Computations | 3
- 29.612 Land Studies II | 5
- 36.411 Town Planning | 3
- 21

**Semester 6**

- 29.211 Geodesy I | 6
- 29.311 Astronomy I | 3
- 29.511 Photogrammetry I | 6
- 29.612 Land Studies III | 2
- 29.614 Land Studies Project | 3
- 20

**Semester 7**

- 29.193 Professional Training | 5 months
- 29.194 Survey Camp | 4 weeks field
- 2 weeks office

#### Semester 8

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>29.212</td>
<td>Geodesy II</td>
</tr>
<tr>
<td>29.312</td>
<td>Astronomy II</td>
</tr>
<tr>
<td>29.512</td>
<td>Photogrammetry II</td>
</tr>
<tr>
<td></td>
<td>Business Management</td>
</tr>
<tr>
<td></td>
<td>General Studies</td>
</tr>
<tr>
<td></td>
<td>Electives (2)</td>
</tr>
</tbody>
</table>

**First half year**

**Second half year**

1 Electives chosen from

- 29.213 Geodesy III | 3
- 29.313 Astronomy III | 3
- 29.513 Photogrammetry III | 3
- 29.615 Land Studies | 3
- 29.173 Project | 3
- Plus 5-day survey camp

Mathematics IIB may be taken in two parts each of three terms duration.

### BACHELOR OF SURVEYING

#### Part-time Course

| Stage 1 | Mathematics I | 4 |
|         | Engineering I | 4 |
|         | Geodesy I | 6 |
|         | Astronomy I | 3 |
|         | Photogrammetry I | 6 |
|         | Land Studies I | 2 |
|         | Land Studies Project | 3 |

**Stage 2**

- Physics I | 8
- GE350 | Seminar | 1
- CE201 | Engineering for Surveyors | 2
- CE262 | Land Surveying II | 3
- EE203 | *Introduction to Electrical Information | 1
- EE322 | **Electronics | 1

- 7
Year III and Year IV of the University of New South Wales course is as indicated under the full-time course.

* First half year
** Second half year
  1 Plus five-day survey camp
  2 Mathematics IIB may be taken in two parts each of three terms duration.

DESCRIPTION OF SUBJECT ENTRIES

The subjects offered in the Faculty of Engineering course outlines may be varied from time to time both in content and hours.

Each subject has an identification number with prefixed letters indicating the Department responsible for the subject, 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 subject 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 subject is a joint offering of more than one department.

The hours shown for each subject 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 1½ 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.

_Indicating Numerals_  
- CE-0-  
  - CE-1-  
  - CE-2-  
  - CE-3-  
  - CE-4-  
  - CE-5-  
  - CE-6-  

_Indicating Numerals_  
- Field of Study  
  - CE-0- Service Courses  
  - CE-1- Structures  
  - CE-2- Materials  
  - CE-3- Fluid Mechanics, Water Resources  
  - CE-4- Surveying — general courses  
  - CE-5- Civil Engineering practice  
  - CE-6- Surveying — Specialist courses

_521101 CE111 Statics_  

**Prerequisites** Nil  

**Hours** One lecture hour and one ½ hour tutorial per week.  

**Examination** One 3-hour paper  

**Content**  
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, cables under distributed loads.

**Text**  
Hall, A. S. & Archer, F.  
Principles of Statics (University of New South Wales, Student's Union)

**References**  
Beer & Johnston  
Mechanics for Engineers Statics (2nd ed. McGraw-Hill)

Meriam, J. L.  
Statics (Wiley 1966)

_521100 CE161 Land Surveying I_  

**Prerequisites** Nil  

**Hours**  
2½ lecture hours, 2 tutorial hours and 1½ hours of fieldwork per week. Survey camp of 42 hours.

**Examination** Two 3-hour papers  

**Content**  
Basic measurement techniques and instruments, levelling, traversing, plane table, tacheometry; contours, areas, volumes, route surveys and associated calculations; hydrographic and underground surveys; introduction to photogrammetry; controlling and setting out small engineering projects. Cartographic drawing and instruments. Historical review of surveying methods and instruments.

**Texts**  
Bannister, A. & Raymond, S.  
Surveying (Pitman 1959)

- Seven-Figure Mathematical Tables (W. & R. Chambers 1958)

**References**  
Definitions of Terms used in Geodetic and other Surveys (U.S. Coast and Geodetic Survey Sp. Pub. 1948)

Clark, D.  

Whyte, W. S.  
Basic Metric Surveying (Butterworths 1969)
522402 CE201 Engineering for Surveyors

**Prerequisites**  
Engineering I

**Hours**  
2 lecture hours and one tutorial hour per week

**Examination**  
Progressive assessment only

**Content**  
Materials, structures and design of instruments. Aspects of hydraulics, hydrology and soil mechanics.

**References**  

522901 CE202 Materials and Structures

**Prerequisites**  
Engineering I and Maths I

**Corequisites**  
Engineering I and Maths I

**Hours**  
2 lecture hours and one tutorial and laboratory hour per week

**Examination**  
One 3-hour paper in two parts

**Content**  
Uniaxial loading, states of stress and strain; stress and strain relations; 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.

**Text**  

Van Vlack, L. H. *Elements of Materials Science* (Addison-Wesley 1964)

522102 CE212 Mechanics of Solids I

**Prerequisites**  
Engineering I and Maths I

**Hours**  
1½ lecture hours and one ½ tutorial hour per week

**Examination**  
One 3-hour paper

**Content**  
Uniaxial loading, states of stress and strain; stress and strain relations; internal forces, internal stresses; deflexion of beams, torsion, buckling.

**Text**  

522101 CE221 Properties of Materials I

**Prerequisites**  
Engineering I

**Hours**  
1½ lecture hours and one tutorial hour per week

**Examination**  
One 3-hour paper

**Content**  

**Suggested Preliminary Reading**  

**Text**  
References
Davis, H. E., Troxell, G. E. & Wiskocil, C. J.  
McClintock, F. A. & Argon, A. S.  
Richards, C. W.

Mechanical Behaviour of Materials (Addison-Wesley 1966)  
Engineering Material Science (Chapman-Hall 1961)

522103 CE222 Concrete Technology †
Hours 1½ lecture hours and 1½ laboratory hours per week
Examination One 3-hour paper
Content Materials in concrete; concrete mix design; properties of hardened and plastic concrete, manufacturing and field control; special concretes; lectures and laboratory work.

Suggested Preliminary Reading

Texts
Neville, A. M. Properties of Concrete (Pitman)  

References
Lea, F. M. & Desch, C. H. The Chemistry of Cement and Concrete (Arnold)  
Taylor, W. H. Concrete Technology and Practice (Angus & Robertson)

SAA Code—AS1141—Methods for Sampling and Testing Aggregates (Standards Association of Australia)

SAA Code—AS1465—Dense Natural Aggregates for Concrete (Standards Association of Australia)

522201 CE241 Surveying †
Prerequisites Engineering I and Mathematics I

Part I of this subject may be taken as a one unit elective in the Department of Mechanical Engineering.

84
Hours
1½ lecture-hours, one ½ hours tutorial and 1 hour of fieldwork per week. Survey camp of 42 hours.

Examination
One 3-hour paper

Content
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.

Texts
Bannister, A. & Raymond, S. Surveying (Pitman)

References
Barry, B. A. Construction Measurements (Wiley)
Clark, D. Plane and Geodetic Surveying Vol. I (Plane Surveying) (Constable)

522401 CE261 Surveying Computations I
Prerequisites
CE161

Hours
1½ lecture hours and 1½ tutorial hours per week

Examination
Progressive assessment only

Content

Texts
— Chamber's Seven Figure Mathematical Tables (Chambers 1958)
— Tables of Natural Sines etc. to every 10 seconds (D.M.R. 1949)

OR
— Natural Trigonometric Tables, Six Figures (Government Printer, Pretoria)

Reference
Richardus, P. Project Surveying (North Holland 1966)

522403 CE262 Land Surveying II
Prerequisites
CE161

Corequisites
CE261

Hours
2½ lecture hours, 1 tutorial hour and one hour of fieldwork per week. Survey camp of 42 hours

Examination
Two 3-hour papers

Content
Control Surveys: plane triangulation with ten-second theodolites, precise traversing; contour surveys, including optical distance measurement; calculations of areas and volumes; calculating and setting out curves. Barometric and trigonometrical levelling. Hydrographic surveying. Introduction to use of one-second theodolites.

Texts
Bannister, A. & Raymond, S. Surveying (Pitman 1959)

References
Cooper, M. A. R. Modern Theodolites and Levels (Crosby Lockwood 1971)
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)

523304 CE303 Structural Design
Prerequisites
CE212 and ME241

Hours
2 lecture hours and one tutorial hour per week

Examination
Progressive assessment only

Content
Design of steel and reinforced concrete structures for students not following the Civil Engineering course.
Texts: As for CE313 (Design)

References: As for CE313 (Design)

523101 CE313 Structural Analysis and Design I

Prerequisites: CE212 & CE221

Hours: 4 lecture hours and 2 tutorial hours per week

Examination: One 3-hour paper (Analysis)

Content:
Analysis of elastic statically determinate and indeterminate systems by classical methods; plastic analysis; basic design of steel and reinforced concrete structures.

Texts

Analysis
B.H.P.—A.I.S. Hot Rolled Carbon Steel Sections and Plates (B.H.P. Co. Ltd.)
Bresler, B., Lin, T. Y. & Scalzi, J. B. Design of Steel Structures (Wiley)
OR
McGuire, W. Steel Structures (Prentice-Hall)
OR
Gorenc, B. E. & Tinyou, R. Steel Designer's Handbook (N.S.W. University Press)
Ferguson, P. M. Reinforced Concrete Fundamentals (3rd ed. Wiley)
Trahair, N. S. Design Course — Pt. I Design of Beams and Columns
— Pt II Design of Tension members — Plastic Design (A.I.S.C.)
— S.A.A. Code for Concrete Buildings A.S. 1480 — 1973 (Standards Association of Australia)

References

Analysis
Baker & Heyman, J.
Coates, R. C., Coutie, M. G. & Kong, F. K.
Horne, M. R.
Norris, C. H. & Wilber, J. B.

Design
Gray, C. S.
Sachs, P.

Steel Designer's Manual (Lockwood)
Wind Forces in Engineering (Pergamon)
Engineering Drawing Practice — A.S.C.A. A1 1966 (Standards Association of Australia)

*Engineering Drawing Practice A.S.C. A1 1966 (Imperial Units)

AS1100, Parts 3, 4, 5, 6, 7 & 9 (Metric Drawing Standard)

S.A.A. Code for High Strength Bolts — AS1511 — 1973 (Standards Association of Australia)


523105 CE313A Structural Analysis I (Topic in Civil Engineering II in the Faculty of Mathematics)

Prerequisites: CE212 and Mathematics I

Hours: 2 lecture hours and one tutorial hour per week

* Due to conversion to S.I. Units, codes will be confirmed by the lecturer concerned.
Examination
One 3-hour paper

Content
Analysis component of CE313
Analysis of elastic statically determinate and indeterminate systems by classical methods; plastic analysis.

Text & References
As for CE313 (Analysis Component)

523102 CE324 Soil Mechanics †

Prerequisites
CE212

Pre- or Corequisite
CE332

Hours
1½ lecture hours and 1½ laboratory hours per week

Examination
One 3-hour paper

Content
Index properties, classification of soils; permeability, capillarity, seepage and flow nets; stresses in soils; settlement and consolidation; compaction, shear strength and failure criteria; stability of retaining walls.

Texts
Lambe, T. W. Soil Testing for Engineers (Wiley)
— Methods of Testing Soils for Engineering Purposes A.S. A89 (Standards Association of Australia)

523301 CE332 Fluid Mechanics II

Prerequisites
CE231

Hours
2 lecture-hours and one hour tutorial and laboratory per week

Examination
One 3-hour paper

Content
Similitude; flow nets, boundary layers; closed conduit flow; pipe networks; unsteady flow; waterhammer, hydraulic machinery, open channel hydraulics, backwater curves.

† Part I of this subject may be taken as a one unit elective in the Department of Mechanical Engineering.

523104 CE333 Water Resources Engineering

Hours
2 lecture hours and one tutorial hour per week

Examination
One 3-hour paper

Content

Texts
— Australian Rainfall and Runoff (Institution of Engineers, Australia, Stormwater Standards Committee)
Tebbutt, T. H. Y. Principles of Water Quality Control (Pergamon 1971)

References
Chow, V. T. Handbook of Applied Hydrology (McGraw-Hill)

Preliminary Reading
Rouse, H. & Ince, S. History of Hydraulics (Dover 1963)

Texts
Henderson, F. M. Open Channel Flow (Collier-Macmillan 1966)
Olson, R. M. Engineering Fluid Mechanics (3rd ed. Tutext 1973)

References
Davis, C. V. & Sorensen Applied Hydraulics in Engineering (Ronald Press 1963)
Rouse, H. Engineering Hydraulics (Wiley 1951)
Streeter, V. Handbook of Fluid Dynamics (McGraw-Hill 1961)
Vallentine, H. R. Applied Hydrodynamics (Butterworths)
52300 CE40 Surveying for Architects

Hours 1 ½ lecture hours, one ½ hour tutorial and one hour of fieldwork

Examination One 3-hour paper

Content
Introduction; linear measurements and corrections; chain surveying; levelling and booking; contours; the theodolite and its use in measuring angles; traversing; plane table methods of surveying; tacheometry.

Reference
Bannister, A. & Raymond, S.
Surveying (Pitman)

523202 GE350 Seminar

Hours 2 seminar hours per week for 21 weeks

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

523106 CE352 Civil Engineering Systems

Hours One lecture hour and one half hour tutorial per week

Examination Two ½-hour term papers and one 3-hour final paper

Content
General introduction to the systems approach. Techniques available as aids to the identification of optimal policies—mathematical modelling, computer simulation, computer mapping, various mathematical programming techniques, heuristics. Choice of Techniques, problem formulation. Examples applications of the systems approach to civil engineering problems.

Text
Woodhead, P. W. & Wortman, R. H.

References
Baumol, W. J. Economic Theory and Operations Analysis (Prentice-Hall)
de Nenfville, R. & Stafford, J. H. Systems Analysis for Engineers and Managers (McGraw-Hill)
Wagner, H. M. Principles of Operations Research (Prentice-Hall)

524101 CE414 Structural Analysis and Design II

Prerequisite CE313 and Mathematics IIB

Hours 31 lecture-hours and 21 tutorial hours per week

Examination One 3-hour paper

Content
524104 CE414B Structural Design II
Prerequisites 
CE313
Hours 
1½ lecture hours and 1½ tutorial hours per week
Examination 
Progressive assessment only
Content
Design component of CE414.

Text

AS1481 — 1974 — SAA Prestressed Concrete Code (Standards Association of Australia)

References
Bresler, B., Lin, T. Y. & Scalzi, J. B.
Coates, R. C., Coutie, M. G. & Kong, F. K.
Horne, M. R. & Merchant, W.
Lin, T. Y.
Livesley, R. K.
Martin, H. C.
Norris, C. H. & Wilbur, J. B.

524103 CE414A Structural Analysis II
Prerequisites 
CE313 and Mathematics IIB
Hours 
1½ lecture-hours and 1½ tutorial hours per week
Examination 
One 3-hour paper
Content
Analysis component of CE414.

References
Coates, R. C., Coutie, M. G. & Kong, F. K.
Horne, M. R. & Merchant, W.
Livesley, R. K.
Martin, H. C.
Norris, C. H. & Wilbur, J. B.

524403 CE425 Earth and Rock Engineering
Prerequisites 
CE324
Hours 
One lecture hour and ½ hour tutorial per week
Examination 
One 3-hour paper
Content
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.

References
Lambe, T. W. & Whitman, R. V.
Terzaghi, K. & Peck, R. B.

524102 CE452 Engineering Construction
Hours 
2 lecture hours and one tutorial hour per week
Examination 
One 3-hour paper
Content
Management: Construction company failures and the need for efficient management; principles of management, management functions and techniques; nature and type of organisations structure.
Administration: Costing; estimating; engineering contracts; drawings and specifications; tendering.
DEPARTMENT OF ELECTRICAL ENGINEERING

Electrical Engineering is a rapidly expanding branch of engineering. It includes such fields as computer and information science, switching theory, 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, computers, electronics or communication 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.

Preparation of Programme

Each student will be assigned an academic advisor from among the teaching staff. The student is expected to arrange his own programme 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.

All choices in the various degree programmes are to be made according to prerequisite and corequisite requirements and timetable restrictions. Complete lists of pre- and corequisites appear in the description of individual subjects. Subjects offered in the first half year are indicated by *, in the second half year by **, and for the full year by ***.

Definition of Units

Individual subjects 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.
## Course Outlines

### Classifications

(a) Classifying subjects are shown below (where EE400 indicates any fourth year Electrical Engineering subject).

(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.

<table>
<thead>
<tr>
<th>Year/Stage</th>
<th>B.E. IN ELECTRICAL ENGINEERING</th>
<th>B.Sc./B.E.</th>
<th>B.Sc.(Eng.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physics IA</td>
<td>Maths I</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EE231</td>
<td>EE231</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>EE311</td>
<td>EE311</td>
<td></td>
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<tr>
<td>4</td>
<td>EE480/491</td>
<td>EE480/491</td>
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<td>Group III</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part III</td>
<td>Science</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subject</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
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</tr>
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<td>7</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Year I/II</th>
<th>B.E. IN COMPUTER ENGINEERING</th>
<th>B.Sc./B.E.</th>
<th>B.Sc.(Eng.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Physics IA</td>
<td>Maths I</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EE231</td>
<td>EE231</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>EE311</td>
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</tr>
<tr>
<td>4</td>
<td>EE480/491</td>
<td>EE480/491</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Arts Subject</td>
<td>Group III</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Part III</td>
<td>Science</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Subject</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>EE400</td>
<td></td>
</tr>
<tr>
<td>7</td>
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### SCHEDULE 1.3

#### BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
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</thead>
<tbody>
<tr>
<td>Year I</td>
<td></td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4***</td>
</tr>
<tr>
<td>Engineering I</td>
<td>4***</td>
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<tr>
<td>Physics IA</td>
<td>4***</td>
</tr>
<tr>
<td>EE231 Workshop Practice</td>
<td>4***</td>
</tr>
<tr>
<td>ME121 Workshop Practice</td>
<td>1***</td>
</tr>
<tr>
<td>Year II</td>
<td></td>
</tr>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1*</td>
</tr>
<tr>
<td>EE204 Introduction to Electrical Energy</td>
<td>1**</td>
</tr>
<tr>
<td>EE231 Electrical Circuits</td>
<td>1***</td>
</tr>
<tr>
<td>EE311 Mathematics II B (Topics C, D, E, H)</td>
<td>4***</td>
</tr>
<tr>
<td>PH221 Electromagnetics &amp; Quantum Mechanics</td>
<td>2***</td>
</tr>
<tr>
<td>Chemistry IS</td>
<td>2***</td>
</tr>
<tr>
<td>EE341 Electives</td>
<td>4***</td>
</tr>
<tr>
<td>Year III</td>
<td></td>
</tr>
<tr>
<td>GE350 Seminar</td>
<td>1***</td>
</tr>
<tr>
<td>EE311 Electrical Machinery</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 Automatic Control</td>
<td>1*</td>
</tr>
<tr>
<td>EE361 Computer Structure-Circuit &amp;</td>
<td>1*</td>
</tr>
<tr>
<td>Assembly Languages</td>
<td></td>
</tr>
<tr>
<td>Five of EE300 or EE400</td>
<td>5***</td>
</tr>
<tr>
<td>EE Electives</td>
<td>4***</td>
</tr>
<tr>
<td>Year IV</td>
<td></td>
</tr>
<tr>
<td>Seven of EE300 or EE400 or EE500</td>
<td>7</td>
</tr>
<tr>
<td>EE480/491 Project/Seminar</td>
<td>4</td>
</tr>
<tr>
<td>EE Electives</td>
<td>4</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. Each student should hand in a report concerning his practical experience to the department secretary during the first term but not later than the last week of the term.

* First half year
** Second half year
*** Full year

1 See Elective Requirements on page 109.
2 The completion of this unit may be delayed to second year if desired.
3 Mathematics II B may be taken in two parts each of three terms duration.
4 See Year I course details on page 40.

Recommended Programme for the Bachelor of Engineering in Electrical Engineering by Part-time study

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics I</td>
<td>4***</td>
</tr>
<tr>
<td>Engineering I</td>
<td>4***</td>
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<table>
<thead>
<tr>
<th>Stage 2</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics I A</td>
<td>4***</td>
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<tr>
<td>Mathematics II B</td>
<td>4***</td>
</tr>
<tr>
<td>Elective (Industrial experience)</td>
<td>1***</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 3</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1*</td>
</tr>
<tr>
<td>EE204 Introduction to Electrical Energy</td>
<td>1**</td>
</tr>
<tr>
<td>EE231 Electrical Circuits</td>
<td>1**</td>
</tr>
<tr>
<td>Chemistry IS</td>
<td>2***</td>
</tr>
<tr>
<td>PH221 Electromagnetic &amp; Quantum Mechanics</td>
<td>2***</td>
</tr>
<tr>
<td>Elective</td>
<td>1***</td>
</tr>
<tr>
<td>Elective (Industrial experience)</td>
<td>1***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 4</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>GE350 Seminar</td>
<td>1***</td>
</tr>
<tr>
<td>EE311 Electrical Machinery</td>
<td>1*</td>
</tr>
<tr>
<td>EE331 Circuits</td>
<td>1*</td>
</tr>
<tr>
<td>One of EE300 or EE400</td>
<td>1**</td>
</tr>
<tr>
<td>Elective</td>
<td>5***</td>
</tr>
<tr>
<td>Elective (Industrial experience)</td>
<td>1***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 5</th>
<th>Subject Units</th>
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<tbody>
<tr>
<td>EE321 Electronics</td>
<td>1*</td>
</tr>
<tr>
<td>EE341 Automatic Control</td>
<td>1*</td>
</tr>
<tr>
<td>EE361 Computer Structure: Machine and Assembly Languages</td>
<td>1*</td>
</tr>
<tr>
<td>Five of EE300 or EE400</td>
<td>5***</td>
</tr>
<tr>
<td>Elective (Industrial experience)</td>
<td>1***</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year VI Full Time 2</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Six of EE300 or EE400</td>
<td>6***</td>
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<tr>
<td>Elective</td>
<td>6***</td>
</tr>
<tr>
<td>EE480/491 Project/Seminar</td>
<td>4***</td>
</tr>
</tbody>
</table>

1 See Elective Requirements on page 109.
2 The timetable for Year VI is prepared on the basis that the student will attend the course full time. Any student who is unable to complete Year VI as a full time student may do so over two part time years.
3 Mathematics II B may be taken in two parts each of three terms duration.
4 ME121 Workshop practice must be taken in Stage 1 or 2.

SCHEDULE 3.3

BACHELOR OF SCIENCE (ENGINEERING) IN ELECTRICAL ENGINEERING

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Subject Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics I</td>
<td>4***</td>
</tr>
<tr>
<td>Engineering I</td>
<td>4***</td>
</tr>
</tbody>
</table>
## Bachelor of Engineering in Computer Engineering

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Stage 2</strong></td>
<td></td>
</tr>
<tr>
<td>Physics IA</td>
<td>4***</td>
</tr>
<tr>
<td>Mathematics IIB (Topics C, D, E, &amp; H)</td>
<td>4***</td>
</tr>
<tr>
<td>ME121 Workshop Practice</td>
<td>1***</td>
</tr>
<tr>
<td><strong>Stage 3</strong></td>
<td></td>
</tr>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1*</td>
</tr>
<tr>
<td>EE204 Introduction to Electrical Energy</td>
<td>1**</td>
</tr>
<tr>
<td>EE231 Electrical Circuits</td>
<td>1**</td>
</tr>
<tr>
<td>PH221 Electromagnetics and Quantum Mechanics</td>
<td>2***</td>
</tr>
<tr>
<td>Mathematics IIB (Topics C, D, E, &amp; H)</td>
<td>2***</td>
</tr>
<tr>
<td>Electives</td>
<td>1***</td>
</tr>
<tr>
<td><strong>Stage 4</strong></td>
<td></td>
</tr>
<tr>
<td>EE321 Electronics</td>
<td>1*</td>
</tr>
<tr>
<td>EE331 Circuits</td>
<td>1*</td>
</tr>
<tr>
<td>EE361 Computer Structure</td>
<td>1*</td>
</tr>
<tr>
<td>Two of EE300</td>
<td>2**</td>
</tr>
<tr>
<td>Electives</td>
<td>3***</td>
</tr>
<tr>
<td><strong>Stage 5</strong></td>
<td></td>
</tr>
<tr>
<td>EE311 Electrical Machines</td>
<td>1*</td>
</tr>
<tr>
<td>EE341 Automatic Control</td>
<td>1*</td>
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<tr>
<td>Two of EE300</td>
<td>2</td>
</tr>
<tr>
<td>Electives</td>
<td>4***</td>
</tr>
<tr>
<td><strong>Stage 6</strong></td>
<td></td>
</tr>
<tr>
<td>GE350 Seminar</td>
<td>1***</td>
</tr>
<tr>
<td>Four of EE400 or EE500</td>
<td>4***</td>
</tr>
<tr>
<td>Electives</td>
<td>4***</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.

* First half year
** Second half year
*** Full year

---

1. See Elective Requirements on page 109.
2. The completion of this unit may be delayed to Stage 3 if desired.
3. Mathematics IIB may be taken in two parts each of three terms duration.
4. Stages 1 and 2 are not offered.

**SCHEDULE 1.7**

### Bachelor of Engineering in Computer Engineering

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year I</strong></td>
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<tr>
<td>Engineering I</td>
<td>4***</td>
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<tr>
<td>Mathematics I</td>
<td>4***</td>
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<tr>
<td>Physics IA</td>
<td>4***</td>
</tr>
<tr>
<td>Electives</td>
<td>4***</td>
</tr>
<tr>
<td>ME121 Workshop Practice</td>
<td></td>
</tr>
<tr>
<td><strong>Year II</strong></td>
<td></td>
</tr>
<tr>
<td>EE203 Introduction to Electrical Information</td>
<td>1*</td>
</tr>
<tr>
<td>EE204 Introduction to Electrical Energy</td>
<td>1**</td>
</tr>
<tr>
<td>EE231 Electrical Circuits</td>
<td>1**</td>
</tr>
<tr>
<td>Mathematics IIB (Topics C, D, E, &amp; H)</td>
<td>4***</td>
</tr>
<tr>
<td>PH221 Electromagnetics and Quantum Mechanics</td>
<td>2***</td>
</tr>
<tr>
<td>Chemistry I</td>
<td>2***</td>
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<td>5***</td>
</tr>
<tr>
<td><strong>Year III</strong></td>
<td></td>
</tr>
<tr>
<td>EE321 Electronics</td>
<td>1*</td>
</tr>
<tr>
<td>EE331 Circuits</td>
<td>1*</td>
</tr>
<tr>
<td>EE341 Automatic Control (inc. Analog computers)</td>
<td>1*</td>
</tr>
<tr>
<td>EE361 Computer Structure: Machine &amp; Assembly Languages</td>
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</tr>
<tr>
<td>EE322 Electronics</td>
<td>1**</td>
</tr>
<tr>
<td>EE323L Electronics Laboratory</td>
<td>1**</td>
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<tr>
<td>EE362 Logical Design &amp; Switching Theory</td>
<td>1**</td>
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<tr>
<td>One of EE300 subjects</td>
<td>1**</td>
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<tr>
<td>Programming &amp; Algorithms</td>
<td>1*</td>
</tr>
<tr>
<td>Data Structures &amp; Programming</td>
<td>1**</td>
</tr>
<tr>
<td>GE350 Seminar</td>
<td>1***</td>
</tr>
<tr>
<td>Electives</td>
<td>4***</td>
</tr>
</tbody>
</table>

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105
Subject | Units
--- | ---
**Year IV**
EE463 | Computer Operating Systems 1*
EE464 | Compilers, Assemblers and Interpreters 1**
EE425 | Digital Electronics 1**
EE480/491 | Four subjects from List 1 4***
Project/Seminar | 4***
Electives | 4***
Electives | 15

During the course each full time student should complete period 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 departmental secretary during the first term but not later than the last week of the term.

* First half year
** Second half year
*** Full year

1. See Elective Requirements on page 109.
2. Mathematics IIB may be taken in two parts each of three terms duration.

**LIST 1: FOURTH YEAR SUBJECTS FOR COMPUTER ENGINEERING**

<table>
<thead>
<tr>
<th>Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE421</td>
</tr>
<tr>
<td>EE423L</td>
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<tr>
<td>EE441</td>
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<td>EE442</td>
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<td>EE443</td>
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<td>ME581G</td>
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<tr>
<td>Commerce</td>
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<tr>
<td>Mathematics III</td>
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<tr>
<td>Mathematical Logic (Topic O)</td>
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<td>Numerical Analysis (Topic Z)</td>
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<td>Topics in Finite Mathematics</td>
</tr>
<tr>
<td>Mathematics IV</td>
</tr>
<tr>
<td>Graph Theory</td>
</tr>
</tbody>
</table>

**BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING**

In addition to the requirements for the B.E. with the relevant elective requirements selections as shown in Appendix A, the combined degree student is required to undertake one year in the relevant non engineering faculty. This year may be taken after completion of the third or the fourth year of a B.E. programme. For some, there may be advantages for taking this year after completing the four year B.E. requirements but before taking out a B.E. degree.

**Additional year for B.A./B.E. (16 units)**
Art subject Part III
Arts subject Part I or II or III
Arts Part II

**BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING**

The candidate shall complete all requirements for the degrees of Bachelor of Science and Bachelor of Engineering in Electrical Engineering by completing a combined course approved by the Faculty Boards of the Faculties of Engineering and Science, provided that the Deans of both Faculties certify that the work in the combined degree is no less in quantity and quality than if the two degrees were taken separately.

Admission to the combined course shall normally be at the end of the first year and shall be subject to the approval of the Deans of the two Faculties concerned.

**BACHELOR OF COMMERCE/BACHELOR OF ENGINEERING IN ELECTRICAL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme has been approved by the two Faculty Boards:
### Elective Requirements

**B.E. IN ELECTRICAL AND COMPUTER ENGINEERING**

For the B.E. degrees in Electrical and Computer Engineering, the 16 units of electives shall be chosen in accordance with the following rules.

1. Eight elective units must be taken in the Faculty of Engineering, at least two must be from outside the Department of Electrical Engineering and at least two from within the Department.

2. Eight elective units must be taken outside the Faculty of Engineering, and must include one first-year Arts subject or the equivalent in a non-technical area. The latter will be counted as four elective units.

3. If a student elects to do a subject at one level which is required at a later level, the later requirement is to be replaced with elective units.

4. A first-year subject in another faculty taken as an elective is normally equivalent to four units. Half a first-year subject in these Faculties is normally equivalent to two units.

5. Any student enrolled in the Faculty of Engineering who is required, or who elects, to take Economics I as part of his course must take the two subjects:

   - Microeconomics and Economic History I

   with the exception of those students whose courses do not include Mathematics II, Topic H. Such students may replace Economic History I by Economic Statistics I. However, a student taking this combination will not be allowed to take Mathematics II, Topic H at a later stage and count it towards his degree.

Examples of two-unit Electives are:

- Microeconomics or Economic History I.
6. Chemistry I may be taken in lieu of Chemistry IS and two non-engineering electives and Physics II in lieu of PH221 and two non-engineering electives.

7. Students enrolled in the B.E. in Computer Engineering must include MA2F Numerical Analysis as one of the Elective Units in Year II or III of the course.

8. For the B.A./B.E. degree in Electrical Engineering, the rules are as for the B.E. degree save that the eight elective units to be taken outside the Faculty of Engineering must all be applied to Arts subjects. As the student is required to take a Part III Arts subject in the Arts year, one of the subjects taken as an Elective must be a Part II subject.

9. For the B.Sc./B.E. degree in Electrical Engineering, the rules are as for the B.E. degree save that the eight elective units to be taken outside the Faculty must be applied to four units of Arts, two units towards Physics II, and two units of second year Mathematics topics.

10. In any year, except the first year of the course, when a student enrols on a part-time basis, one year of industrial experience may be substituted for one elective unit up to a total of five elective units. Not more than four such units may be substituted for non-engineering units and not more than four such units may be substituted for units within the eight engineering elective units. A first year Arts subject or the equivalent in a nontechnical area must still be taken. To earn this substitution, the student must submit a report concerning his practical experience for the year to the department secretary by the 31st October of the year for which the substitution is being sought and such other reports as may be required. In order for a student to be eligible for the industrial elective, he should comply with the instruction issued by the Department. A copy of the instructions may be seen on the Electrical Engineering Notice Board up to the 15th April, each year.

B.Sc.(Eng.) IN ELECTRICAL ENGINEERING

The 12 elective units in the B.Sc.(Eng.) course are to be selected by the student, with the advice and approval of his academic advisor, subject to the following requirements:

1. A minimum of four elective units are to be taken within the Faculty of Engineering, at least two of which must be outside the Department of Electrical Engineering.

2. One first-year Arts subject or the equivalent must be taken in a nontechnical area. It will be counted as four elective units.

3. If a student elects to do a subject at one level which is required at a later level, the later requirement is to be replaced with elective units.

4. 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 programme subject to pre- and corequisite requirements.

5. A first-year subject in another faculty taken as an elective is normally equivalent to four units. Half a first-year subject in these Faculties is normally equivalent to two units.

6. Any student enrolled in the Faculty of Engineering who is required, or who elects, to take Economics I as part of his course must take the two subjects:

Microeconomics and Economic History I

with the exception of those students whose courses do not include Mathematics II, Topic H. Such students may replace Economic History I by Economic Statistics I. However a student taking this combination will not be allowed to take Mathematics II, Topic H at a later stage and count it towards his degree.

Students enrolling for Electives which are normally three hours per week only, may enrol in Microeconomics or Economic History I.

Prerequisites and Corequisites

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisites/ Corequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE203</td>
<td>Introduction to Electrical Information, Maths I, Physics IA or IB</td>
</tr>
<tr>
<td>EE204</td>
<td>Introduction to Electrical Energy</td>
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<tr>
<td>EE231</td>
<td>Electrical Circuits, EE203</td>
</tr>
<tr>
<td>EE311</td>
<td>Electrical Machinery, EE204</td>
</tr>
<tr>
<td>EE312</td>
<td>Electrical Machinery, EE311, Corequisite EE313 recommended but not mandatory</td>
</tr>
<tr>
<td>EE313</td>
<td>Power Systems, EE204 &amp; EE231</td>
</tr>
<tr>
<td>EE321</td>
<td>Electronics, PH221</td>
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<tr>
<td>EE322</td>
<td>Electronics, EE203</td>
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<tr>
<td>EE323L</td>
<td>Electronics Laboratory, PH221, Corequisite EE322</td>
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<tr>
<td>EE331</td>
<td>Circuits, EE204 &amp; EE231</td>
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<tr>
<td>EE332</td>
<td>Circuits, EE204 &amp; EE231</td>
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<td>EE341</td>
<td>Automatic Control, Maths IIB</td>
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<tr>
<td>EE342</td>
<td>Automatic Control, EE341</td>
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<tr>
<td>EE361</td>
<td>Computer Structure, EE361, recommended but not mandatory</td>
</tr>
<tr>
<td>EE362</td>
<td>Logical Design and Switching Theory, Maths I</td>
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<td>EE411</td>
<td>Electrical Machines, EE312</td>
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<tr>
<td>EE412</td>
<td>Advanced Topics in Heavy Current Electrical Engineering, EE411</td>
</tr>
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</table>
DESCRIPTION OF SUBJECT ENTRIES

Subjects 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 11 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>
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<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>
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<td>EE-5</td>
<td>Field Theory</td>
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<td>EE-6</td>
<td>Computer Science or Automata Theory</td>
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<td>EE-7</td>
<td>Project/Directed Reading</td>
</tr>
<tr>
<td>EE-8</td>
<td>Seminar</td>
</tr>
</tbody>
</table>

531201 EE101 Introduction to Electrical Engineering***

Prerequisites  Nil

Hours  1½ hours of lectures, tutorials and laboratory work per week

Examination  Progressive assessment and final examination

Content

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.

Topics in computer science; Introduction to switching theory, Boolean algebra, number representation and arithmetic operations, binary arithmetic, basic computer organisation. Engineering applications of computers.

Application of electrical engineering to biological, socio-economic and industrial systems.
**Preliminary Reading**
Karbowiak & Huey, Information, Computers, Machines and Humans (John Wiley)

**Texts**
To be advised

**References**
Cruy & Van Valkenburg, Introductory Signals and Circuits (Blaisdell)
Pederson, Studer & Whinnery, Introduction to Electronic Systems, Circuits and Devices (McGraw-Hill)

**Prerequisite**
EE203

**Hours**
3 hours of lectures, tutorial and laboratory work per week

**Examination**
Progressive assessment and final examination

**Content**

**Texts**
To be advised

**References**
Fitzgerald, Higginbotham & Grabel, Basic Electrical Engineering
Hammond & Gehmlich, Electrical Engineering (2nd ed.)
References
Baldwin, C. T. *Fundamentals of Electrical Measurements* (G. Harrop)
Balabanian, N. *Fundamentals of Circuit Theory* (Allyn & Bacon)
Friedland, Wing & Ash *Principles of Linear Networks* (McGraw-Hill)

533104 EE311 Electrical Machinery*
Prerequisite EE204
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content
The Ideal Transformer. Transformer Reactances and equivalent circuits. Per unit system. Basic Electromechanical energy conversion principles.
Principles of D.C. Machines and their steady state operation.

Text

References
Clayton & Hancock *The Performance and Design of Direct Current Machines* (Pitman)
Say *The Performance and Design of Alternating Current Machines* (Pitman)
Siskind, Charles S. *Direct-Current Machinery* (McGraw-Hill)

533209 EE312 Electrical Machinery**
Prerequisite EE311
Corequisite EE313 recommended but not mandatory
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content

Text

References
Clayton & Hancock *The Performance and Design of Direct Current Machines* (Pitman)
Say *The Performance and Design of Alternating Current Machines* (Pitman)
Siskind, Charles S. *Direct-Current Machinery* (McGraw-Hill)

533201 EE313 Power Systems**
Prerequisite EE204 & EE231
Corequisite EE312 recommended but not mandatory
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content

Text

References
— *Westinghouse Transmission and Distribution Reference Book*
Freeman *Electrical Power Transmission & Distribution* (George G. Harrap & Co. Ltd.)
Say *The Performance and Design of Alternating Current Machines* (Pitman)
— *J. & P. Switchgear Book.*
533102 EE321 Electronics* (Physical electronics)

Prerequisite PH221

Hours 3 hours of lectures and tutorials per week

Examination Progressive assignment and final examination


Text Millman & Halkias Integrated Electronics (McGraw-Hill)

References Angelo, J. Electronics BJTs, FETs & Microcircuits (McGraw-Hill)

Chirlian Electronic Circuits (McGraw-Hill)

533202 EE322 Electronics**

Prerequisite EE203

Hours 3 hours of lectures and tutorials per week

Examination Progressive assessment and final examination

Content Introduction to Active Circuits. Basic electronic amplifiers: applications of feedback, negative and positive; power supplies for electronic equipment; elements of pulse circuity.

Text As for EE321

Reference G. E. Transistor Manual

533207 EE323L Electronics Laboratory**

Prerequisite PH221D

Corequisite EE322

Hours 3 hours of laboratory work per week

Examination No final examination

Content An essentially practical course, complementing EE322. Laboratory exercises requiring the application of Active Circuits theory to the solution of specific problems.

533105 EE331 Circuits*

Prerequisites EE204 & EE231

Hours 3 hours of lectures, tutorials and laboratory work per week.

Examination Progressive assessment and final examination


Text Desoer & Kuth Basic Circuit Theory (McGraw-Hill)

References Roe, P. H. Networks and Systems (Addison & Wesley)

Kuo, B. C. Linear Networks and Systems (McGraw-Hill)

533203 EE332 Circuits**

Prerequisites EE204 & EE231

Hours 3 hours of lectures, tutorials and laboratory work per week

Examination Progressive assessment and final examination

Content 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 line; impedance charts and matching with stubs.

Text Potter & Fisch Theory of Networks and Lines (Prentice-Hall)

References Moore, R. K. Travelling Wave Engineering (McGraw-Hill)

Johnson, W. C. Transmission Lines and Networks (McGraw-Hill)

Ware & Reed Communication Circuits (Wiley)
533213  EE341 Automatic Control* (Also see ME361)

**Prerequisites**  Maths II, Topics C, D, E  
**Hours**  3 hours of lectures, tutorials and laboratory work per week  
**Examination**  Progressive assessment and final examination  

**Content**  

**Text**  Nil  

**References**  
Chen *Introduction to Linear System Theory* (Holt, Rinehart & Winston)  
Desoer *Notes for a Second Course in Linear Systems* (Van Nostrand Reinhold)  
Gupta & Hasdorff *Fundamentals of Automatic Control* (Wiley)  
Melsa & Schultz *Linear Control Systems* (McGraw-Hill)  
Ogata *Modern Control Engineering* (Prentice-Hall)  
Raven *Automatic Control Engineering* (McGraw-Hill)  

533210  EE342 Automatic Control**

**Prerequisite**  EE341  
**Hours**  3 hours of lectures, tutorials and laboratory work per week  
**Examination**  Progressive assessment and final examination  

**Content**  
Continuation of EE341.  

**Text**  Nil  

**References**  
Chen  
Desoer  
Gupta & Hasdorff  
Melsa & Schultz  
Ogata  
Raven  

533212  EE362 Logical Design and Switching Theory**

**Prerequisite**  Maths I  
**Hours**  3 hours lectures, tutorials and practical work per week  
**Examination**  Progressive assessment and final examination  

**Content**  
Boolean algebra, combinational logic, logical circuits, minimization techniques, threshold logic. Data representation, binary arithmetic, codes, error checking and correcting. Sequential logic, flip-flops, state diagrams, state reduction, races and hazards. Logic subsystems: registers, adders, counters, converters, coders, etc. Basic architecture of digital computers.  

**Text**  To be advised  

**References**  
Hill & Peterson *Introduction to Switching Theory and Logical Design* (Wiley)  
Lewin *Theory and Design of Digital Computers* (Nelson)  
Kohavi *Switching and Finite Automata Theory* (McGraw-Hill)  
Mano *Computer Logic Design* (Prentice-Hall)
533208 EE380 Project/Directed Reading

Prerequisite Nil
Hours By arrangement
Examination To be advised

Content
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.

534120 EE411 Electrical Machines*

Prerequisite EE312
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content

Text

534121 EE413 Electrical Machines** (Not offered in 1975)

Prerequisite EE411

Content
Continuation of EE411. Advanced work on the design and performance of electrical machines.

Texts
Say *The Performance and Design of Alternating Current Machines* (Pitman)

534105 EE412 Advanced Topics in Heavy Current Electrical Engineering**

Prerequisites EE411
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content

Text

534107 EE415 Power Systems*

Prerequisites EE312 & 332
Hours 3 hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination

Content

Texts To be advised

References
J. & P. Switchgear Book
Westinghouse Transmission and Distribution Reference Book
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisite</th>
<th>Hours</th>
<th>Examination</th>
<th>Content</th>
<th>Text</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>534126 EE423L Electronics Laboratory*</td>
<td>Prerequisite: EE323L</td>
<td>3 hours of practical work per week</td>
<td>Nil</td>
<td>Complements EE421. Circuit development projects individually assigned.</td>
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</tr>
</tbody>
</table>
534132 EE443 Optimization Techniques (Not offered in 1975)

**Prerequisites**
Maths II, Topics C, D, E.

**Content**
Mathematical background to optimization. Comparison of optimization methods; engineering applications—such as to problems of identification, control, pattern recognition and resource allocation.

**Texts**
- *Fundamentals and Applications of Nonlinear Programming*

**Reference**

534116 EE444 Communication Systems*

**Prerequisites**
EE331

**Hours**
3 hours per week

**Examination**
Progressive assessment and final examination

**Content**
Introduction to the common forms of analog modulation, as well as pulse modulation systems including pulse code modulation. Performance in the presence of noise is considered.

**Text**

534128 EE445 Communication Systems* (Not offered in 1975)

**Prerequisites**
EE342

**Content**
Stochastic processes including stationary gaussian processes from a time-domain viewpoint. Kalman filtering and application to AM and FM demodulation.

**Text**

534133 EE446 Advanced Topics in Control

**Prerequisite**
EE442

**Content**
Linear optimal regulatory theory. Singular control problems and control problems without input disturbances. Methods for solving suboptimal systems. Computational methods.

**Text**

534134 EE447 Digital Communications**

**Prerequisite**
Consent of Instructor

**Hours**
3 hours of lectures and tutorials per week

**Examination**
Progressive assessment and final examination

**Content**
1. Noisy Memoryless M-ary channels
   - Orthogonal signalling or noisy memoryless channels. Optimum receivers, the matched filters, the correlation receiver. Shannons channel capacity theorem. Introduction to coding techniques; block, algebraic and convolution codes.

2. Noisy channels with memory

**Texts**
To be advised

**References**
- Lucky, Galz & Weldon, *Principles of Data Communication*
- Wozercraft & Jacobs, *The Principles of Communication Engineering*
- Lucky, Galz & Weldon

534129 EE451 Field Theory*

**Prerequisites**
Maths II Topics C, D, E

**Hours**
3 hours of lectures, tutorials and experimental work per week

**Examination**
Progressive assessment and final examination
Content
Maxwell's equations, wave propagation in unguided and guided configuration, Elementary Antenna Theory.
Experimental work on field plotting and microwave measurements.

Text
Jordan, E. C. & Balmain, K. G.  
*Electromagnetic Waves and Radiating Systems* (Prentice-Hall)

Reference
Carter, G. W.  
*The Electromagnetic Field and its Engineering Aspects* (Longmans)

534130 EE452 Microwave Measurements* (Not offered in 1975)
Prerequisites
EE451 or Physics III or consent of instructor.

Content
Generation and modulation of microwave frequencies; measurement of frequency, wavelength and attenuation; use of stubs and other forms of impedance matching.

Text
To be advised

References
Adams, S. F.  
*Microwave Theory and Application* (Hewlett Packard Co.)
Barlow, H. M. & Cullen, A. L.  
*Microwave Measurements* (Constable 1950)
Ginzton, E. L.  
*Microwave Measurements* (McGraw-Hill)
Rano, S., Whinnery, J. R. & Van Duzer, T.  
*Fields and Waves in Communication Electronics*

534124 EE463 Computer Operating Systems*

Prerequisite
EE361

Hours
3 hours per week

Examination
Progressive assessment and final examination

Content

Text
Hansen  
*Operating System Principles* (Prentice-Hall)

References
Coffman & Denning  
*Operating Systems Theory* (Prentice-Hall)
Donovan  
*Systems Programming* (McGraw-Hill)

534125 EE464 Compilers, Assemblers and Interpreters**

Prerequisite
EE361

Hours
3 hours per week

Examination
Progressive assessment and final examination

Content

Text
Gries  
*Compiler Construction for Digital Computers* (Wiley)

References
Donovan  
*Systems Programming* (McGraw-Hill)
Gear  
*Computer Organisation and Programming* (McGraw-Hill)
Stone  
*Introduction to Computer Organisation and Data Structures* (McGraw-Hill)

534102 EE480 Project/Directed Reading***

Content
Topics to be arranged with a staff member in the field of interest during first term. Full time students are normally required to undertake a project.

534101 EE491 Seminar***

Content
Talks on various topics of general interest in engineering. EE480 and EE491 are taken together and counted as four units.
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 design, production and use of machinery. The courses in Mechanical Engineering develop from basic subjects, through those of an applied nature to reach a 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.

The Bachelor of Engineering degrees in Mechanical and Industrial Engineering comprise four years of full-time study or their equivalent in part-time study or a combination of full- and part-time attendance.

Courses of study currently available in the Department are:

(i) Bachelor of Engineering degree course in Mechanical Engineering
This course is designed to give a basic training in the activities followed by professional mechanical engineers. It is oriented towards design, plant operation and control, manufacturing methods, material usage and energy conversion and utilisation.

(ii) Bachelor of Engineering degree course in Industrial Engineering
Years I and II of this course are similar to the full-time degree course in Mechanical Engineering.
In the later years the course is oriented towards the study of production techniques and their control and the application of scientific principles to administration and industrial management. The course is thus designed for those engineers who wish to make their career in the planning, supervision and administration of industrial undertakings.

(iii) Bachelor of Engineering degree course in Naval Architecture
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 a study of Naval Architecture and is designed to provide professional training for engineering students who are interested in ship building, and/or offshore engineering as a career.

Note
The last two years of the Naval Architecture course will be discontinued as those students currently enrolled complete the course. Students enrolling for the Naval Architecture course for the first time in 1975 will have to transfer to the University of New South Wales after completing the first two years of the course.

Students proceeding by full-time study in (i), (ii) and (iii) above are required to gain as much industrial experience as possible by working in industry during long vacations.

(iv) Bachelor of Arts/Bachelor of Engineering degree course in Mechanical Engineering
and
(v) Bachelor of Arts/Bachelor of Engineering degree course in Industrial Engineering
comprising five years of full-time study in the Faculties of Arts and Engineering.
These courses (iv & v) have 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.

(vi) Bachelor of Science/Bachelor of Engineering degree course in Mechanical Engineering
and
(vii) 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.

(viii) Bachelor of Commerce/Bachelor of Engineering degree course in Mechanical Engineering
and
(ix) Bachelor of Commerce/Bachelor of Engineering degree course in Industrial Engineering
comprising five years of full-time study in the Faculties of Economics and Commerce and Engineering.
Students are required to gain as much industrial experience as possible by working in Industry during long vacations.

(x) 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 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.

The course may, with the permission of the Faculty Board, be completed in one full-time year.

Note
The Bachelor of Science (Engineering) degrees are being phased out. No student is permitted to enrol or re-enrol in these courses unless he was enrolled in the course prior to 1st January, 1974.
A student is permitted to continue in the course for as long as he has passed sufficient subjects in the course to enable him to complete all requirements for admission to the degree before the end of the 1979 academic year.
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) Entrolment in individual units of Engineering I will only be permitted in exceptional circumstances. Examination results for such 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 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 who are reading for a Bachelor of Engineering degree on a part-time basis may choose to take Industrial Experience units as part of their Elective programme (see Paragraph 4 of the Elective Requirements on page 20).

Students who are reading for a Bachelor of Engineering degree on a part-time basis may choose to take Industrial Experience units as part of their Elective programme (see Paragraph 4 of the Elective Requirements on page 20).

Units
One "unit" approximates to 42 contact hours; for further explanation see page 39).

SCHEDULE 1.5

BACHELOR OF ENGINEERING IN
MECHANICAL ENGINEERING

<table>
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<th>Subject</th>
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<td><strong>Year I</strong></td>
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<tr>
<td>Engineering I</td>
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<tr>
<td>Mathematics I</td>
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<td>Physics IA</td>
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<td>Chemistry I</td>
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<td>Electives</td>
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<td><strong>Total</strong></td>
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<td><strong>Year II</strong></td>
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<td>ME201 Laboratory Measurements</td>
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<td>ME212 Engineering Design</td>
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<tr>
<td>ME213 Engineering Design</td>
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### Recommended Programme for the Bachelor of Engineering in Mechanical Engineering

**By Part-time Study**

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**Year VI Full Time**

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1. First half year
2. Second half year
4. Mathematics IIB may be taken in two parts each of three terms duration.
5. See Year I course details on page 40.

---

**SCHEDULE 3.5**

**BACHELOR OF SCIENCE (ENGINEERING) IN MECHANICAL ENGINEERING**

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5. * First half year
6. ** Second half year
7. See Elective Requirements on page 20.
8. Any student who is unable to complete Year VI as a full-time student may do so over two part-time years and may include ME096 in his programme if not previously taken.
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**SCHEDULE 1.A**

**BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING**

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1 See Elective Requirements on page 20.
2 Mathematics IIB may be taken in two parts each of three terms duration.
3 Stages 1 and 2 will not be offered after 1974.
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* First half year

** Second half year

1. See Elective Requirements on page 20.

2. Mathematics IIB may be taken in two parts each of three terms duration

3. See Year I course details on page 40.

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### Recommended Programme for the Bachelor of Engineering in Industrial Engineering by Part-Time Study

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* First half year

** Second half year

1. See Elective Requirements on page 20.

2. Any student who is unable to complete YEAR VI as a full-time student may do so over two part-time years and may include ME096 in his programme if not previously taken.
### SCHEDULE 3.4

**BACHELOR OF SCIENCE (ENGINEERING) IN INDUSTRIAL ENGINEERING**

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* First half year
** Second half year

1 See Elective Requirements on page 20.
2 Mathematics IIB may be taken in two parts each of three terms duration.
3 Stages 1 and 2 will not be offered after 1974.

---

### SCHEDULE 1.6

**BACHELOR OF ENGINEERING IN NAVAL ARCHITECTURE**

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* First half year

** Second half year

1 See Elective Requirements on page 20.

2 Mathematics IIB may be taken in two parts each of three terms duration.

3 See note on page 130.

4 See Year I course details on page 40.

RECOMMENDED PROGRAMME FOR THE BACHELOR OF ENGINEERING IN NAVAL ARCHITECTURE BY PART-TIME STUDY

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<tr>
<td>ME482</td>
<td>Engineering Economics</td>
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1. A maximum of three Industrial Experience units may be claimed in this course.
2. See Elective Requirements on page 20.
3. Any student who is unable to complete Year VI as a full-time student may do so over two part-time years.
4. See Note on page 130.

### BACHELOR OF SCIENCE (ENGINEERING) IN NAVAL ARCHITECTURE

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1. See Elective Requirements on page 20.
2. Mathematics IIB may be taken in two parts each of three terms duration.
3. Stages 1 and 2 will not be offered after 1974.

### BACHELOR OF ARTS/BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING

The course followed must comply with Section 19 of the Requirements for the Degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme is recommended:

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The course followed must comply with Section 19 of the Requirements for the Degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme is recommended:

### Subject | Units
--- | ---
ME381 Methods Engineering | 1
ME382 Production Engineering | 1
ME383 Quality Engineering | 1
ME384 Design for Production | 1
ME413 Design of Crankshafts, Flywheel & other Rotating Members | 1
ME301 Engineering Computations | 1
ME342 Properties of Materials | 1
ME343 Mechanics of Solids | 1
EE203 *Introduction to Electrical Information | 1
EE204 **Introduction to Electrical Energy | 1
GE350 Seminar | 1

* First half year

** Second half year

1 See Elective Requirements on page 20.

### Bachelor of Arts/Bachelor of Engineering in Industrial Engineering

The course followed must comply with Section 19 of the Requirements for the Degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme is recommended:

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2 Electives | 10

#### Year II

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<td>ME222 Process Technology</td>
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*Electives | 8

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*Electives | 6

#### Year V

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<td>ME361 Automatic Control</td>
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<td>ME385 Accounting &amp; Financial Studies</td>
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*Electives | 3

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**BACHELOR OF SCIENCE/BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme is recommended:

**Year I**
- Chemistry IS: 2 units
- Engineering I: 4 units
- Mathematics I: 4 units
- Physics IA: 4 units
- **Electives**: 2 units
- ME121 Workshop Practice: 1 unit
- **Total**: 17 units

**Year II**
- Mathematics IIA: 4 units
- Mathematics IIC: 4 units
- Physics II: 4 units
- ME201 Laboratory Measurements: 1 unit
- ME251 Fluid Mechanics: 1 unit
- ME271 Thermodynamics: 1 unit
- ME221 Workshop Practice: 1 unit
- **Total**: 16 units

**Year III**
- Mathematics IIIA: 8 units
- Mathematics IIB: 4 units
- ME241 Properties of Materials: 1 unit
- CE212 Mechanics of Solids I: 1 unit
- ME222 Process Technology: 1 unit
- **Total**: 16 units

---

**BACHELOR OF COMMERCE/BACHELOR OF ENGINEERING IN MECHANICAL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme has been approved by the two Faculty Boards:

**Year I**
- Engineering I: 4 units
- Mathematics I: 4 units
- Physics IA: 4 units
- ME121 Workshop Practice: 1 unit
- **Total**: 17 units

---

1. Approximate unit values. Refer to Arts Faculty Handbook for subject details.
2. See Elective Requirements on page 20.
3. Mathematics IIB may be taken in two parts each of three terms duration.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year II</strong></td>
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</tr>
<tr>
<td>ME221 Workshop Practice</td>
<td>1</td>
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<tr>
<td>ME222 Process Technology</td>
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<tr>
<td>ME223 Mechanical Technology</td>
<td>1</td>
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<tr>
<td>ME241 Properties of Materials</td>
<td>13</td>
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<tr>
<td>CE212 Mechanics of Solids</td>
<td>1</td>
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<tr>
<td>3Mathematics IIB</td>
<td>4</td>
</tr>
<tr>
<td>2Accounting I</td>
<td>4</td>
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<tr>
<td>2Macroeconomics</td>
<td>4</td>
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<tr>
<td><strong>Year III</strong></td>
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<tr>
<td>ME201 Laboratory Measurements</td>
<td>1</td>
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<tr>
<td>ME212 Engineering Design</td>
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<tr>
<td>ME213 Engineering Design</td>
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<tr>
<td>ME232 Dynamics of Machines</td>
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<tr>
<td>ME251 Fluid Mechanics</td>
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<tr>
<td>ME271 Thermodynamics</td>
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<tr>
<td>EE203 Introduction to Electrical Information</td>
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<td>EE204 Introduction to Electrical Energy</td>
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<tr>
<td>One of Economic History I</td>
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<td>Economic Statistics I</td>
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<td>3Legal Studies I</td>
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<td>ME372 Heat Transfer</td>
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<td>CE303 Structural Design</td>
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<tr>
<td>ME342 Properties of Materials</td>
<td>1</td>
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<td>ME343 Mechanics of Solids</td>
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<th>Subject</th>
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<td><strong>Year V</strong></td>
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<tr>
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<td>GE350 Seminar</td>
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<tr>
<td>ME413 Design of Crankshifts, Flywheel &amp; other Rotating Members</td>
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</tbody>
</table>

1 Three of the six elective units must be selected from the list of Departmental Technical Electivities.

2 The subjects which count towards the B.Com. degree are those marked plus six Engineering units chosen from subjects normally taken in 3rd or 4th Year of the full-time Engineering programme which may be counted as one Group C subject.

**BACHELOR COMMERCE/BACHELOR OF ENGINEERING IN INDUSTRIAL ENGINEERING**

The course followed must comply with Section 19 of the Requirements for the degrees of Bachelor of Engineering and Bachelor of Science (Engineering). The following programme has been approved by the two Faculty Boards:

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<th>Subject</th>
<th>Units</th>
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<tr>
<td><strong>Year I</strong></td>
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<tr>
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<td>2Microeconomics</td>
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<td>ME222 Process Technology</td>
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<tr>
<td>ME223 Mechanical Technology</td>
<td>1</td>
</tr>
<tr>
<td>ME241 Properties of Materials</td>
<td>1</td>
</tr>
<tr>
<td>CE212 Mechanics of Solids</td>
<td>1</td>
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<tr>
<td>3Mathematics IIB</td>
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<td>2Accounting I</td>
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<tr>
<td>2Macroeconomics</td>
<td>4</td>
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</table>
Subject Units

Year III
ME201 Laboratory Measurements 1
ME212 Engineering Design 1
ME213 Engineering Design 1
ME232 Dynamics of Machines 1
ME251 Fluid Mechanics 1
ME271 Thermodynamics 1
EE203 Introduction to Electrical Information 1
EE204 Introduction to Electrical Energy 1
One of
Economic History I 2
Legal Studies I 2
Economic Statistics I 2
Economics & Commerce 4
Economics & Commerce 4
18

Year IV
ME301 Engineering Computations 1
ME313 Engineering Design 1
ME333 Dynamics of Machines 1
ME361 Automatic Control 1
ME381 Methods Engineering 1
ME382 Production Engineering 1
ME383 Quality Engineering 1
ME384 Design for Production 1
ME342 Properties of Materials 1
ME343 Mechanics of Solids 1
Economics & Commerce 4
Electives 3
17

Year V
ME496 Project/Seminar 4
ME091 Industrial Law 4
GE350 Seminar 1
Economics & Commerce 4
Electives 3
16

1 Three of the six elective units must be selected from the list of Departmental Technical Electives.
2 The subjects which count towards the B.Com. degree are those marked
2 plus six Engineering units chosen from subjects normally taken in
3rd or 4th Year of the full-time Engineering programme which may be
counted as one Group C subject.

Conditions as to Selection of Electives

Clause 1
Chemistry I consisting of 4 units may be substituted for Chemistry IS and
the two first-year elective units in the Bachelor of Engineering courses.

Clause 2
The two elective units of the first-year Bachelor of Engineering degree
courses must be taken in faculties other than the Faculty of Engineering.

Clause 3
At least three of the six elective units taken in Year IV of the Bachelor
of Engineering degree courses must be selected from the departmental list
of technical electives on page 158.

Clause 4
In the case of persons in full employment proceeding as part-time students,
each year of appropriate employment that is supervised and approved by
the Head of the Department is credited as one unit of elective. A maximum
of five such units are allowed, described as:—
ME092 Industrial Experience 1 unit
ME093 Industrial Experience 1 unit
ME094 Industrial Experience 1 unit
ME095 Industrial Experience 1 unit
ME096 Industrial Experience 1 unit
These elective units may be used to meet any elective requirements in
Clauses 2 and 3 above, except the departmental technical elective require­
ment in Clause 3.

Clause 5
Three elective units in the B.A./B.E. courses and in the B.Sc./B.E. courses
must be selected from the list of Departmental Technical Electives on
page 158.
### List of Prerequisites

#### Mechanical and Industrial Engineering

<table>
<thead>
<tr>
<th>Subject Unit</th>
<th>Prerequisite</th>
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</thead>
<tbody>
<tr>
<td>ME201</td>
<td>*Maths I, *Physics IA or IB ME121, ME111/2, CE111, *Maths I</td>
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<tr>
<td>ME213</td>
<td>*ME121, *ME212, ME111/2, CE111, *Maths I</td>
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<tr>
<td>ME221</td>
<td>*ME121</td>
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<tr>
<td>ME222</td>
<td>*ME121</td>
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<td>ME223</td>
<td>Maths I ME213, ME232, ME111/2, CE111</td>
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<td>ME241</td>
<td>Maths I ME111/2, CE111</td>
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<td>ME251</td>
<td>Maths I ME131</td>
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<td>ME271</td>
<td>Maths I, Physics IA or IB</td>
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<td>ME301</td>
<td>Math I</td>
</tr>
<tr>
<td>ME313</td>
<td>Math I ME213, ME232, Math I</td>
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<tr>
<td>ME333</td>
<td>Math I ME241</td>
</tr>
<tr>
<td>ME342</td>
<td>*CE212</td>
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<tr>
<td>ME343</td>
<td>Math I ME251</td>
</tr>
<tr>
<td>ME352</td>
<td>*Maths I</td>
</tr>
<tr>
<td>ME361</td>
<td>Math I ME222/3</td>
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<tr>
<td>ME372</td>
<td>Math I ME222/3</td>
</tr>
<tr>
<td>ME382</td>
<td>Math I ME222/3</td>
</tr>
<tr>
<td>ME383</td>
<td>Math I ME222/3</td>
</tr>
<tr>
<td>ME384</td>
<td>Math I ME213, ME222/3</td>
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<td>ME385</td>
<td>Math I ME361</td>
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<tr>
<td>ME401</td>
<td>Math I ME361</td>
</tr>
<tr>
<td>ME402</td>
<td>Math I ME361</td>
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<tr>
<td>ME403</td>
<td>Math I ME361</td>
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<td>ME404</td>
<td>Math I ME361</td>
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<tr>
<td>ME407</td>
<td>Math I ME361</td>
</tr>
<tr>
<td>ME408</td>
<td>Math I ME361</td>
</tr>
<tr>
<td>ME413</td>
<td>*ME313, *ME333</td>
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<tr>
<td>ME414</td>
<td>ME251, *ME352</td>
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<tr>
<td>ME415</td>
<td>*CE303, ME213, ME232</td>
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<tr>
<td>ME416</td>
<td>ME313, ME342/3</td>
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<td>ME417</td>
<td>ME213, ME232</td>
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<td>ME418</td>
<td>ME313, ME372</td>
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<tr>
<td>ME419</td>
<td>Design of Conveyors &amp; Materials Handling Equipment</td>
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<tr>
<td>ME434</td>
<td>Advanced Kinematics &amp; Dynamics of Machines ME333</td>
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<tr>
<td>ME444</td>
<td>Properties of Materials ME342</td>
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<tr>
<td>ME445</td>
<td>Mechanics of Solids ME343</td>
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<tr>
<td>ME446</td>
<td>An Introduction to Plastic Analysis ME342/3</td>
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<tr>
<td>ME447</td>
<td>An Introduction to Experimental Analysis ME342/3</td>
</tr>
<tr>
<td>ME448</td>
<td>An Introduction to Photomechanics ME342/3</td>
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<tr>
<td>ME449</td>
<td>Reliability Analysis of Mechanical Systems ME313, ME372</td>
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<tr>
<td>ME453</td>
<td>Fluid Mechanics ME352</td>
</tr>
<tr>
<td>ME454</td>
<td>Turbomachinery ME352</td>
</tr>
<tr>
<td>ME473</td>
<td>Thermodynamics ME271</td>
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<tr>
<td>ME474</td>
<td>Heat Transfer ME372</td>
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<tr>
<td>ME476</td>
<td>Developments in the Use of Solar Energy ME271, ME372</td>
</tr>
<tr>
<td>ME481</td>
<td>Engineering Administration ME372</td>
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<tr>
<td>ME482</td>
<td>Engineering Economics ME313</td>
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<tr>
<td>ME485</td>
<td>Tool Design ME372</td>
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<td>ME486</td>
<td>Industrial Design ME313</td>
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<tr>
<td>ME487</td>
<td>Operations Research—Deterministic Models ME313</td>
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<tr>
<td>ME488</td>
<td>Operations Research—Probabilistic Models ME313</td>
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<tr>
<td>ME489</td>
<td>Operations Research—Applications in Industry ME313</td>
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**Naval Architecture**

<table>
<thead>
<tr>
<th>Subject Unit</th>
<th>Prerequisite</th>
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</thead>
<tbody>
<tr>
<td>NA201</td>
<td>Theoretical Naval Architecture *Maths I, ME111/2, ME131, CE111</td>
</tr>
<tr>
<td>NA221</td>
<td>Naval Architecture Technology *Maths I, ME111/2, CE111</td>
</tr>
<tr>
<td>NA241</td>
<td>Applied Naval Architecture ME111/2</td>
</tr>
<tr>
<td>NA311</td>
<td>Ship Design &amp; Construction NA201, NA221, NA241</td>
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<tr>
<td>NA342</td>
<td>Applied Naval Architecture ME251, NA201, NA221, NA241</td>
</tr>
<tr>
<td>NA351</td>
<td>Resistance &amp; Propulsion of Ships ME251, NA201, NA221, NA241</td>
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<tr>
<td>NA402</td>
<td>Special Purpose Ships NA311, NA351</td>
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<td>NA431</td>
<td>Ships’ Machinery NA311, NA351</td>
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<tr>
<td>NA452</td>
<td>Theoretical Naval Architecture NA311, NA351</td>
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<tr>
<td>NA481</td>
<td>Shipyard Production &amp; Management NA311, NA351</td>
</tr>
</tbody>
</table>

* Prerequisites thus indicated may, with the consent of the Head of the Department, be read concurrently with the subject unit named.
## List of Prerequisites

### Mechanical and Industrial Engineering

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<thead>
<tr>
<th>Subject Unit</th>
<th>Prerequisite</th>
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</thead>
<tbody>
<tr>
<td>ME201 Laboratory Measurements</td>
<td>*Maths I, *Physics IA or IB</td>
</tr>
<tr>
<td>ME212 Engineering Design</td>
<td>*ME121, ME111/2, CE111, *Maths I</td>
</tr>
<tr>
<td>ME213 Engineering Design</td>
<td>*ME121, *ME212, ME111/2, CE111, *Maths I</td>
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<tr>
<td>ME221 Workshop Practice</td>
<td>*ME121</td>
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<td>ME222 Process Technology</td>
<td>*ME121</td>
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<td>ME223 Mechanical Technology</td>
<td>*ME121</td>
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<td>ME232 Dynamics of Machines</td>
<td>Maths I, ME131, ME111/2, CE111</td>
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<td>ME241 Properties of Materials</td>
<td>Maths I, ME111/2, CE111</td>
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<td>ME251 Fluid Mechanics</td>
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<td>ME271 Thermodynamics</td>
<td>Maths I, Physics IA or IB</td>
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<td>ME213, ME232, Maths I</td>
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<td>ME361 Automatic Control</td>
<td>Maths IIB</td>
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<tr>
<td>ME372 Heat Transfer</td>
<td>*Maths IIB</td>
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<tr>
<td>ME381 Methods Engineering</td>
<td>Maths I, ME222/3</td>
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<td>ME382 Production Engineering</td>
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<td>ME383 Quality Engineering</td>
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<td>ME213, ME222/3</td>
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<td>ME385 Accounting &amp; Financial Studies</td>
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<td>ME403 Resources Planning &amp; Allocation</td>
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<td>ME414 Design of Hydraulic &amp; Pneumatic Power Systems</td>
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<td>ME415 Design of Crane &amp; Hoist Equipment</td>
<td>*CE303, ME213, ME232</td>
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<td>ME416 Design of Pressure Vessels, High Pressure Pipelines, Plates &amp; Shells</td>
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<td>ME417 Design of Worm &amp; Special Purpose Gear Reduction Units</td>
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<td>ME418 Design of Thermal Unit Components</td>
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Prerequisites thus indicated may, with the consent of the Head of the Department, be read concurrently with the subject unit named.

### Naval Architecture

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<th>Subject Unit</th>
<th>Prerequisite</th>
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<tr>
<td>ME419 Design of Conveyors &amp; Materials Handling Equipment</td>
<td>*ME313, ME232</td>
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<tr>
<td>ME434 Advanced Kinematics &amp; Dynamics of Machines</td>
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<td>ME444 Properties of Materials</td>
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<td>ME445 Mechanics of Solids</td>
<td>ME343</td>
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<tr>
<td>ME446 An Introduction to Plastic Analysis</td>
<td>ME342/3</td>
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<td>ME447 An Introduction to Experimental Analysis</td>
<td>ME342/3</td>
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<tr>
<td>ME448 An Introduction to Photomechanics</td>
<td>ME342/3</td>
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<tr>
<td>ME449 Reliability Analysis of Mechanical Systems</td>
<td>ME313, Maths IIB</td>
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<tr>
<td>ME453 Fluid Mechanics</td>
<td>*ME352</td>
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<tr>
<td>ME454 Turbomachinery</td>
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<td>ME473 Thermodynamics</td>
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<td>ME474 Heat Transfer</td>
<td>ME372</td>
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<td>ME476 Developments in the Use of Solar Energy</td>
<td>ME271, ME372</td>
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<tr>
<td>ME481 Engineering Administration</td>
<td>Maths I</td>
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<tr>
<td>ME482 Engineering Economics</td>
<td>Maths I</td>
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<td>ME485 Tool Design</td>
<td>ME384</td>
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<td>ME486 Industrial Design</td>
<td>ME313</td>
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<td>ME487 Operations Research — Deterministic Models</td>
<td>Maths IIB</td>
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<tr>
<td>ME488 Operations Research — Probabilistic Models</td>
<td>Maths IIB</td>
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<tr>
<td>ME489 Operations Research — Applications in Industry</td>
<td>Maths IIB</td>
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</tbody>
</table>

*Prerequisites thus indicated may, with the consent of the Head of the Department, be read concurrently with the subject unit named.*
Departmental Technical Electives

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

1 SUBJECT UNITS (42 hrs/unit)

ME401 Systems Analysis
ME402 Systems Planning, Organization & Control
ME403 Resources Planning & Allocation
ME404 Mathematical Programming
ME407 Environmental Engineering
ME408 Industrial Safety Engineering
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 Reduction Units
ME418 Design of Thermal Unit Components
ME419 Design of Conveyors & Materials Handling Equipment
ME434 Advanced Kinematics & Dynamics of Machines
ME444 Properties of Materials
ME445 Mechanics of Solids
ME446 An Introduction to Plastic Analysis
ME447 An Introduction to Experimental Analysis
ME448 An Introduction to Photomechanics
ME449 Reliability Analysis for Mechanical Systems
ME453 Fluid Mechanics
ME454 Turbomachinery
ME473 Thermodynamics
ME474 Heat Transfer
ME476 Developments in the Use of Solar Energy
ME485 Tool Design
ME486 Industrial Design
ME487 Operations Research — Deterministic Models
ME488 Operations Research — Probabilistic Models
ME489 Operations Research — Applications in Industry

Should other departments or faculties select three or more of the 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.

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

Preferred Combinations

Preferred combinations of subject units to form Departmental Technical Electives are set out below. Students should carefully consider these combinations before seeking any variation. All elective combinations are of 3 x 42 = 126 hours' duration.

<table>
<thead>
<tr>
<th>Combination</th>
<th>Prerequisite</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME401 Systems Analysis</td>
<td>Maths IIB</td>
</tr>
<tr>
<td>ME402 Systems Planning, Organization &amp; Control</td>
<td>Maths IIB &amp; ME361</td>
</tr>
<tr>
<td>ME403 Resources Planning &amp; Allocation</td>
<td>Maths IIB</td>
</tr>
<tr>
<td>ME489 Operations Research — Applications in Industry</td>
<td>Maths IIB</td>
</tr>
<tr>
<td>ME402 Systems Planning, Organization &amp; Control</td>
<td>Maths IIB</td>
</tr>
<tr>
<td>ME403 Resources Planning &amp; Allocation</td>
<td>Maths IIB &amp; ME361</td>
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<tr>
<td>ME404 Mathematical Programming</td>
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<tr>
<td>ME402 Systems Planning, Organization &amp; Control</td>
<td>Maths IIB</td>
</tr>
<tr>
<td>ME403 Resources Planning &amp; Allocation</td>
<td>Maths IIB &amp; ME361</td>
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<tr>
<td>ME409 Environmental Engineering</td>
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<tr>
<td>ME413 Design of Crankshafts, Flywheels &amp; other Rotating Members</td>
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<tr>
<td>ME414 Design of Hydraulic &amp; Pneumatic Power Systems</td>
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<tr>
<td>ME473 Thermodynamics</td>
<td>ME474 Heat Transfer</td>
</tr>
<tr>
<td>ME476 Developments in the Use of Solar Energy</td>
<td>ME476 Developments in the Use of Solar Energy</td>
</tr>
<tr>
<td>ME434 Advanced Kinematics &amp; Dynamics of Machines</td>
<td>ME434 Advanced Kinematics &amp; Dynamics of Machines</td>
</tr>
<tr>
<td>ME499 Reliability Analysis for Mechanical Systems</td>
<td>ME413 Design of Crankshafts, Flywheels &amp; other Rotating Members</td>
</tr>
<tr>
<td>ME446 An Introduction to Plastic Analysis</td>
<td>ME447 An Introduction to Experimental Analysis</td>
</tr>
<tr>
<td>ME448 An Introduction to Photomechanics</td>
<td>ME449 Reliability Analysis for Mechanical Systems</td>
</tr>
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Combination Prerequisite

ME415 Design of Crane & Hoist Equipment | ME213
ME417 Design of Worm & Special Purpose Gear Reduction Units | ME232
ME419 Design of Conveyors & Materials Handling Equipment | CE303
ME486 Industrial Design | ME313
ME485 Tool Design | ME342
ME444 Properties of Materials | ME384

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

DESCRIPTION OF SUBJECT ENTRIES

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 prefix letter G 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 1/2 hours 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 & Seminar

://www.example.com

Naval Architecture

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

ME092 to ME096 Industrial Experience Units
See page 199.

Examination
Progressive assessment

541101 ME111 Graphics

Prerequisites Nil

Hours 42

Examination Progressive assessment

Content
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.

Text
Levens, A. S. Graphics (Wiley 1968)
OR
Luzadder, W. J. Basic Graphics (Prentice-Hall 1968)

References
Earle, J. H. Design Drafting (Addison Wesley 1972)
541102 ME112 Engineering Drawing and Elementary Design

Prerequisites Nil
Hours 42
Examination Progressive assessment

Content

Text
Australian Standard Engineering Drawing Practice ASCZ1 — 1973 (Institution of Engineers, Australia)

References
Earle, J. H. Design Drafting (Addison Wesley 1972)
Levens & Luzadder as for ME111

541103 ME131 Dynamics

Prerequisites Nil
Hours 42
Examination One 3-hour paper

Content
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.

Text
Meriam, J. L. Mechanics—Pt. II Dynamics (International Student ed. S. I. Units)

Reference

542201 ME201 Laboratory Measurements

Prerequisites *Maths I & *Physics IA or IB
Hours 42
Examination Progressive assessment

Content
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 emphasized, 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.
542302 ME212 Engineering Design
Prerequisites *ME121, ME111/2, CE111, *Maths I
Hours 42
Examination Progressive assessment

Content
Design procedures for mechanical components. Load estimation. Typical allowable stress and factor of safety values. Stress calculations. Detail considerations of the design of shafts, bearings, couplings, bolted joints, welded connections, wall brackets, eccentric connections, levers, flat and vee belts, drives and springs. Horsepower, calculations for straight and helical spur gear reductions.

Text
Hall, A. S., Holowenko, A. R. & Laughlin, H. G.

References
Black, P. H. & Adams, O. E.
Doughty, V. L. & Vallance, A.
Faires, V. M.
Hall, A. S., Holowenko, A. E. & Laughlin, B. G.
Phelan, R. M.
Siegal, W. J., Maleev, V. L. & Hartmann, J. B.

542103 ME221 Workshop Practice
Prerequisites *ME121
Hours 42
Examination Progressive assessment

Content
Further studies of the basic methods and processes used in the engineering trades with instruction, practice and assignments related to Milling and Shaping, Gem cutting, Grinding, Tool-Machining, Press and Die Work, Blacksmithing, Patternmaking, Foundry Practice, Electrical Fitting and the manufacture of simple engineering components.

Text
Tech Education

References
DeGarmo, E. P.
Doyle, L. E. et al
French & Vierck

542303 ME213 Engineering Design
Prerequisites *ME121, *ME212, ME111/2, CE111, *Maths I
Hours 42
Examination One 3-hour paper
H. Ford Trade School  Shop Theory (McGraw-Hill)
—  Trade Catalogues

542101 ME222 Process Technology

**Prerequisites**  *ME121
**Hours**  42
**Examination**  Progressive assessment

**Content**

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

OR
Doyle, L. E. et al  *Manufacturing Processes and Materials for Engineers* (Prentice-Hall)

**References**
Campbell, J. S.  *Processes and Materials in Manufacturing* (McGraw-Hill)
Datsko, I.  *Materials, Properties and Manufacturing Processes* (Wiley)

542301 ME232 Dynamics of Machines

**Prerequisites**  Maths I, ME131, ME111/2, CE111
**Hours**  42
**Examination**  One 3-hour paper

**Content**
Kinematics and dynamics of simple mechanisms, cams and toothed gearing.

**Text**
Hirschhorn, J.  *Kinematics and Dynamics of Plane Mechanisms* (McGraw-Hill)

**References**
Holowenko, A. R. C.  *Dynamics of Machinery* (Wiley)
Kepler, H. B.  *Basic Graphical Kinematics* (McGraw-Hill)
Rothbart, H. A.  *Cam Design, and Accuracy* (Wiley)
Shigley, J. E.  *Theory of Machines* (McGraw-Hill)

542102 ME241 Properties of Materials

**Prerequisites**  Maths I, ME111/2, CE111
**Hours**  70
**Examination**  One 3-hour paper

**Content**
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.
Texts Nil

References
McClintock & Argon Mechanical Behaviour of Materials (Addison-Wesley)
Richards, C. W. Engineering Materials Science (Wadsworth)
Van Vlack, L. H. Elements of Materials Science (Addison-Wesley)

542202 ME251 Fluid Mechanics
Prerequisites Maths I, ME131
Hours 42
Examination Progressive assessment

Content
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 equation, 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.

Text
Johnston, A. K. & Hill, B. J. Force and Motion (University of Newcastle)

References

542203 ME271 Thermodynamics
Prerequisites Maths I, Physics IA or IB
Hours 42
Examination Progressive assessment

Content

Texts
Haywood, R. W. Thermodynamic Tables in S.I. (Metric) Units (Cambridge University Press 1972)

543101 ME301 Engineering Computations
Prerequisites Maths I
Hours 42
Examination Progressive assessment

Content
Introduction to linear programming, with engineering applications.

Texts
— Fortran (Dataset Pty. Ltd. 1973)

References
Forsythe, G. & Moler, C. B. Computer Solution of Linear Algebraic Systems (Prentice-Hall 1967)
Ralston, A. A First Course in Numerical Analysis (I.S.E. McGraw-Hill 1965)

543302 ME313 Engineering Design
Prerequisites ME213, ME232, Maths I
Hours 42
Examination Progressive assessment
**Content**
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.

**Text**
Siegel, W. J., Malev, V. L. & Hartmann, J. B.

**References**
Howarth, M. H. *Design of High Speed Diesel Engines* (Constable)
Lipson & Juvinall *Handbook of Stress and Strength* (Macmillan)
Matousek, R. *Engineering Design* (Blackie)
Purday *Diesel Engine Design* (Constable)
Seely & Smith *Advanced Mechanics of Materials* (Wiley)
Shigley, J. E. *Mechanical Engineering Design* (McGraw-Hill)
Walshaw *Diesel Engine Design* (Newnes)

**543301 ME333 Dynamics of Machines**

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Maths IIB</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>Progressive assessment</td>
</tr>
</tbody>
</table>

**Content**

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

**References**
Anderson, R. A. *Fundamentals of Vibrations* (Macmillan)
Seto, W. W. *Mechanical Vibrations* (Schaum)
Timoshenko, S. & Young, D. H. *Vibration Problems in Engineering* (Van Nostrand)
Yu Chen *Vibrations—Theoretical Methods* (Addison-Wesley)

**543102 ME342 Properties of Materials**

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>ME241</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>One 3-hour paper</td>
</tr>
</tbody>
</table>

**Content**

**Text**

**References**
D’Isa, F. *Mechanics of Metals* (Addison-Wesley)
Fung, Y. C. *A First Course in Continuum Mechanics* (Prentice-Hall)
McClintock & Argon *Mechanical Behaviour of Materials* (Addison-Wesley)
Richards, C. W. *Engineering Materials Science* (Wadsworth)

**543103 ME343 Mechanics of Solids**

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>*CE212</th>
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</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>Progressive assessment</td>
</tr>
</tbody>
</table>

**References**

Content

Texts
Higdon, A. et al Mechanics of Materials (Wiley)

References
Dally, J. W. & Riley, W. F. Experimental Stress Analysis (McGraw-Hill)
Popov Introduction to Mechanics of Solids (Prentice-Hall)

543201 ME352 Fluid Mechanics
Prerequisites ME251
Hours Progressive assessment
Examination 42

Content
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.

Texts Nil
References
Csanady Theory of Turbomachines (McGraw-Hill)
Kovats, A. & Desmur, G. Pumps, Fans and Compressors (Blackie)

543204 ME361 Automatic Control
Prerequisites Maths IIB
Hours 42
Examination Progressive assessment

543202 ME372 Heat Transfer
Prerequisites = Maths IIB
Hours 42

Content

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

172
543501 ME381 Methods Engineering

Prerequisites Maths I, ME222/3
Hours 42
Examination Progressive assessment

Content

Text
Niebel, B. W. *Methods Engineering* (Wiley)

References
Barnes, R. M. *Motion and Time Study* (Wiley)
Krick, E. V. *Motion and Time Study* (Irwin)

543502 ME382 Production Engineering

Prerequisites Maths I, ME222/3
Hours 42
Examination Progressive assessment

Content
Production planning, Inventory functions, Forecasting; Scheduling and control of production. Design of a production control system. Quality and quantity control. Production inventory systems.

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

References
Brown, R. G. *Management Decision for Production Operations* (Holt, Rinehart & Winston)
Buffs, E. S. *Modern Production Management* (Wiley)
Magee, J. & Boodman, D. H. *Production Planning and Inventory Control* (E.U.P.)

543503 ME383 Quality Engineering

Prerequisites Maths IIB, ME222/3
Hours 42
Examination Progressive assessment

Content

Texts Nil

References
Duncan, A. J. *Quality Control and Industrial Statistics* (Irwin)
Grant, E. L. *Statistical Quality Control* (McGraw-Hill)
Juran, J. M. & Gryna, F. M. *Quality Planning and Analysis* (McGraw-Hill)
Kirkpatrick, E. G. *Quality Control for Managers and Engineers* (Wiley)

543504 ME384 Design for Production

Prerequisites ME213, ME222/3
Hours 42
Examination Progressive assessment

Content
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.

Texts Nil
416105 ME385 Accounting and Financial Studies

Content
For subject entry see under Faculty of Economics and Commerce on page 243.

544451 ME401 Systems Analysis
Prerequisites Maths IIB, ME361
Hours 42
Examination Progressive assessment

Content
An introduction to systems concepts. Mathematical modelling and some probability concepts. Deterministic and probabilistic models, stochastic models.

Texts Nil

References
Busacker & Saaty
Finite Graphs and Networks (McGraw-Hill 1965)
Haberman, C.
Engineering Systems Analysis (Merrill 1965)
Hall, A.
A Methodology for Systems Engineering (Van Nostrand 1962)
Machol, R.
Systems Engineering Handbook (McGraw-Hill)
McMillan, C. & Gonzalez, R. F.
Systems Analysis, A Computer Approach to Decision Models (Irwin Dorsey 1968)
Content

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.

References

Firey, K. *Man, Mind and Land* (New York, Free Press 1960)
Zimmerman, E. W. *World Resources and Industries* (New York, Harper 1951)

544417 ME404 Mathematical Programming

Prerequisites

Maths IIB

Hours

42

Examination

Progressive assessment

Content

Introduction to the solution of static optimisation problems. Dynamic programming; computational refinements of the basic algorithm. Linear programming; the Simplex algorithm and its revised form; duality theory; sensitivity analysis; decomposition algorithms. Transportation and assignment problems.

Texts


References

Kunzi, H. P., Kreile, W. & Oettli, W. *Non-Linear Programming* (Blaisdell 1966)

544453 ME407 Environmental Engineering

Prerequisites

Completed Year II of Course

Hours

42

Examination

Progressive assessment

Content

The role of the engineering in environmental pollution and control is examined through interaction of man with air, water, and land masses which comprise the environment in which he lives. Effects of air and noise pollution on man, vegetation, and other materials will be considered. Methods of reducing pollution to acceptable levels will be studied through consideration of physical diffusion models and the examination of existing quality standards, control legislation and various forms of measuring and control hardware.

Texts

Perkin, Henry C. *Air Pollution* (McGraw-Hill)
Taylor, Rupert *Noise* (Penguin Books)

References

Batton, L. J. *The Unclean Sky* (Anchor)
Lund, H. F. *Industrial Pollution Control Handbook* (McGraw-Hill)
Stern, A. C. *Noise Reduction* (McGraw-Hill)
Treshow, M. *Fresh Air* (University of Utah Press)
544422 ME408 Industrial Safety Engineering

| Prerequisite     | Maths II  
|------------------|-----------
| Hours            | 42        
| Examination      | To be advised 
| Content          | A course dealing with both theoretical and practical aspects of engineering safety. The course will include:
  Concepts, principles and techniques in the application of various analytical approaches for engineering system safety and reliability. Applications of statistical analysis to engineering system safety evaluation and design. The fault-free analysis technique and its application to hazard evaluation and to the design of safe systems.
  Human factors and environmental considerations. Particular industrial situations—hazards due to such factors as fire, machinery, electrical components.
  Health hazards due to noise pollution, toxic gases, dangerous chemicals and radio activity.

References
Beranek, L. L. *Noise Reduction* (McGraw-Hill)
C.S.I.R.O. *Safety Handbook 1965*
Guyot & Cole, R. A. *An Introduction to Industrial Safety* (West Publishing Corp.)
S.A.A. *Guide to Safety Standards*
Simonds, R. H. & Grimaldi, J. V. *Safety Management* (Irwin)

544403 ME414 Design of Hydraulic and Pneumatic Power Systems

| Prerequisites     | ME251, *ME352 
|-------------------|-----------
| Hours             | 42        
| Examination       | Progressive assessment 
| Content           | 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.

References
Kay, F. X. *Pneumatics* (Machinery Reference Series)
Molloy, E. *Hydraulic Machinery* (Newnes)
Morris, H. M.  
**Applied Hydraulics in Engineering** (The Ronald Peers Co.)

War, W. G.  
**Hydraulics in Mechanical Handling** (Trade & Technical Press Ltd.)

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**Hydraulic Handling** (Trade & Technical Press Ltd.)

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**Principles of Hydraulics** (Trade & Technical Press Ltd.)

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### 544405 ME415 Design of Crane and Hoist Equipment

**Prerequisites**

*CE303, ME213, ME232

**Hours**

42

**Examination**

Progressive assessment

**Content**

The designs of the mechanical components for various types of cranes, hoists and associated equipment with special reference to The Australian Standard Crane 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.

**Texts**

Nil

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### 544407 ME417 Design of Worm and Special Purpose Gear Reduction Units

**Prerequisites**

ME213, ME232

**Hours**

42

**Examination**

Progressive assessment

**Content**

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.

**Texts**

Nil

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### 544406 ME416 Design of Pressure Vessels, High Pressure Pipelines, Plates and Shells

**Prerequisites**

*ME313, ME342/3

**Hours**

42

**Examination**

Progressive assessment

**Content**


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**References**

- **Morris, H. M.**  
  *Applied Hydraulics in Engineering* (The Ronald Peers Co.)

- **War, W. G.**  
  *Hydraulics in Mechanical Handling* (Trade & Technical Press Ltd.)

---

**Texts**

Nil
544408 ME418 Design of Thermal Unit Components

Prerequisites  ME313, ME372

Hours  42

Examination  Progressive assessment

Content

Text

References
Kays, W. N. & Loudon, A. L.  Combustion Engineering (Combustion Engineering & Superheater Inc.)


—  S.A.A. Boiler Code AS 1200 — 1972 Standards Assn. of Australia
—  S.A.A. Pressure Piping Code CB 18 Standards Assn. of Australia
—  The ASHRAE Handbook Vols. 1 and 2
—  Unfired Pressure Vessels AS 1210 — 1972 Standards Assn. of Australia
—  Water Tube Boilers AS 1228 — 1972 Standards Assn. of Australia

544409 ME419 Design of Conveyors and Materials Handling Equipment

Prerequisites  ME313, ME232

Hours  42

Examination  Progressive assessment

Content
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.

Text
Nil

References
Atherton, W. H.  Conveying Machinery (Technical Press Ltd.)
—  Pneumatic Handling of Powdered Materials
    The Engineers’ Equipment Association (Constable)

Hudson, E. G.  Conveyors (John Wiley—Chapman & Hall)

Spivakovsky & Dyackkov  Conveyors and Related Equipment (Peace Publishers, Moscow)

Stockier, H. E.  Materials Handling (Prentice-Hall)
—  S.A.A. Crane and Hoist Code C.B. 2
—  A.S.B. 3/6/238/255 Conveyor and Elevator Belting

544419 ME434 Advanced Kinematics and Dynamics of Machines

Prerequisites  ME333

Hours  42

Examination  Progressive assessment

Content
Dynamic Motion Analysis; energy distribution method, equivalent mass-and-force method, the rate-of-exchange-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.

Text
Hirschhorn, J.  Kinematics and Dynamics of Plane Motion (McGraw-Hill)

References
Hall, A. S.  Kinematics and Linkage Design (Prentice-Hall 1960)

Holowenko, A. R.  Dynamics of Machines (Wiley)
544416 ME448 An Introduction to Photomechanics
Prerequisites ME342/3
Hours 42
Examination Progressive assessment

Content
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.

References
Dally, J. W. & Riley, W. F. Experimental Stress Analysis (McGraw-Hill 1965)
Durelli, A. J. & Riley, W. F. Introduction to Photomechanics (Prentice-Hall 1965)
Frocht, M. M. Photoelasticity Vol. 1 1st ed., Vol 2 1st ed. (Wiley)

544418 ME449 Reliability Analysis for Mechanical Systems
Prerequisites ME313, Maths IIB
Hours 42
Examination Progressive assessment

Content
Reliability Case Studies. Automobile suspension ignition systems. Measuring system.

Text

References
Haviland, R. P. Engineering Reliability and Long Life Design (Van Nostrand 1964)

544411 ME453 Fluid Mechanics
Prerequisites *ME352
Hours 42
Examination Progressive assessment

Content

Text
Nil

References
Brown, J. H. Hydro-electric Engineering Practice Vol. 2 (Blackie)
Streeter, V. L. & Wylie, E. B. Hydraulic Transients (McGraw-Hill)
Vallentine, H. R. Applied Hydrodynamics (Butterworths)

544461 ME454 Turbomachinery
Prerequisites *ME352
Hours Progressive assessment
Examination 42

Content

Text
Nil
544412 ME473 Thermodynamics

**Prerequisites**
ME271

**Hours**
Progressive assessment

**Examination**
42

**Content**
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 multi-stage vapour-compression cycles,
calculation of refrigeration and air conditioning loads, physical aspects
of equipment.

**Texts**
Nil

**References**
Hatsopoulos, G. N. & Keenan, J. H.  
*Principles of General Thermodynamics*  
(John Wiley)
Jennings, B. H. & Lewis, S. R.  
*Air Conditioning and Refrigeration*  
(International Text Book)
Threlkelo, J. L.  
*Thermal Environmental Engineering*  
(Prentice-Hall)
Van Wylen, G. J. & Sonntag, R. E.  
*Fundamentals of Classical Thermodynamics*  
(John Wiley)  
—  
*Guide and Data Book ASHRAE*

---

544413 ME474 Heat Transfer

**Prerequisites**
ME372

**Hours**
42

**Examination**
Progressive assessment

**Content**
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.

---

544423 ME476 Development in the Use of Solar Energy

**Prerequisites**
ME271, ME372

**Examination**
Progressive assessment

**Content**
Solar radiation — outer atmosphere values and depletion by the earth’s
atmosphere. Diffuse sky radiation and heat balance of earth and
The flat-plate and concentrating solar energy collectors.
Solar engines, refrigeration and air-conditioning.
Solar stills, water heaters and furnaces.
Solar batteries. Solar architecture.
Solar energy and photosynthesis.

**Texts**
Nil

**References**
Threlkeld, J. L.  
*Thermal Environmental Engineering*  
(Prentice-Hall 1970)  
—  
*Journal of the Solar Energy Society*

---

544101 ME481 Engineering Administration

**Prerequisites**
Maths I

**Hours**
42

**Examination**
One 2-hour paper

**Content**
The historical development of the theory and practice of organisation
and administration in industrial enterprises. Nature and types of
organisation. Communications. The management team. The industrial
engineer. Industrial law. Case studies.

**Text**
Buffa, E. S.  
*Modern Production Management* (Wiley)
### 544102 ME482 Engineering Economics

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Maths I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>One 3-hour paper</td>
</tr>
</tbody>
</table>

**Content**

The time value of money, economic criteria for engineering decision making, purchase and replacement economics, cost/benefit analysis. Critical evaluation of cost data for decision making. Introduction to demand, supply, price and the policy of the firm in various market situations. Introduction to decision making theory, Bayesian statistics and operations research.

**Text**

Riggs, J. L. *Economic Decision Models* (McGraw-Hill)

**References**


DeGarmo, E. P. & Canada, J. R. *Engineering Economy* (Collier-Macmillan)

Theuse, H. G. *Engineering Economy* (Prentice-Hall)

### 544431 ME485 Tool Design

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>ME384</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>Progressive assessment</td>
</tr>
</tbody>
</table>

**Content**

The design of tools, jigs and fixtures for various material forming and machining processes. The relative economics of jigs, fixtures and special tooling.

**Texts**

Nil

**References**

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


Mayle, W. R. *Machines and Perception in Industrial Design* (Studio Vista)

Pye, D. *The Nature of Design* (Studio Vista)

Read, H. *Art and Industry* (Faber & Faba)

Schanfer, H. *The Roots of Modern Design* (Studio Vista)

Van Doren, H. *Industrial Design* (McGraw-Hill)

### 544841 ME487 Operations Research — Deterministic Models

<table>
<thead>
<tr>
<th>Prerequisites</th>
<th>Maths II B</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hours</td>
<td>42</td>
</tr>
<tr>
<td>Examination</td>
<td>Progressive assessment</td>
</tr>
</tbody>
</table>

**Content**

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.
Texts
Ackoff, R. L. & Sasienj, M. W.
Wagner, H. W.

References
Hillier, I. S. & Lieberman, G. J.
McMillan, C.
McMillan, C. & Gonzalez, P. F.
Taha, H. A.

544842 ME488 Operations Research — Probabilistic Models
Prerequisites Maths IIB
Hours 42
Examination Progressive assessment
Content
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.

Text
Saaty, T. L.

References
Brown, R. G.
Hadley, G. & Whitin, T. M.
Taha, H. A.

544843 ME489 Operations Research — Applications in Industry
Prerequisites Maths IIB
Hours 42
Examination Progressive assessment

Content
The case study approach to industrial cases. The application of operations research to industrial problems.

Texts Nil

References
Dooley, A. R. et al Casebooks in Production Management (Wiley 1968)
Duckworth, E. A Guide to Operation Research (Methuen 1965)
Eilon, S., Hall, R. I. & King, J. R. Exercises in Industrial Management (Macmillan 1966)
McKenny, J. L. & Rosenbloom, R. S. Cases in Operations Management
Schnelle, K. E. Case Analysis and Business Problem Solving (McGraw-Hill 1967)

544103 ME491 Technical Seminar
Hours 42
Examination Progressive assessment

544203 ME496 Project/Seminar
Hours 126
Examination Progressive assessment

542501 NA201 Theoretical Naval Architecture
Prerequisites *Maths I, ME111/2, ME131, CE111
Hours 42
Examination One 3-hour paper
Content
Hydrostatics, trim and stability, dynamic stability, free surface effects, inclining experiment, launching calculations, use of computers, loading and discharging.

Texts Nil
Reference
Robb, A. M. Theory of Naval Architecture (Charles Griffin & Co.)
542502 NA221 Naval Architecture Technology

Prerequisites  *Maths I, ME111/2, CE111

Hours  42

Examination  One 3-hour paper

Content  Ships' construction and production methods, framing systems, lofting.

Texts  Nil

Reference  Walton & Baxter  *Know Your Own Ship* (Charles Griffin & Co.)

542503 NA241 Applied Naval Architecture

Prerequisites  ME111/2

Hours  84

Examination  Progressive assessment

Content  Drawing exercises, lines plan, structural drawing, hydrostatic calculations.

543602 NA311 Ship Design and Construction

Prerequisites  NA201, NA221, NA241

Hours  42

Examination  One 3-hour paper

Content  Design criteria, tonnage, safety requirements, hull form, general arrangements, propulsion machinery, auxiliary machinery, ships' services. Structural analysis, structural design to the requirements of a classification society.

Texts  

Reference  

543603 NA342 Applied Naval Architecture

Prerequisites  ME251, NA201, NA221, NA241

Hours  84

Examination  Progressive assessment

Content  Design and drawing practice relating to ship design and construction and resistance and propulsion of ships.

Texts  Nil

Reference  —  *Principles of Naval Architecture* (The Society of Naval Architects & Marine Engineers)

543601 NA351 Resistance and Propulsion of Ships

Prerequisites  ME251, NA201, NA221, NA241

Hours  42

Examination  One 3-hour paper


References  

Robb, A. M.  *Theory of Naval Architecture* (Charles Griffin & Co.)


544602 NA402 Special Purpose Ships

Prerequisites  NA311, NA351

Hours  42

Examination  One 3-hour paper

Content  Ships for special cargoes, dredges, tugs, submersibles, offshore structures, supply tenders etc. Design criteria.

Text  

Reference  

196
544604 NA341 Ships' Machinery

**Prerequisites**  NA311, NA351

**Hours**  42

**Examination**  One 3-hour paper

**Content**  Propulsion machinery, auxiliary machinery, deck machinery, rigging, navigational aids.

**Text**  Harrington, R. L. (ed.) Marine Engineering (The Society of Naval Architects)

544601 NA451 Theoretical Naval Architecture

**Prerequisites**  NA311, NA351

**Hours**  42

**Examination**  One 3-hour paper

**Content**  Wave theory, ships dynamics, stabilisers. Sea-going qualities, dynamic positioning.

**Texts**  Nil

**References**  Robb, A. M.  Theory of Naval Architecture (Charles Griffin & Co.)

—  Principles of Naval Architecture (The Society of Naval Architects & Marine Engineers)

544801 NA481 Shipyard Production and Management

**Prerequisites**  Nil

**Hours**  42

**Examination**  One 3-hour paper

**Content**  Pre-fabrication techniques, standardisation, yard lay-out, production planning, contract law, launching arrangements.

544504 NA496 Project/Seminar

**Hours**  126

**Examination**  Progressive assessment

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ME092 to ME096 Industrial Experience Units

**Examination**  Progressive assessment

**Content**  These subject units are designed to formalise the periods of Industrial Experience which may be studied in lieu of elective units by part-time students. Each of the Industrial Experience units is equivalent to one elective unit of 42 hours. Students who wish to study any or all of the Industrial Experience units ME092-096 in lieu of elective units will be required to attend some 10 lecture and tutorial periods which will deal with working and professional environments, essentials of communication and report writing. In addition, each student will be required to present a seminar relating to aspects of his experience and to report to his industrial experience tutor twice per term. Some assignments relating to employment and experience will be set. Students will also be required to present a report giving a connected account and critical evaluation of his engineering activities and experience during the year. Such units may be used by part-time students in lieu of the elective requirements of Clauses 2 and 3, page 156, or vice versa.

**Texts**  Nil

**Reference**  Carmichael, A. J.  A Guide to Students Undertaking Project Work (University of Newcastle)

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Interdepartmental Subjects

The Faculty of Engineering proposes to introduce a number of interdepartmental subjects in Energy Conversion and Management to be offered as fourth year electives. The first of these subjects will be offered in 1975 and will be known as GE471 Energy. It will cover:—

The basics of energy transformations and conversions.

The ramifications of the second law of thermodynamics and its implications in the management of nuclear, solar, chemical, thermal, electrical and mechanical forms of energy.

Full details of the course will not be available until early 1975.
Diploma in Industrial Engineering

General

The Diploma in Industrial Engineering is a postgraduate course directed especially towards those concerned with the planning, supervision and administration of industrial undertakings. The course has a twofold objective. Primarily it has been designed as a bridging course for those graduates with limited or no formal training in the various basic disciplines of industrial engineering. In this respect the programme of study will be selected so as to complement the person's particular technological knowledge with instruction in the industrial field so that he can better perform the functions of industrial management, planning and control. For those persons who already have had, in their undergraduate programme, a comprehensive training in the basic disciplines of industrial engineering, the course has a secondary objective. In this case the aim is to broaden the person's basic training with the offer of study in a wider range of disciplines which have an important application in the industrial engineering field.

Scope of Course

The Diploma programme consists of ten units of formal course work plus two units of project work. Normally this programme shall be completed in not less than two years of part-time study, although in special cases approved by the Faculty Board, the programme may be completed in one year on a full-time study basis.

As specified in the degree Requirements, the basic unit involves a student in a total of approximately 120 hours' work. This total period includes all formal course work plus assignments and study. For a formal instructional course the unit includes 42 hours of lectures or the equivalent.

The approved subjects for the Diploma are arranged in three Groups and are listed in the schedule that follows. The Group I subjects are those required for a basic understanding of the principles of Industrial Engineering while the Groups II and III subjects permit a wider selection for those students already trained in the basic principles.

The programme selected in every case is subject to the approval of the Faculty Board on the recommendation of the Head of the Department.

The general requirements concerning the conditions of award of the Diploma in Industrial Engineering are set out on page 27 of this Handbook.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group I</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME381</td>
<td>Methods Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ME382</td>
<td>Production Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ME385</td>
<td>Accounting &amp; Financial Studies</td>
<td>1</td>
</tr>
<tr>
<td>ME401</td>
<td>Systems Analysis</td>
<td>1</td>
</tr>
<tr>
<td>ME487</td>
<td>Operations Research — Deterministic Models</td>
<td>1</td>
</tr>
<tr>
<td>ME488</td>
<td>Operations Research — Probabilistic Models</td>
<td>1</td>
</tr>
<tr>
<td>ME582D</td>
<td>Industrial Computations</td>
<td>1</td>
</tr>
<tr>
<td>ME681D</td>
<td>Industrial Law</td>
<td>2</td>
</tr>
<tr>
<td>ME682D</td>
<td>Case Studies in Industrial Management</td>
<td>1</td>
</tr>
<tr>
<td>ME683D</td>
<td>Engineering Economics</td>
<td>2</td>
</tr>
<tr>
<td><strong>Group II</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME402</td>
<td>Systems Planning, Organisation &amp; Control</td>
<td>1 ME401</td>
</tr>
<tr>
<td>ME403</td>
<td>Resources Planning &amp; Allocation</td>
<td>1 ME401</td>
</tr>
<tr>
<td>ME404</td>
<td>Mathematical Programming</td>
<td>1</td>
</tr>
<tr>
<td>ME407</td>
<td>Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ME408</td>
<td>Industrial Safety Engineering</td>
<td>1</td>
</tr>
<tr>
<td>ME419</td>
<td>Design of Conveyors &amp; Materials Handling Systems</td>
<td>1</td>
</tr>
<tr>
<td>ME444</td>
<td>Properties of Materials</td>
<td>1</td>
</tr>
<tr>
<td>ME449</td>
<td>Reliability Analysis for Mechanical Systems</td>
<td>1</td>
</tr>
<tr>
<td>ME485</td>
<td>Tool Design</td>
<td>1</td>
</tr>
<tr>
<td>ME486</td>
<td>Industrial Design</td>
<td>1</td>
</tr>
<tr>
<td>ME489</td>
<td>Operations Research — Applications in Industry</td>
<td>1 ME487, ME488</td>
</tr>
<tr>
<td>ME685D</td>
<td>Industrial Process Control</td>
<td>1 ME401, or equivalent</td>
</tr>
<tr>
<td>ME686D</td>
<td>Industrial Psychology</td>
<td>1</td>
</tr>
<tr>
<td>ME503G</td>
<td>Design of Experiments for Engineering Research</td>
<td>2</td>
</tr>
<tr>
<td>ME505G</td>
<td>Systems Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>ME507G</td>
<td>Resources Planning &amp; Allocation</td>
<td>2</td>
</tr>
<tr>
<td>ME517G</td>
<td>Materials Handling &amp; Transportation Systems</td>
<td>2</td>
</tr>
<tr>
<td>ME535G</td>
<td>Vibration &amp; Noise Problems in Industry</td>
<td>2</td>
</tr>
<tr>
<td>ME583G</td>
<td>Modelling of Management Problems</td>
<td>1</td>
</tr>
<tr>
<td>ME584G</td>
<td>Simulation</td>
<td>1</td>
</tr>
<tr>
<td><strong>Group III</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Subjects approved by the Faculty Board for an individual course but not included in Group I or Group II</td>
<td>The number of units to be assigned to these subjects will be determined by the Board</td>
<td></td>
</tr>
</tbody>
</table>

* Except where indicated the prerequisites will be those indicated in the Faculty of Engineering Handbook
Diploma Subject Entries

540152 ME582D Industrial Computations

Prerequisites
Nil

Hours
42

Examination
Progressive assessment

Content

Text
Guttman, I. & Wilks, S. S.  Introductory Engineering Statistics (Wiley)

References
Moroney, M. J. Facts from Figures (Pelican)
Paradine, C. G. & Rivett, B.H.P. Statistical Methods for Technologists (E.U.P.)
Walpole, R. E. Introduction to Statistics (Macmillan)

540162 ME682D Case Studies in Industrial Management

Prerequisites
Nil

Hours
42

Examination
Progressive assessment

Content
Studies in organisational and executive action requirements of specific industrial situations, using the case study method.

Texts
Nil

References
Blank, P. M. & Scott, W. R. Formal Organisation (Routledge & Keegan)
Dubin, R. The World of Work (Prentice-Hall)

540171 ME683D Engineering Economics

Prerequisites
Nil

Hours
84

Examination
One 3-hour paper

Content
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.

Text
Riggs, J. L. Economic Decision Models (McGraw-Hill)

References
Grant, E. L. & Ireson, E. G. Principles of Engineering Economy (Ronald)
Merritt, A. J. & Skyes, A. The Finance and Analysis of Capital Projects (Longmans)
Samuelson, P. A. Economics (McGraw-Hill)

540173 ME684D Project

Hours
84

Examination
Progressive assessment

540174 ME685D Industrial Process Control

Prerequisites
Nil

Hours
To be advised

Examination
Progressive assessment

Content
Principles and techniques applicable to the analysis and design of control systems with particular application to industrial processes. Modelling of control systems. Time and frequency domain analysis of linear systems. Basic control actions. Detecting, measuring and correcting elements. Introduction to non-linear control. Introduction to system identification applied to industrial processes.
540175 ME686D Industrial Psychology

Prerequisites Nil

Hours To be advised

Examination Progressive assessment

Content
Course dealing with the psychological aspects of human operation in industrial systems.

Texts Nil

References To be advised

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 or postgraduate diploma material may be taken from inside or 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. It will be necessary for the Dean, as administrative head of the Faculty, to approve the 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 following pages contain departmental listings of approved M.Eng.Sc. subjects and some suggested programmes for integrated courses in various areas of interest. A student may, however, select any combination of the listed topics subject to the approval of the Head(s) of the relevant Department(s) and the Dean.
RECOMMENDED PROGRAMMES

It is recommended that candidates wishing to specialise in one of the following areas should select their course work programme from the subjects listed for that area.

A. Applied Mechanics/Structures

<table>
<thead>
<tr>
<th>Subjects offered by the Department of Civil Engineering</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE511G Advanced Structural Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>CE512G Prestressed Concrete Design</td>
<td>2</td>
</tr>
<tr>
<td>CE553G Civil Engineering Systems</td>
<td>2</td>
</tr>
</tbody>
</table>

Department of Civil Engineering

<table>
<thead>
<tr>
<th>Subjects offered by other Faculties</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mathematics</td>
<td></td>
</tr>
<tr>
<td>Programming &amp; Algorithms</td>
<td>1</td>
</tr>
<tr>
<td>Data Structures &amp; Programming</td>
<td>1</td>
</tr>
<tr>
<td>Mathematics III, Topic Z</td>
<td>1</td>
</tr>
</tbody>
</table>

Department of Commerce

| Commercial Programming               | 1     |

B. Computer Science

Department of Electrical Engineering

| EE516 Computer-Aided Analysis of Power Systems | 1 |
| EE563 Computer Operating Systems              | 1 |
| EE564 Compilers, Assemblers & Interpreters   | 1 |
| EE565 Pattern Recognition                     | 1 |
| EE566 Automata & Computing Machines           | 1 |
| EE567 Computer Process Control                | 1 |
| EE568 Advanced Computer Architecture          | 1 |
| EE569 Formal Languages & Automata             | 1 |

Department of Mechanical Engineering

| ME581G Mathematical Programming              | 2 |

C. Engineering Materials

<table>
<thead>
<tr>
<th>Department of Civil Engineering</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE521G Materials of Construction</td>
<td>2</td>
</tr>
<tr>
<td>CE522G Advanced Rock &amp; Earth Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CE552G Transportation &amp; Traffic Engineering</td>
<td>2</td>
</tr>
</tbody>
</table>

Department of Mechanical Engineering

<table>
<thead>
<tr>
<th>Subjects offered by other Faculties</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mechanical Engineering</td>
<td></td>
</tr>
<tr>
<td>ME503G Design of Experiments for Engineering Research</td>
<td>2</td>
</tr>
<tr>
<td>ME511G Experimental &amp; Theoretical Stress Analysis</td>
<td>2</td>
</tr>
<tr>
<td>ME517G Materials Handling &amp; Transportation Systems</td>
<td>2</td>
</tr>
<tr>
<td>ME546G Elasticity, Plasticity &amp; Applications</td>
<td>2</td>
</tr>
<tr>
<td>ME581G Mathematical Programming</td>
<td>2</td>
</tr>
</tbody>
</table>

Together with approved topics and subjects which may be offered by the Faculties of Science and Applied Science.

D. Environmental Studies/Environmental Engineering

Department of Chemical Engineering

| ChE501 Chemical Process Principles for Effluent Control | 1 |
| ChE513 Advanced Combustion                              | 2 |
| ChE521 Air Pollution Effluent Control                   | 2 |
| ChE522 Control of Industrial Liquid Effluents           | 2 |
| ChE623 Advanced Topics in Effluent Control              | 1 or 2 |

Department of Civil Engineering

| CE534G Water & Waste Water Treatment                  | 2 |
| CE535G Water Pollution & Water Quality Management    | 2 |

Department of Mechanical Engineering

<table>
<thead>
<tr>
<th>Subjects offered by other Faculties</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Mechanical Engineering</td>
<td></td>
</tr>
<tr>
<td>ME503G Design of Experiments for Engineering Research</td>
<td>2</td>
</tr>
<tr>
<td>ME505G Systems Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>ME507G Resources Planning &amp; Allocation</td>
<td>2</td>
</tr>
<tr>
<td>ME508G Air Pollution Studies</td>
<td>2</td>
</tr>
<tr>
<td>ME535G Vibration &amp; Noise Problems in Industry</td>
<td>2</td>
</tr>
<tr>
<td>ME573G Heat Transfer</td>
<td>1</td>
</tr>
<tr>
<td>ME581G Mathematical Programming</td>
<td>2</td>
</tr>
</tbody>
</table>

Together with approved topics or subjects which may be offered by other Faculties.

E. Fluid Mechanics/Water Resources Engineering

Department of Civil Engineering

<p>| CE531G Advanced Fluid Mechanics (Civil)               | 2 |
| CE532G River &amp; Coastal Engineering                    | 2 |
| CE534G Waste &amp; Waste Water Treatment                  | 2 |
| CE535G Water Pollution &amp; Water Quality Management    | 2 |</p>
<table>
<thead>
<tr>
<th>Department of Mechanical Engineering</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME505G Systems Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>ME554G Fluid Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>ME555G Advanced Turbomachinery</td>
<td>2</td>
</tr>
<tr>
<td>ME581G Mathematical Programming</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>F. Furnace Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Department of Chemical Engineering</td>
<td></td>
</tr>
<tr>
<td>ChE502 Reaction Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE511/512 Advanced Heat Transfer</td>
<td>2</td>
</tr>
<tr>
<td>ChE513 Advanced Combustion</td>
<td>2</td>
</tr>
<tr>
<td>ChE514 Furnace Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE521 Air Pollution Effluent Control</td>
<td>2</td>
</tr>
<tr>
<td>ChE542 Comminution</td>
<td>1 or 2</td>
</tr>
<tr>
<td>Department of Electrical Engineering</td>
<td></td>
</tr>
<tr>
<td>EE542 Modern Control</td>
<td>1</td>
</tr>
<tr>
<td>EE546 Modern Control</td>
<td>1</td>
</tr>
<tr>
<td>Department of Mechanical Engineering</td>
<td></td>
</tr>
<tr>
<td>ME503G Design of Experiments for Engineering Research</td>
<td>2</td>
</tr>
<tr>
<td>ME581G Mathematical Programming</td>
<td>2</td>
</tr>
<tr>
<td>G. Operations Research/Management Science</td>
<td></td>
</tr>
<tr>
<td>Department of Chemical Engineering</td>
<td></td>
</tr>
<tr>
<td>ChE531 Process Optimization</td>
<td>2</td>
</tr>
<tr>
<td>Department of Civil Engineering</td>
<td></td>
</tr>
<tr>
<td>CE551G Construction Planning &amp; Control</td>
<td>2</td>
</tr>
<tr>
<td>CE552G Civil Engineering Systems</td>
<td>2</td>
</tr>
<tr>
<td>Department of Mechanical Engineering</td>
<td></td>
</tr>
<tr>
<td>ME502G Operations Research &amp; Decision Theory</td>
<td>2</td>
</tr>
<tr>
<td>ME505G Systems Analysis &amp; Design</td>
<td>2</td>
</tr>
<tr>
<td>ME581G Mathematical Programming</td>
<td>2</td>
</tr>
<tr>
<td>ME582G Probabilistic Models in Operations Research</td>
<td>2</td>
</tr>
<tr>
<td>ME583G Modelling of Management Problems</td>
<td>1</td>
</tr>
<tr>
<td>ME584G Simulation</td>
<td>1</td>
</tr>
<tr>
<td>ME685G Advanced Operations Research</td>
<td>2</td>
</tr>
</tbody>
</table>

**Subject offered by other Faculties**

Department of Mathematics

Selected Topics in Mathematics IV.

Department of Commerce

Selected topics from Diploma in Business Studies

Where possible it is recommended that students who wish to study in this area undertake subjects ME581G to ME584G inclusive as a first year programme.

<table>
<thead>
<tr>
<th>Department of Chemical Engineering</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE502 Reaction Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE513 Advanced Combustion</td>
<td>2</td>
</tr>
<tr>
<td>ChE514 Furnace Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE531 Process Optimization</td>
<td>2</td>
</tr>
<tr>
<td>ChE541 Particulate Separations</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE542 Comminution</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE603 Advanced Problems in Mass Transfer &amp; Reaction Engineering</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

Department of Electrical Engineering

EE542 Modern Control | 1
EE546 Modern Control | 1

Department of Mechanical Engineering

ME502G Operations Research & Decision Theory | 2
ME503G Design of Experiments for Engineering Research | 2
ME546G Elasticity, Plasticity & Applications | 2
ME581G Mathematical Programming | 2
ME685G Advanced Operations Research | 2

I. Systems

Department of Civil Engineering

CE533G Civil Engineering Systems | 2

Department of Electrical Engineering

EE541 Sample Data Control Systems | 1
EE542 Modern Control | 1
EE543 Optimization Techniques | 1
EE544 Communication Systems | 1
EE545 Communication Systems | 1
EE546 Modern Control | 1
EE547 Digital Communications | 1
EE552 Advanced Topics in Communication Systems | 1
EE567 Computer Process Control | 1

Department of Mechanical Engineering

ME505G Systems Analysis & Design | 2
ME581G Mathematical Programming | 2

Subjects offered by other Faculties

Department of Mathematics

Stochastic Processes
Signal Detection
General Statement
Before preparing their course for any year students should check in the
Departmental lists which subjects are to be offered in that year.
Approval for any course chosen from the subject listings must be given by
the Head of the Department concerned and the Dean of the Faculty of
Engineering.

General Prerequisites
The general prerequisite for all subjects is graduate level in appropriate
subjects. However, specific prerequisites are necessary for certain subjects
and these are listed in the subject description where applicable.

DEPARTMENT OF CHEMICAL ENGINEERING

The following topics have been approved for inclusion in the M.Eng.Sc.
course programme. Those topics which will not be offered in 1975 are
marked †. The other topics are offered subject to adequate enrolment.
Units are equivalent to 42 hours contact time.

Formal lecture courses 1975

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE501</td>
<td>Chemical Process Principles for Effluent Control</td>
<td>1</td>
</tr>
<tr>
<td>ChE503</td>
<td>Computational Methods in Chemical Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE511</td>
<td>Advanced Heat Transfer</td>
<td></td>
</tr>
<tr>
<td>ChE512</td>
<td>(a) Radiative Transfer</td>
<td>1</td>
</tr>
<tr>
<td>ChE513</td>
<td>(b) Conduction &amp; Convection</td>
<td>1</td>
</tr>
<tr>
<td>ChE514</td>
<td>Advanced Combustion***</td>
<td>2</td>
</tr>
<tr>
<td>ChE515</td>
<td>Furnace Engineering***</td>
<td>2</td>
</tr>
<tr>
<td>ChE516</td>
<td>Energy Management</td>
<td>2</td>
</tr>
<tr>
<td>ChE517</td>
<td>Reaction Engineering</td>
<td>2</td>
</tr>
<tr>
<td>ChE521</td>
<td>Air Pollution Effluent Control***</td>
<td>2</td>
</tr>
<tr>
<td>ChE522</td>
<td>Control of Industrial Liquid Effluents***</td>
<td>2</td>
</tr>
<tr>
<td>ChE531</td>
<td>Process Optimization</td>
<td>2</td>
</tr>
</tbody>
</table>

Tutorial topics

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>ChE523</td>
<td>Particulate Separations</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE524</td>
<td>Comminution</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE611</td>
<td>Advanced Problems in Mass Transfer &amp; Reaction Engineering</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE612</td>
<td>Advanced Topics in Heat Transfer</td>
<td>1 or 2</td>
</tr>
<tr>
<td>ChE621</td>
<td>Advanced Topics in Effluent Control</td>
<td>1 or 2</td>
</tr>
</tbody>
</table>

On consultation with the Department, courses can be planned to specialise either in environmental control or in furnace engineering.

† Chemical Process Principles is recommended as a prerequisite to these courses for students who have not previously completed Chemical Engineering subjects.

SUBJECT ENTRIES

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>510128</td>
<td>ChE501 Chemical Process Principles for Effluent Control</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 42 hours</td>
<td></td>
</tr>
</tbody>
</table>

Content
This is primarily a bridging course for students in the field of environmental control who have not had a chemical engineering background, and deals with specific problems in stoichiometry, particle separation and reaction rate related to gas and water treatment methods.

Texts
Nil

References
Himmelblau, D. M. *Basic Principles and Calculations in Chemical Engineering* (2nd ed. Prentice-Hall 1967)
Levenspiel, O. *Chemical Reaction Engineering* (2nd ed. Wiley 1972)

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>510129</td>
<td>ChE503 Computational Methods in Chemical Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Approx. 84 hours</td>
<td></td>
</tr>
</tbody>
</table>

Examination
To be advised

Content
The advent of digital computers has changed the approach of chemical engineers to design and analysis. The course is aimed at illustrating how mathematics may be applied to chemical engineering problems when it is realised that the resulting model can be solved on computers. Examples will be taken from statistics, fluid mechanics, stage operations, reaction engineering, automatic control and optimization.

Texts
— *Fortran IV Manual*

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>510117</td>
<td>ChE511 Advanced Heat Transfer</td>
<td></td>
</tr>
<tr>
<td>510118</td>
<td>ChE512 Advanced Heat Transfer</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hours</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ChE511 — 42 hours, ChE512 — 42 hours</td>
<td></td>
</tr>
</tbody>
</table>
Part (a)
ChE511

Part (b)
ChE512
Studies in heat transfer in packed beds (e.g. blast furnaces, catalytic reactors) and in unsteady conditions.

Text
Part (a)
Hottel, H. C. & Sarofim, A. C. 
Radiative Transfer (McGraw-Hill 1968)

510122 ChE513 Advanced Combustion
Hours Approx. 84 hours

Content
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 systems; prediction of flame length, shape and radiative properties.

Texts
Field, M. A. et al Combustion of Pulverized Coal (BCURA 1967)

References
Thring, M. W. Science of Flames and Furnaces (Chapman & Hall 1962)

510126 ChE514 Furnace Engineering

Prerequisites Advanced Heat Transfer desirable but not essential
Hours Approx. 84 hours

Content
The design and operation of furnaces; heat balances, calculation of losses, insulation, gas recuperation and regeneration; approximate methods of heat-transfer computation; temperature distribution; refractories; physical construction; control; fuels and firing methods; economics of fuel selection and waste-heat recovery; effluent pollution control.

Texts
Thring, M. W. Science of Flames and Furnaces (Chapman & Hall 1962)
Trinck, W. & MacWhinney Industrial Furnaces (J. Wiley)

510135 ChE515 Energy Management

Hours Three hours per week

Content
The cost-price structure of energy supply; factors influencing relative costs of coal-oil gas-electricity.
Technical possibilities and limitations in change of fuel and energy sources for existing equipment.
Primary fuel conversion; liquid fuels from coal and gas.
Energy economy in process plant; the thermodynamics of heating and power generation. Methods of loss assessment and management of in plant energy use; loss control by furnace insulation, sensible heat recuperation and regeneration. Combustion control. Steam economy; the high cost of steam, the sensible use of latent heat; heat exchangers for low level heat recovery. Energy losses in mechanical and fluid-flow systems. Efficient and inefficient speed and flow control systems.
Combined power and process heat systems; the gas turbine in process plant; reversed cycles; the heat pump for distillation and other process systems. Energy storage, in hot water, as latent heat, in solid storage systems, as chemical energy in cells or in intermediate products.
The international resource situation. Energy resources for the future. (Nuclear, solar direct and vegetable growth, etc.)

Text
Hottel, H. C. & Howard, J. B. New Energy Technology (Massachusetts Institute of Technology 1971)

References To be advised
510125 ChE516 Reaction Engineering

Hours Approx. 84 hours

Content
Kinetics of reactions involving mass transfer with chemical reaction and their application to the design of reactors for gas-solid catalytic reactions.

510123 ChE521 Air Pollution Effluent Control

Hours Approx. 84 hours

Content
The general problem; 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. Process modification, by-product recovery, removal of pollutants by reaction, costs and economics.

Text
Strauss, W. *Industrial Gas Cleaning* (Pergamon 1967)

OR


References
Fuchs, N. *Mechanics of Aerosols* (Pergamon 1965)

Stern, A. C. *Air Pollution* (Pergamon 1965)

510124 ChE522 Control of Industrial Liquid Effluents

Hours Approx. 84 hours

Content

Texts
Nil

References

Nemerow, N. L. *Liquid Waste of Industry* (Addison-Wesley 1971)

510127 ChE531 Process Optimization

Hours Approx. 84 hours

Content
The course will consist of lectures, tutorials and guided reading on the mathematical methods used in the optimisation of process plant. Students should be proficient in mathematics and computer programming. Numerical and analytical methods for the optimising of single and multivariable functions including hill climbing techniques. Linear and dynamic programming. Economic profitability criteria including the handling of uncertainty — simulation. Introduction to reliability engineering.

Text

Reference
### Tutorial Courses — Selected Topics

**Content**

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, in Reaction Engineering, or in detailed study of advanced topics in the field of environmental control.

- S10139 ChE523 Particulate Separations
- S10140 ChE524 Communion
- S10136 ChE611 Advanced Problems in Mass Transfer and Reaction Engineering
- S10137 ChE612 Advanced Topics in Heat Transfer
- S10138 ChE621 Advanced Topics in Effluent Control

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### DEPARTMENT OF CIVIL ENGINEERING

The following subjects have been approved for inclusion in the M.Eng.Sc. course programme. Those subjects which will not be offered in 1975 are marked ¥. The other subjects will be offered subject to adequate enrolment.

#### LECTURE COURSES

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CES511G</td>
<td>Advanced Structural Analysis &amp; Design ***</td>
<td>2</td>
</tr>
<tr>
<td>CES512G</td>
<td>Prestressed Concrete Design ***</td>
<td>2</td>
</tr>
<tr>
<td>CES513G</td>
<td>Materials of Construction ***</td>
<td>2</td>
</tr>
<tr>
<td>CES522G</td>
<td>Advanced Earth &amp; Rock Engineering</td>
<td>2</td>
</tr>
<tr>
<td>CES531G</td>
<td>Advanced Fluid Mechanics (Civil) ***</td>
<td>2</td>
</tr>
<tr>
<td>CES532G</td>
<td>River &amp; Coastal Engineering ***</td>
<td>2</td>
</tr>
<tr>
<td>CES534G</td>
<td>Water &amp; Waste Water Treatment ***</td>
<td>2</td>
</tr>
<tr>
<td><strong>CES535G</strong></td>
<td>Water Pollution &amp; Water Quality Management ***</td>
<td>2</td>
</tr>
<tr>
<td><strong>CES535G</strong></td>
<td>Construction Planning &amp; Control ***</td>
<td>2</td>
</tr>
<tr>
<td><strong>CES535G</strong></td>
<td>Transportation &amp; Traffic Engineering ***</td>
<td>2</td>
</tr>
<tr>
<td><strong>CES535G</strong></td>
<td>Civil Engineering Systems ***</td>
<td>2</td>
</tr>
</tbody>
</table>

- First half year
- **Second half year
- *** Full year

#### SUBJECT ENTRIES

**520103 CES511G Advanced Structural Analysis and Design ***

<table>
<thead>
<tr>
<th>Hours</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>One 3-hour paper</td>
</tr>
</tbody>
</table>

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### Content

This course is oriented towards the analysis and design of steel structures. Two topics from the following will be selected.

1. Instability of beams, columns, and frames, including analysis of thin walled sections in torsion.
2. Matrix analysis of structures, including finite element methods. (It will be assumed that students have some familiarity with the linear matrix displacement method).
3. Advanced plastic analysis including linear programming methods of analysis and design.

**Texts**

- To be advised

**References**

- Galambos, T. V. *Structural Members and Frames* (Prentice-Hall 1968)

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**520105 CES512G Prestressed Concrete Design**

<table>
<thead>
<tr>
<th>Hours</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two  lecture hours and one tutorial hour per week</td>
<td>One 3-hour paper</td>
</tr>
</tbody>
</table>

**Content**

Review of design procedures of statically determinate prestressed concrete structure, 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.

**Text**

- AS1481 — 1974 — SAA Prestressed Concrete Code Standards Association of Australia

**References**

- Guyon, Y. *Prestressed Concrete Vols. I and II* (Wiley)
- Lonhardt, F. *Prestressed Concrete Design and Construction* (Wilhelm Ernst & Sohn)

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**520106 CES521G Materials of Construction**

**Prerequisites**

- Nil

<table>
<thead>
<tr>
<th>Hours</th>
<th>Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>One  lecture hour, one tutorial hour and one laboratory hour per week</td>
<td>One 3-hour paper</td>
</tr>
</tbody>
</table>

---

**Text**

- AS1481 — 1974 — SAA Prestressed Concrete Code Standards Association of Australia
**References**

Leliavsky, S.  
*An Introduction to Fluvial Hydraulics*  
(Dover 1966)

Leopold, L. B., Wolman, M. G. & Miller, J. P.  
*Fluvial Processes in Geomorphology*  
(Freeman 1964)

Streeter, V. L. (ed.)  
*Handbook of Fluid Dynamics*  
(McGraw-Hill 1961)

Wiegel, R. L.  
*Oceanographical Engineering*  
(Prentice-Hall 1964)

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**CE534G Water and Wastewater Treatment***

**Hours**  
Two lecture hours and one tutorial hour per week

**Examination**  
One 3-hour paper

**Content**  

**Texts**  
Nil

**References**

Eckenfelder, W. W.  
*Water Quality Engineering*  
(Barnes & Noble 1970)

Imhof, K., Muller, W. J. & Thistlethwayte, D. K. B.  
*Disposal of Sewage and Other Waterborne Wastes*  
(2nd ed. Butterworth 1971)

Klein, L.  
*River Pollution Vol. 2 Causes and Effects*  
(Butterworths 1962)

Klein, L.  
*River Pollution Vol. 3 Control*  
(Butterworths 1966)

Kneese, A. & Bower, B. T.  
*Managing Water Quality: Economics, Technology, Institutions*  
(John Hopkins Press 1968)

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**CE551G Construction Planning and Control***

**Hours**  
One and a half lecture hours and one and a half tutorial hours per week

**Examination**  
One 3-hour paper

**Content**

2. Use of ICL computer package in Network Analysis.
3. Planning Assignment: Example of major project planning and control.

**Preliminary Reading**

Antill, J. M.  
*Civil Engineering Management*  
(Angus & Robertson 1970)

**Texts**  
*Computer Manual ICL1900 Series PERT*
520112 CE552G Transportation and Traffic Engineering

*Hours* One and a half lecture hours and one and a half tutorial hours per week

*Examination* One 3-hour paper

*Content*
Transport in the National economy. Sociological and environmental evaluation of transportation systems. Land-use/transport interaction; demands for travel.

Transportation planning; data collection, trip generation, trip distribution, traffic assignment, modal split, economic evaluation. The role of new technologies, possible system innovations.

Traffic Engineering.

Economic Analysis for Highways.

*Text*
Bruton, M. J. *Introduction to Transportation Planning* (Hutchinson 1970)

*Reference*

520113 CE553G Civil Engineering Systems

*Hours* Two lecture hours and one tutorial hour per week

*Examination* One 3-hour paper

*Content*
Introduction to system analysis. Mathematical programming and optimisation techniques; applications to problems in structural design, engineering management, water resource systems and transportation.

*Texts* Nil

*References*


DEPARTMENT OF ELECTRICAL ENGINEERING

The following subjects have been approved for inclusion in the M.Eng.Sc. course programme. Those subjects which will not be offered in 1975 are marked †. The other subjects will be offered subject to adequate enrolment.

*All subjects are 1 unit (42 hours) unless otherwise noted.*

†EE516 Computer-Aided Analysis of Power Systems
EE541 Sample Data Control Systems *
EE542 Modern Control **
†EE543 Optimization Techniques
EE544 Communication Systems **
†EE545 Communication Systems *
†EE546 Modern Control
EE547 Digital Communications **
†EE552 Advanced Topic in Communication Systems **
EE563 Computer Operating Systems *
EE564 Compilers, Assemblers & Interpreters **
EE565 Pattern Recognition **
†EE566 Automata & Computing Machines
†EE567 Computer Process Control
EE568 Advanced Computer Architecture **
EE569 Formal Languages & Automata *
EE580 Thesis/Project (by arrangement)
EE590 Seminar ***

* First half year
** Second half year
*** Full year

SUBJECT ENTRIES

530100 EE516 Computer-Aided Analysis of Power Systems (not offered in 1975)

*Content*
Application of digital computers to the analysis of power systems, with emphasis on loss and fault calculations, and optimization.

*Text*
53017  EE541 Sample Data Control Systems *

**Prerequisites**  Consent of instructor

**Hours**  Three hours of lectures, tutorial and laboratory work per week

**Examination**  Progressive assessment, a term paper and a final examination

**Content**  Sampled-data control systems, z-transform, state-variable techniques, sampling and reconstruction.


**Reference**  Kuo, B. C.  *Discrete-Data Control Systems*  (Prentice-Hall Inc. 1970)

53012 EE542 Modern Control**  (Nonlinear Optimal Control Theory)

**Prerequisites**  EE341 and EE342

**Hours**  Three hours of lectures, tutorials and laboratory work per week

**Examination**  Progressive assessment and final examination

**Content**  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.


**Reference**  Sage, A. P.  *Optimum Systems Control*  (Prentice-Hall 1968)

530120 EE543 Optimization Techniques  (not offered in 1975)

**Content**  Mathematical background to optimization. Comparison of optimization methods; engineering applications — such as to problems of identification, control, pattern recognition and resource allocation.

Text
Masanao, A.  *Introduction to Optimization Techniques (Fundamentals and Applications of Nonlinear Programming)*  (New York, Macmillan 1971)

Reference
Donald, P.  *Optimization Theory with Applications*  (New York, Wiley 1969)

530104 EE544 Communication Systems**

**Prerequisites**  EE331, EE332 or EE341, EE342 or consent of instructor.

**Hours**  Three hours per week

**Examination**  Progressive assessment and final examination

**Content**  Introduction to the common forms of analog modulation, as well as pulse modulation systems including pulse code modulation. Performance in the presence of noise is considered.


530123 EE545 Communications Systems*  (not offered in 1975)

**Prerequisites**  EE342 or equivalent

**Content**  Stochastic processes including stationary gaussian processes from a time-domain viewpoint. Kalman filtering and application to AM and FM demodulation.


530128 EE546 Modern Control  (Linear Optimal Control Theory)

**Prerequisites**  EE341 and EE342

**Content**  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.
Text
Anderson, B. D. & Moore, J. B. Linear Optimal Control (Prentice-Hall 1971)

530129 EE547 Digital Communication **
Prerequisites Consent of instructor
Hours Three hours of lectures and tutorials per week
Examination Progressive assessment, a term paper and a final examination
Content (1) and (2) as for EE447
Text To be advised

530110 EE552 Advanced Topics in Communications Systems ** (not offered in 1975)
Prerequisites EE451 or Physics III or consent of instructor
Content A primarily experimental course with some lectures and tutorial work. Generation and modulation of microwave frequencies; measurement of frequency, wave length and attenuation; use of stubs and other forms of impedance matching.
Texts To be advised
References As for EE447

530117 EE563 Computer Operating Systems*
Prerequisite EE361
Hours Three hours per week
Examination Progressive assessment and final examination
Text Hansen Operating System Principles (Prentice-Hall)
References Coffin & Denning Operating System Theory (Prentice-Hall)
Donovan Systems Programming (McGraw-Hill)

530118 EE564 Compilers, Assemblers and Interpreters**
Prerequisite EE361
Hours Three hours per week
Examination Progressive assessment and final examination
Text Nil
Gries Compiler Construction for Digital Computers (Wiley)
References Donovan Systems Programming (McGraw-Hill)
Gear Computer Organisation and Programming (McGraw-Hill)
Stone Introduction to Computer Organisation and Data Structures (McGraw-Hill)

530108 EE565 Pattern Recognition**
Prerequisite Maths IIB
Hours Three hours of lectures, tutorials and laboratory work per week
Examination Progressive assessment and final examination
Content 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.
Texts Nil
References Fu, K. S. Sequential Methods in Pattern Recognition and Machine Learning (Academic Press 1968)
Nilsson, J. Learning Machines (McGraw-Hill)
Sebestyen, G. Decision-making Processes in Pattern Recognition (New York, Macmillan Book Co. 1962)
Uhr Pattern Recognition (Wiley 1966)

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<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>530119</td>
<td>EE566 Automata and Computing Machines (not offered in 1975)</td>
<td>Prerequisite: Maths I</td>
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<tr>
<td></td>
<td></td>
<td>Content: An introduction to the theory of finite and infinite computation, and to logic machines.</td>
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<tr>
<td></td>
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<td>Texts: Nil</td>
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<td>References:</td>
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<tr>
<td></td>
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<td>Hennia, F.</td>
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<td></td>
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<td>Arbib, M.</td>
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<td>Minsky, M.</td>
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<td>Finite State Models for Logical Machines (John Wiley)</td>
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<td>Brains, Machines and Mathematics (McGraw-Hill)</td>
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<td></td>
<td></td>
<td>Computation (Finite and Infinite Machines) (Prentice-Hall)</td>
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<tr>
<td>530125</td>
<td>EE567 Computer Process Control (not offered in 1975)</td>
<td>Prerequisite: Maths I</td>
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<tr>
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<td>Content: Modelling the automated process — physical and economic models. Optimization of both well defined and poorly defined processes. Computer simulation languages. Analog computation.</td>
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<td></td>
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<td>Text: Nil</td>
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<td>References:</td>
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<td></td>
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<td>Lee, T. H.</td>
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<td>Adams, G. E. &amp;</td>
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<td>Gains, W. M.</td>
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<td></td>
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<td>Stephenson, R. E.</td>
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<td></td>
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<td>Computer Process Control (Wiley 1968)</td>
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<td></td>
<td>Computer Simulation for Engineers (Harcourt Brace &amp; Jovianovich 1971)</td>
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<tr>
<td>530121</td>
<td>EE568 Advanced Computer Architecture**</td>
<td>Hours: 3 hours of lectures, seminars and tutorials per week</td>
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<td>Examination: Progressive assessment and final examination</td>
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<tr>
<td>530122</td>
<td>EE569 Formal Languages and Automata*</td>
<td>Prerequisites: Maths I</td>
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<td>Corequisite: EE564 complements course but not mandatory</td>
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<td>Hours: Three hours per week</td>
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<td>Examination: Progressive assessment and final examination</td>
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<td>Content: Languages and Grammars. Properties of regular, context-free and context-sensitive grammars. Relationship between automata and formal languages.</td>
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<td>Text: Hopcroft &amp; Ulman</td>
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<td>Formal Languages and their Relation to Automata (Addison-Wesley)</td>
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<tr>
<td>530110</td>
<td>EE580 Thesis/Project</td>
<td>Content: Multiples of 1 unit</td>
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<td>Topics to be arranged.</td>
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<tr>
<td>530111</td>
<td>EE590 Seminar***</td>
<td>Content: 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.</td>
</tr>
</tbody>
</table>
The following subjects have been approved for inclusion in M.Eng.Sc. programmes. The offering of any subject is dependent on adequate enrolments in that subject. Subjects marked † are unlikely to be offered in 1975.

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>Units</th>
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<tbody>
<tr>
<td>ME404</td>
<td>Mathematical Programming</td>
<td>1</td>
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<tr>
<td>ME502G</td>
<td>Operations Research &amp; Decision Theory</td>
<td>2</td>
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<tr>
<td>†ME503G</td>
<td>Design of Experiments for Engineering Research</td>
<td>2</td>
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<tr>
<td>ME505G</td>
<td>Systems Analysis &amp; Design</td>
<td>2</td>
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<tr>
<td>†ME507G</td>
<td>Resources Planning &amp; Allocation</td>
<td>2</td>
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<tr>
<td>ME508G</td>
<td>Air Pollution Studies</td>
<td>2</td>
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<tr>
<td>ME511G</td>
<td>Experimental &amp; Theoretical Stress Analysis</td>
<td>2</td>
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<tr>
<td>ME515G</td>
<td>Advanced Design Concepts in Mechanical Engineering</td>
<td>2</td>
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<tr>
<td>†ME517G</td>
<td>Materials Handling &amp; Transportation Systems</td>
<td>2</td>
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<tr>
<td>ME535G</td>
<td>Vibration &amp; Noise Problems in Industry</td>
<td>2</td>
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<tr>
<td>†ME536G</td>
<td>Advanced Dynamics of Machines</td>
<td>1</td>
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<tr>
<td>ME546G</td>
<td>Elasticity, Plasticity &amp; Applications</td>
<td>2</td>
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<tr>
<td>†ME554G</td>
<td>Fluid Mechanics</td>
<td>1</td>
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<tr>
<td>†ME555G</td>
<td>Advanced Turbomachinery</td>
<td>2</td>
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<tr>
<td>ME575G</td>
<td>Heat Transfer</td>
<td>1</td>
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<tr>
<td>ME581G</td>
<td>Mathematical Programming</td>
<td>2</td>
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<tr>
<td>ME582G</td>
<td>Probabilistic Models in Operations Research</td>
<td>2</td>
</tr>
<tr>
<td>ME583G</td>
<td>Modelling of Management Problems</td>
<td>1</td>
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<tr>
<td>ME584G</td>
<td>Simulation</td>
<td>1</td>
</tr>
<tr>
<td>ME685G</td>
<td>Advanced Operations Research</td>
<td>2</td>
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SUBJECT ENTRIES

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<tr>
<th>Code</th>
<th>Subject</th>
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<tr>
<td>54011S</td>
<td>ME502G Operations Research and Decision Theory (Refer also ME487/485)</td>
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<tr>
<th>Hours</th>
<th>Three hours of lectures, seminars and tutorials per week</th>
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<tbody>
<tr>
<td>Examinations</td>
<td>Progressive assessment</td>
</tr>
</tbody>
</table>

Content

References

- Vajda, S. *Readings in Mathematical Programming* (Pitman)
- Wagner, H. M. *Principles of Operations Research* (Prentice-Hall)

540101 ME503G Design of Experiments for Engineering Research

Prerequisites Nil

Hours Three hours of lectures, seminars and tutorials per week

Examinations Progressive assessment

Content
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.

References

- Nil

540112 ME505G Systems Analysis and Design

Hours Three hours of lectures, tutorials and seminars per week

Examinations Progressive assessment
Content


Texts
Nil

References
Busacker & Saaty
Finite Graphs and Networks (McGraw-Hill 1965)

Holerman, C.
Engineering Systems Analysis (Merrill 1965)

Machol, R.

Wayne-Weymore
A Mathematical Theory of Systems Engineering (Wiley 1967)

540116 ME507G Resources Planning and Allocation
Hours
Three hours per week

Examination
Progressive assessment

Content

Classification of resources. The distribution and abundance of natural resources and their importance to industrial societies. Issues in resource management: depletion of nonrenewable resources; policies for conservation and substitution, their goals, utility and practical implementation; management of renewable resources, quantitative models, optimal rates of utilisation.

Man-made resources: formulation of capital, technological development.

Texts
Nil

References
Barnett, J. H. & Morse, C.
Scarcity and Growth: The Economics of Natural Resource Availability (John Hopkins University Press 1963)

Clawson, M. (ed.)
Natural Resources and International Development (John Hopkins University Press 1963)

Jarrett, H. (ed.)
Comparisons in Resource Management (John Hopkins University Press 1961)

McDivitt, J. F.
Minerals and Men (John Hopkins University Press 1965)

540117 ME508G Air Pollution Studies
Hours
Three hours per week

Examination
Progressive assessment

Content

This course will cover the following themes:
(a) Atmosphere diffusion models and physico-chemical interactions on the local and global scale.
(b) Establishing air quality goals with incomplete information.
(c) Pollution sources and ambient pollution measurements: emphasis on the motor vehicle.
(d) Control strategies: legislation, environmental impacts, and economic considerations.

Texts
Nil

References
Chanlett, E. T.
Environmental Protection (McGraw-Hill 1973)

McCaltnac, B. M.
Introduction to the Scientific Study of Air Pollution (Reidel 1971)

Pasquill, F.
Atmospheric Diffusion (Van Nostrand 1962)

Royal College of Physicians
Air Pollution and Health (Pitman 1970)

Stern, A. C.

540106 ME511G Experimental and Theoretical Stress Analysis
Hours
Three hours of lectures and tutorials per week

Examination
Progressive assessment

Content

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.

Texts
Nil
References
Dally, J. W. & Riley, W. F. Experimental Stress Analysis (McGraw-Hill 1965)
Durelli, A. J. & Riley, W. F. Introduction to Photomechanics (Prentice-Hall 1965)
McMillan, C. Mathematical Programming (Wiley 1970)
Southwell, R. V. An Introduction to the Theory of Elasticity (Dover 1969)

540107 ME515G Advanced Design Concepts in Mechanical Engineering
Hours Three hours per week
Examination Progressive assessment
Content
The application of system 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.

Texts Nil

References
Furman, T. T. The Use of Computers in Engineering Design (E.U.P.)
Haviland, R. P. Engineering Reliability and Long Life Design (Van Nostrand 1964)
Johnson, R. C. Optimum Design of Mechanical Elements (Wiley)
Matousski, R. Engineering Design (Blackie)
Morrison, D. Engineering Design (McGraw-Hill)

540113 ME517G Materials Handling and Transportation Systems
Hours Three hours per week
Examination Progressive assessment
Content
An introduction using a systems approach to transport needs, which makes use of System Analysis, Network Methods, Stock Control Techniques as well as Sensitivity Studies. The technical characteristics and unit-cost data for various types of transport systems are examined. Examples considered will include conveyor systems, pipeline systems (pneumatic and hydraulic), road and rail systems and sea transport systems such as Lash, Splash, RoRo, Container, &c. Other studies will include stockpiling, packaging and cargo transfer systems. Evaluation and optimisation of transport systems with an introduction to their design.

ME535G Vibration and Noise Problems in Industry
Hours Three hours of lectures, tutorials and laboratory per week
Examination Progressive assessment
Content
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:


Texts
Anderson, R. A. Fundamentals of Vibrations (Macmillan)
Beranek Noise Reduction (McGraw-Hill)
References
540108 ME536G Advanced Dynamics of Machines

**Hours** One and a half hours per week

**Examination** Progressive assessment

**Content**
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.

**Text**
Hirschhorn, J. *Kinematics and Dynamics of Plane Motion* (McGraw-Hill)

**References**
Hall, A. S. *Kinematics and Linkage Design* (Prentice-Hall 1960)
Holowenko, A. R. *Dynamics of Machinery* (Wiley)

540109 ME546G Elasticity, Plasticity and Applications

**Hours** Three hours of lectures and tutorials per week

**Examination** Progressive assessment

**Content**
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 experimential methods.

**Texts** Nil

**References**
Ford *Advanced Mechanics of Materials* (Longmans)
Hill, R. *The Mathematical Theory of Plasticity* (Oxford)
Wang *Applied Elasticity* (McGraw-Hill)
Zienkiewicz & Holister *Stress Analysis* (Wiley)

540114 ME554G Fluid Mechanics

**Hours** One and a half hours of lectures per week

**Examination** Progressive assessment

**Content**
Lectures and laboratory work dealing with a section of the following topics. Two phase flow particularly related to transport of solids in pipelines; Fractional analysis and its application; Pump and compressor design; Application of hydrodynamics; Computer applications in fluid mechanics.

**Texts** Nil

**References**
Kovats, A. *Centrifugal and Axial Flow Pumps and Compressors* (Pergamon)
Streeter, V. L. *Handbook of Fluid Dynamics* (McGraw-Hill)
Valentine, H. R. *Applied Hydrodynamics* (Butterworths)

540103 ME555G Advanced Turbomachinery

**Hours** Three hours of lectures and tutorials per week

**Examination** Progressive assessment

**Content**
More advanced study of the fluid mechanics and thermodynamics of flow in cascades and three-dimensional guiding surfaces, leading to the design of a selected turbomachine.

**Texts** Nil

**Reference**
Csanady, G. T. *Theory of Turbomachines* (McGraw-Hill 1964)

540118 ME575G Heat Transfer

**Hours** One and a half hours of lectures and laboratory per week

**Examination** Progressive assessment

**Content**
Lectures and laboratory work dealing with a selection of the following topics. Heat transfer in laminar and turbulent flow; Heat transfer with boiling; Condensation heat transfer; Heat exchangers; Radiant heat transfer and furnace applications; Applications of dimensional analysis; Applications of computer techniques in heat and mass transfer.

**Reference** To be advised

540119 ME581G Mathematical Programming

**Hours** Three hours of lectures and tutorials per week

**Examination** Progressive assessment
Content
A survey of methods for the solution of statics, deterministic optimisation problems.
Linear programming; the simplex algorithm and its revised form duality theory; sensitivity analysis; decomposition algorithms transportation and assignment problems.
Linear programming in integers; cutting plane algorithms branch-and-bound methods; implicit enumeration; algorithms for binary integer programmes.
Network, scheduling and other combinatorial problems.
Introduction to the theory of convex nonlinear programmes; the Kuhn-Tucker theorem applications to quadratic programming and geometric programming.
Dynamic programming methods.

Texts
Gass, S. I.  
Geoffrion, A. M. (ed.)  
Perspectives on Optimisation (Addison-Wesley 1972)
Nemhauser, G. L.  
Introduction to Dynamic Programming (Wiley 1966)

References
Bellman, R. E. & Dreyfus, S. E.  
Applied Dynamic Programming (Princeton 1962)
Duffin, R. J., Peterson, E. L. & Zener, C.  
Geometric Programming (Wiley 1967)
Hadley, G.  
Linear Programming (Addison-Wesley, World Student Series 1969)
Künzi, H. P., Krell, W. & Oettli, W.  
Nonlinear Programming (Blaisdell 1966)
Luenberger, D. G.  
Introduction to Linear and Nonlinear Programming (Addison-Wesley 1973)
Taha, H. A.  
Operations Research (Macmillan 1971)
Wilde, D. J. & Beightler, C. S.  
Foundations of Optimisation (Prentice-Hall 1967)

540120 ME582G Probabilistic Models in Operations Research

Hours  Three hours of lectures, tutorials and seminars per week
Examination  Progressive assessment

References
Taha, H. A.  
Operations Research (Macmillan)
Wagner, H. M.  
Principles of Operations Research (Prentice-Hall)

540121 ME583G Modelling of Management Problems

Hours  One and a half hours of lectures per week
Examination  Progressive assessment

Content
Principles of model building; classification of models; cause-effect structures; organizational objectives; problem formulation; management problems in industry and government; models for marketing, manpower, production, inventory, distribution, and investment; case studies of management problems.

Reference
Rivett, B. H. P.  
Principles of Model Building (Wiley)

540122 ME584G Simulation

Hours  One and a half hours of lectures per week
Examination  Progressive assessment

Content
The basic methodology of simulation and its relationship to operations research and the scientific method; analogue, digital and hybrid simulation; the representation of uncertainty in simulation models, sampling methods; simple example of simulation of a queue to illustrate the problems and methods involved in the construction of different models to answer different questions; the general discrete event network and its limitations; general solutions to the modelling of such networks; the classical 3 phase model;
programming languages for simulation;
design of simulation experiments;
simulation project.

Texts
Nil

References
Naylor, T. H. et al  Computer Simulation Techniques (J. Wiley 1966)
Tocher, K. D.  The Art of Simulation (E.U.P. 1963)

433260 ME681G Industrial Law
For subject description see under Faculty of Economics and Commerce on page 244.

540123 ME685G Advanced Operations Research
Prerequisite  ME502G or ME487/488
Hours  Three hours of lectures, tutorials and seminars per week
Examination  Progressive assessment
Content
The application of the Operational Research Method 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.
Reference
Wagner, H. M.  Principles of Operations Research (Prentice-Hall)

SUBJECT OFFERED BY THE FACULTY OF ARTS

Philosophy

General Note
One subject only is offered in First Year and Fourth Year, but two subjects are offered in Second Year and Third Year, of which students may take one or both. For each subject there will be two examination papers.

To enrol in Fourth (Honours) Year, students should have completed at least four Philosophy subjects and obtained at least Credit grading. In addition to course work, Fourth Year students will write a thesis.

In other years, essays and exercises will be part of the year's work.

381100 Philosophy I
Prerequisites  Nil
Hours  Four hours per week
Examination  See below
Content
Section 1: Introduction to Philosophy
Section 2: Logic and Options
Section 3: Seminars

Section 1
381101 Introduction to Philosophy
Hours  One hour per week
Examination  One three-hour paper
Content
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, his theory of innate ideas, and his attempt to prove the existence of God and the immaterial character of the soul. This section will continue throughout the year.

Texts
Descartes  Philosophical Writings (Anscombe & Geach ed. Nelson)
Plato  The Last Days of Socrates (Penguin)

References
Burnet, J.  Greek Philosophy (Macmillan)
Guthrie, W. K. C.  The Greek Philosophers (Methuen)
Kenny, A.  Descartes (Random House)
Taylor, A. E.  Plato: the Man and his Work (Macmillan)
Section 2
381103 Logic and Options

Hours  Two hours per week

Examination  An examination will be conducted at the end of first term — for those dissatisfied with their result, a further examination will be available in November.

Content
First term: 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.

Text  Lemmon, E. J.  *Beginning Logic* (Nelson)

Examination  One three-hour paper for two options

Second and Third Terms, two of a series of options. These will include

Content
(a) More advanced logic
(b) Scientific Method
(c) Politics
(d) Ethics

Special seminars of a more advanced kind than those of first term will be given.

Details of options will be provided during the year, and choice should be discussed with members of the Department.

Section 3
381104 Seminars

Hours  One hour per week

Content
Seminars are conducted in small groups, and the programme is related to the material of Section 1. Members of groups are expected to prepare papers, and to develop acquaintance with problems and ways of discussing them.

As with essays, marks awarded for papers will be included in the mark for the year's work. Credit is also given for performance as a group member.
433220 ME6S1 Industrial Law

Prerequisites
Nil

Hours
2 lecture hours and one tutorial hour

Examination
Two papers. Students will be permitted to take into the examination copies of Statutes as advised and lists of cases to be supplied during the course, provided the copies are not marked otherwise than by underlining.

Content
A study of industrial law divided into two broad parts: a study of the law affecting the individual employer and employee; and a study of the law affecting employer-and employee-groups. The first part includes analysis and description of the master-servant relationship at common law; duration, termination and terms of the contract of service; remedies for breach by either party of the contract of service; promises in restraint of trade; the doctrine of vicarious liability; the employer's duty of care at common law; the employer's statutory duties; the employer's defences to an employee's action for damages; workers' compensation. The second part includes an examination of the constitutional background of industrial legislation: the legal framework of the Federal and State systems of conciliation and arbitration; strikes and lockouts; special "industrial torts"; enforcement and penal provisions; standard working hours and leave with pay; wage fixation; legal status of industrial organisations.

Suggested Preliminary Reading
Sykes, E. I. The Employer, the Employee and the Law (3rd ed. Law Book Co.)

Texts
Glasbeek, H. J. & Eggleston, E. M. Cases and Materials on Industrial Law in Australia (Butterworths)
Sykes, E. I. & Glasbeek, H. J. Labour Law in Australia (Butterworths)
--- Annual Holidays Act, 1944 (N.S.W. Government Printer)
--- Conciliation and Arbitration Act, 1904 (Australian Government Printer)
--- Industrial Arbitration Act, 1940 (N.S.W. Government Printer)
--- Long Service Leave Act, 1935 (N.S.W. Government Printer)
--- Workers' Compensation Act, 1926 (N.S.W. Government Printer)
--- Commonwealth of Australia Constitution Act, 1900 (U.K.) (Australian Government Printer)

References
Boulter, N. Workers' Compensation Law and Practice in N.S.W. (Law Book Co.)
Cullen, C. L. & Macken, J. J. An Outline of Industrial Law (Law Book Co.)
Foenander, O. de R. Australian Industrial Regulation (Law Book Co.)
Foenander, O. de R. Industrial Conciliation and Arbitration in Australia (Law Book Co.)
Foenander, O. de R. Recent Developments in Australian Industrial Regulation (Law Book Co.)
Foenander, O. de R. Trade Unionism in Australia (Law Book Co.)
Hepple, B. A. & O'Higgins, P. Individual Employment Law (Sweet & Maxwell)
Macken, J. J. Australian Industrial Law — The Constitutional Basis (Law Book Co.)
Mills, C. P. Federal Industrial Laws (Butterworths)
Mills, C. P. New South Wales Industrial Laws (Butterworths)
Mills, C. P. Workers' Compensation in New South Wales (Butterworths)
O'Dea, R. Industrial Relations in Australia (West Publishing Corp.)
Portus, J. H. Australian Compulsory Arbitration 1900-1970 (Law Book Co.)
Portus, J. H. The Development of Australian Trade Union Law (Melbourne University Press)
Shtein, B. J. & Lindgren, K. E. Introduction to Business Law (Law Book Co.)
Sykes, E. I. The Employer, The Employee and the Law (Law Book Co.)
--- Strike Law in Australia (Law Book Co.)
--- Apprentices Act, 1909 (N.S.W. Government Printer)
--- Factories, Shops and Industries Act, 1962 (N.S.W. Government Printer)
--- Scaffolding and Lifts Act, 1912 (N.S.W. Government Printer)
SUBJECTS OFFERED BY THE FACULTY OF MATHEMATICS

Preliminary Notes
The Department offers and examines subjects. Each subject is composed of topics, each topic consisting of about 27 lectures and 13 tutorials throughout the year. Each of the Part I, Part II, and Part III subjects consist of four topics. For Mathematics I, there is no choice of topics; for Mathematics IIA, IIB, IIC there is some choice available to students; for Mathematics II A and II B there is a wider choice. No topic may be counted twice in making up distinct subjects.

(Students who passed some mathematics subjects before this arrangement of subjects was introduced should consult the "transition arrangements" set out on p.155 of the 1970 Faculty of Arts handbook, and p.76 of the 1973 Faculty of Mathematics handbook. Note that the "code letters" for the topics may vary slightly from year to year.)

PART I SUBJECT

661100 Mathematics I
Prerequisites  Mathematics 2S (Advisory)

Hours  Four lecture hours and two tutorial hours per week for three terms.

Examination  Two papers of three hours duration.

Content
Topics
AN — Real Analysis
AL — Algebra
CA — Calculus
NM — Numerical Mathematics

PART I TOPICS

Topic AN — Real Analysis — M. J. Hayes
Prerequisites  Nil

Hours  One lecture hour per week and one tutorial hour per fortnight.

Content

Texts
(Gin is the general text for the course.)

Giles, J. R.  Real Analysis — an Introductory Course
(Wiley 1973)

(It is recommended that students intending to major in Mathematics should have this book.)

Reference
Spivak, M.  Calculus (W. A. Benjamin Inc. 1967)

Topic AL — Algebra — W. Brisley
Prerequisites  Nil

Hours  One lecture hour per week and one tutorial hour per fortnight.

Content
Introduction to basic algebraic objects and ideas. Matrices, permutations, complex numbers. Linear Algebra: vector spaces, homomorphisms, matrices, determinants; algorithms for solution of equations; rank, nullity; eigenvectors and eigenvalues; applications various.

Text
Brisley, W.  A Basis for Linear Algebra (Wiley 1973)

References
Liebeck, H.  Algebra for Scientists and Engineers
(Wiley 1971)

Lipschutz, S.  Linear Algebra (Schaum 1968)

McCoy, N.  Introduction to Modern Algebra (Allyn & Bacon 1968)

Tropper, A. Mary  Linear Algebra (Nelson 1973)

Topic CA — Calculus — E. R. Smith
Prerequisites  Nil

Content
Vector geometry in three dimensions. Revision of differentiation and integration of polynomials and trigonometric functions and of implicit and parametrically defined functions. Definition and properties of logarithmic, exponential and hyperbolic functions. Integration by parts and by substitution techniques. Integration of rational functions. First order separable, linear and homogeneous differential equations. Second

Hours  One lecture hour per week and one tutorial hour per fortnight.

**Text**

**References**
Britton, J. R., Kriegl, R. B. & Rutland, L. W. *Calculus and Analytic Geometry* (Freeman 1966)
Hille, E. & Salas, S. *First Year Calculus* (Ginn Blaisdell 1968) (International Textbook Series)

Topic **NM** — Numerical Mathematics — W. Summerfield

**Prerequisites**
Nil

**Hours**
One lecture hour per week and one tutorial hour per fortnight.

**Content**
Introduction to computers, flowcharts and Fortran coding. Elementary data analysis: calculations of sample moments of discrete distributions and programming of these operations. Introduction to statistical analysis and numerical analysis with computer illustrations. The writing of successful computer programmes is a required part of this topic.

**Texts**
Blatt, J. M. *Basic Forth IV Programming* (Computer Systems of Australia Pty Ltd 1969)
Wilkes, M. V. *A Short Introduction to Numerical Analysis* (Cambridge University Press 1971)

**References**

**PART II SUBJECTS**

The Department offers three Part II subjects. Students whose course restricts them to one such subject must study Mathematics IIA or Mathematics IIB. The subject Mathematics IIA is a pre- or corequisite for Mathematics IIC, and IIA and IIC together a prerequisite for any Part III subject, so students wishing to take two Part II subjects would normally choose Mathematics IIA and IIC. Students taking all three of the Part II subjects would study all twelve of the topics listed below.

**List of Topics for Part II Mathematics**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Corequisite or Prerequisite Topic</th>
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<tbody>
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<td>B</td>
<td>Complex Analysis</td>
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<tr>
<td>C</td>
<td>Calculus and Vector Calculus</td>
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<tr>
<td>D</td>
<td>Linear Algebra</td>
</tr>
<tr>
<td>E</td>
<td>Differential Equations and Integral Transforms</td>
</tr>
<tr>
<td>F</td>
<td>Numerical Analysis and Computing</td>
</tr>
<tr>
<td>G</td>
<td>Fourier series, Partial Differential Equations and Special Functions</td>
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<tr>
<td>H</td>
<td>Probability and Statistics</td>
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<tr>
<td>I</td>
<td>Topic in Statistics e.g. Non-parametric Methods</td>
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<tr>
<td>J</td>
<td>Topic in Applied Mathematics e.g. Mechanics</td>
</tr>
<tr>
<td>K</td>
<td>Topic in Pure Mathematics e.g. Group Theory</td>
</tr>
<tr>
<td>L</td>
<td>Analysis of Metric Spaces</td>
</tr>
</tbody>
</table>

The selection rules and definitions of the Part II subjects follow.

**662100 Mathematics IIA**

**Prerequisite**
Mathematics I

**Hours**
Four lecture hours and two tutorial hours per week for three terms

**Examination**
Each topic is examined separately
Content
Topics B, C, D, and E. In exceptional circumstances and with the consent of the Head of Department, one topic from A, F, G, or H may be substituted for B. Additional substitutions may be allowed in the case of candidates who have passed the subject Mathematics IIB.

662200 Mathematics IIB
Prerequisite Mathematics I
Hours Four lecture hours and two tutorial hours per week for three terms
Examination Each topic is examined separately
Content
For students in the Departments of Chemical Engineering, Civil Engineering, Electrical Engineering, Mechanical Engineering, or Surveying:
Topics C, D, E, F
Topics C, D, E, H
Topics C, D, E, H
Topics C, D, E, H
For students taking a combined BSc/BE course:
Any four of the eight topics A-H from the Part II list on page 249.

662300 Mathematics IIC
Prerequisite Mathematics I
Corequisite Mathematics IIA
Hours Four lecture hours and two tutorial hours per week for three terms
Examination Each topic is examined separately
Content
Either topics G, J, K and L or topics H, I, K and L. Subject to the consent of the Head of Department one topic from A to J may be substituted for one of the topics I or J.

Notes
1. Students may, with the consent of the Head of Department, take Mathematics IIB in two parts each of two lectures per week for three terms.
2. In order to pass both Mathematics IIA and Mathematics IIB a student must study all the topics A to H above and offer them for examination.
3. Mathematics IIA is a corequisite for Mathematics IIC.

4. In order to pass in all three Part II subjects a student must study all twelve topics and offer them for examination.
5. Students who passed a Part II Mathematics subject prior to 1974 and who wish to take further Part II Mathematics subjects should note that the topic coded "L" in 1974 and 1975 corresponds to the topic coded "A" in previous years. Such students may require special permission for their selection of Part II topics, and should consult with the Head of the Department.

Texts
662101 Topic A
Nil
662102 Topic B
Spiegel, Murray R.
Theory and Problems of Complex Variables (McGraw-Hill 1964)
662103 Topic C
Spiegel, Murray R.
662104 Topic D
Lipschutz, S.
Linear Algebra (McGraw-Hill Schaum 1968)
662201 Topic E
Boyce, W. E. & Di Prima, R. C.
662202 Topic F
Ralston, A.
A First Course in Numerical Analysis (McGraw-Hill 1965)
OR
Carnahan, B., Luther, H. A. & Wilkes, J. O.
Applied Numerical Methods (Wiley 1969)
Kreitzberg, C. B. & Shneiderman, B.
The Elements of Fortran Style (New York, Harcourt, Brace & Jovanovich Inc 1972)
662203 Topic G
Weinberger, H. F.
A First Course in Partial Differential Equations (Ginn Blaisdell 1965)
AND
Sneddon, I. N.
Fourier Series (Routledge 1961)
PART III SUBJECTS

The Mathematics Department offers two Part III subjects, each comprising four topics chosen from the list below.

Students wishing to proceed to Honours in Mathematics are required to take both these subjects. Students wishing to proceed to Combined Honours are required to take Mathematics IIIA together with the appropriate subject from Schedule B. Students proceeding to Honours will also be required to study additional topics as prescribed by the Heads of the Departments concerned.

Passes in both Mathematics IIA and IIC are prerequisite for entry to Mathematics IIIA, and Mathematics IIIA is a pre- or corequisite for Mathematics IIIB. It will be assumed that students taking a third-year subject in 1975 have already studied topics C, D, E, K in their Part II subjects.

Students from other Faculties who wish to enrol in particular Part III topics, according to the course schedules of those Faculties, should consult the particulars of the list below, and should consult the lecturer concerned. In particular, the prerequisites for subjects may not all apply to isolated topics.

Summaries of these topics together with booklists will appear in the handbook of the Faculty of Mathematics and will also be available from the Department.

List of Topics for Part III Mathematics

<table>
<thead>
<tr>
<th>Topic</th>
<th>Prerequisite</th>
<th>Corequisite</th>
</tr>
</thead>
<tbody>
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<td>M</td>
<td>General Tensors</td>
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<td>N</td>
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<td>O</td>
<td>Mathematical Logic</td>
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<tr>
<td>P</td>
<td>Differential and Integral Equations</td>
<td>E</td>
</tr>
<tr>
<td>PD</td>
<td>Theory of Partial Differential Equations</td>
<td></td>
</tr>
<tr>
<td>Q</td>
<td>Fluid Dynamics</td>
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</tr>
<tr>
<td>R</td>
<td>Probability and Statistics</td>
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<td>S</td>
<td>Geometry</td>
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<td>T</td>
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<tr>
<td>U</td>
<td>Operations Research</td>
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<tr>
<td>V</td>
<td>Measure Theory and Integration</td>
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</tr>
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<td>W</td>
<td>Analysis of Normed Linear Spaces</td>
<td>Metric Spaces</td>
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<tr>
<td>X</td>
<td>Rings and Fields</td>
<td></td>
</tr>
<tr>
<td>Y</td>
<td>Topic in Applied Probability</td>
<td>e.g. Information Theory</td>
</tr>
<tr>
<td>Z</td>
<td>Mathematical Principles of Numerical Analysis</td>
<td></td>
</tr>
</tbody>
</table>

The selection rules and definitions of the Part III subjects follow.

663100 Mathematics IIIA

**Prerequisites**
Mathematics IIA & IIC

**Hours**
Four lecture hours and two tutorial hours per week for three terms

**Examination**
Each topic is examined separately

**Content**
A subject comprising four topics, which must include O, and at least one of P, Q, R, or U. In addition, students taking this subject will be required to complete an essay on a topic chosen from the history or philosophy of Mathematics.

663200 Mathematics IIIB

**Prerequisite or Corequisite**
Mathematics IIIA

**Hours**
Four lecture hours and two tutorial hours per week for three terms

**Examination**
Each topic is examined separately
A subject comprising four topics chosen from the fifteen listed above.

Notes
1. In order to take both Mathematics IIIA and Mathematics IIIb, a student must study eight topics from M to Z above with the restriction that Topic O, and at least one of P, Q, R, or U must be included in these eight topics.
2. Students aiming to take Mathematics IV may be required to undertake study of more topics than the eight comprising the two part III subjects.

ELECTIVE MATHEMATICS

Subject to meeting any pre-and corequisite requirements, students may take additional Part II topics as elective units. When taken in this way each topic is regarded as a separate subject of one unit value designated by an Engineering number.

The numbers allocated are:

662105 EM2A Mathematical Models
662106 EM2B Complex Analysis
662107 EM2C Calculus and Vector Calculus
662108 EM2D Linear Algebra
662205 EM2E Differential Equations and Integral Transforms
662206 EM2F Numerical Analysis and Computing
662207 EM2G Fourier Series, Partial Differential Equations and special functions
662208 EM2H Probability and Statistics
662305 EM2I Topic in Statistics, e.g. Non-parametric Methods
662306 EM2J Topic in Applied Mathematics, e.g. Mechanics
662307 EM2K Topic in Pure Mathematics, e.g. group theory
662308 EM2L Analyses of Metric Spaces

Recommended electives for students in the different Departments are as follows:

Chemical Engineering — EM2B, EM2G
Civil Engineering — EM2B, EM2G
Electrical Engineering — EM2B, EM2F
Mechanical Engineering — EM2B, EM2G, EM2L

Students may not take as an elective unit any topic which is included in Mathematics IIb for the Department in which they are enrolled.

Full descriptions of these subjects and book lists will be found in the Faculty of Mathematics Handbook, and will also be available from the Department of Mathematics.
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.

**Texts**

- Aylward, G. H. & Findlay, T. J. V. *S.I. Chemical Data* (Sydney, Wiley & Sons Australasia 1970)
- Cartmell, E. *Chemistry for Engineers* (2nd ed London, Butterworths 1964)

**722200 Chemistry IIA**

**Prerequisite**

Chemistry I

**Preparatory Subjects**

Mathematics I and either Physics IA or IB

**Hours**

About 3 lecture hours and 6 hours of tutorial and laboratory classes per week

**Examination**

Two three-hour papers

**Content**

- Analytical Chemistry — Basic principles; spectroscopic procedures; separation methods.
- Co-ordination Chemistry — Types of complexes; structure elucidation; transition metal chemistry.
- Dynamics Kinetics — chemical affinity; electrochemical cells.
- Organic Chemistry — Aliphatic and aromatic compounds; condensation reactions; reaction mechanisms.
- Quantum Chemistry — Schrödinger's equation; methods of approximation; applications to spectroscopy and bonding theories.
- Thermodynamics — Basic laws.

**Texts**


OR


Students intending to proceed to Chemistry IIA are advised to purchase a copy of either:


OR


**741200 Physics IIA**

**Prerequisite**

Science 2F (Advisory)

**Hours**

Three lecture-hours and three hours of laboratory and tutorial work per week

**Examination**

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. There will also be a one-hour written examination on the year's practical work.

**Content**

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. 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.
741300  Physics IB

**Prerequisite**  
Science 2S (Advisory)

**Hours**  
Three lecture-hours and three hours laboratory work or demonstrations and practice period per week.

**Examination**  
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. Also one hour written examination on the year's practical work.

**Content**  
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). 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.

**Texts**  
Bueche, F.  
Principles of Physics

Bueche, F.  
Study Guide to accompany Principles of Physics

742100  Physics II

**Prerequisites**  
Mathematics I, Physics IA or normally a credit pass or better in Physics IB

**Hours**  
Three lecture hours and three hours laboratory work per week

**Examination**  
Three two-hour papers, one at the commencement of third term

**Content**  
Physics II as a required subject for B.E./B.Sc. students.

Mechanics  
Thermal Physics  
Quantum Physics  
Electromagnetics  
Physical Optics.

Physics II students should include at least one Group II Mathematics subject, incorporating for preference Topics C, E, G and H in their course. (It is possible to achieve this combination with either Mathematics IIB, alone, or Mathematics IIA and IIC).

A pass in Physics II by a combined B.E./B.Sc. student will qualify as a prerequisite for Physics IIIA.

**Texts**  
Baird, D. C.  
Experimentation (Prentice-Hall)

Hayt, W. H.  
Engineering Electromagnetics (2nd ed.  
McGraw-Hill 1967)

Smith, F. G. &  
Thompson, J. H.  
Optics (Wiley 1971)

Young, H. D.  
Fundamentals of Optics and Modern Physics  
(McGraw-Hill)

Any further texts will be listed in the Physics Department by late 1974.

742101  PH221 Electromagnetics and Quantum Mechanics

**Prerequisites**  
Mathematics I, Physics IA, or normally a credit pass in IB

**Hours**  
45 lecture hours and 45 laboratory hours

**Examination**  
One two-hour paper and one one-hour paper

**Content**  
The course is intended for students in Electrical Engineering and covers Electromagnetics and Quantum Physics.

Students who may later wish to continue Physics in the Science Faculty are advised that Science Faculty regulations require that Physics II be completed in a single year.

**Texts**  
Hayt, W. H.  
Engineering Electromagnetics (2nd ed.  
McGraw-Hill 1967)

Young, H. D.  
Fundamentals of Optics and Modern Physics  
(McGraw-Hill)
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<td>New students attend to enrol</td>
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<td>Last day to withdraw from first half year subjects</td>
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<td>Confirmation of Enrolment forms due</td>
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<td>Last day to withdraw from full year subjects</td>
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<td>Last day to withdraw from second half year subjects</td>
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<td>First closing date for Applications for Admission 1976</td>
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THE FACULTY HANDBOOKS contain

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Degree Requirements
Syllabuses of Subjects
Texts and References

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By-laws
Council
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Officers and Former Officers of the University
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Contents and Index to Contents

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January
1 Wednesday Public Holiday — New Year's Day
3 Friday Last day for return of Re-Enrolment Forms — Continuing Students
13 Monday Deferred Examinations begin
17 Friday Closing date for Applications for Admission from persons attempting 1974 Australian secondary or tertiary examinations (including N.S.W. Higher School Certificate)
24 Friday Deferred Examinations end
27 Monday Public Holiday — Australia Day

February
7 Friday Closing date for applications for residence in Edwards Hall
21 Friday & 24 Monday New students attend the University in person to have enrolment approved
25 Tuesday Final date for completion of Re-enrolment

March
3 Monday First Term begins
21 Friday Graduation Day
28 Friday Good Friday — Easter Recess commences

April
2 Wednesday Lectures resume
21 Monday Last day for withdrawal without academic penalty from 1st half year subjects
25 Friday Public Holiday — Anzac Day

May
10 Saturday First Term ends
June
2 Monday  Second Term begins
13 Friday  Last day for return of Confirmation of Enrolment forms
16 Monday  Public Holiday — Queen's Birthday

July
7 Monday  Last day for withdrawal without academic penalty from courses in all faculties, except half year Engineering subjects.

August
16 Saturday  Second Term ends

September
8 Monday  Third Term begins
15 Monday  Last day for withdrawal without academic penalty from 2nd half year subjects

October
6 Monday  Public Holiday — Eight Hour Day
31 Friday  Lectures and other classes cease

November
1 Saturday  First closing date for Applications for Admission 1976
8 Saturday  Third Term ends — Annual Examinations begin
29 Saturday  Annual Examinations end

1976
January
19 Monday  Deferred Examinations begin
30 Friday  Deferred Examinations end

March
1 Monday  First Term begins

Administrative Staff

Vice-Chancellor and Principal
Professor J. J. Auchmuty, CBE, MA, PhD, HonLLD(Dublin), HonDLitt(Sydney), FAHA, MRIA, FRHistS (To 31 December 1974)
Professor D. W. George, BSc, BE, PhD(Sydney), FIEE, FIEAust, AAIP (From 1 January 1975)

Vice-Principal and Deputy Vice-Chancellor
Professor A. D. Tweedie, MA(New Zealand)

Deputy Vice-Chancellor
Professor E. O. Hall, MSc(New Zealand), PhD(Cambridge), FInstP, MAustIMM, FIM(Lond.), FAIP, FRSA

Personal Assistant to Vice-Chancellor
A. Nell Emanuel, BA(New South Wales)

Secretary to Vice-Chancellor
Nancy A. Perkins

Educational Services and Research
H. Maddox, BA, PhD(London)

Bursar's Division

Bursar
L. W. Harris, FASA, ABIA, MRIPA

Assistant Bursars
L. J. Caldwell, BCom, AASA(S), ACIS
J. M. Falconer, AASA(S), ABIA
G. W. Walker, AASA
Secretary's Division

Secretary
P. D. Alexander, BA, DipEd(Sydney)

Faculty Secretariat
J. S. Boydell, MA(Cambridge) (Assistant Secretary)
R. J. Archer, BSc, BEcon, DipEd(Queensland)
D. E. Brock, BA(New England) (Seconded to Education)
F. C. Hawkins, BCom
Linda S. Wheeler, BA

Student Administration
P. H. Farley, BA(New South Wales), MA(Macquarie) (Assistant Secretary)
Glennie Jones, BA(New South Wales) (Examinations)
R. A. Gibbs, BA, DipEd(New South Wales)
G. J. Martin, BCom

Publicity and Publications
J. W. Armstrong, BA
E. Joan Bale, BA(New South Wales)

Statistics
D. L. Farmer, BSc, DipEd(Sydney)

E.D.P. Development
D. S. Dunlop
A. Hall

Planner's Division

University Planner
Vacant

Deputy Planner
D. D. Morris, BArch, DipLD(New South Wales), ASTC, FRAIA, AAILA (Acting Planner)

Staff Architect
W. J. Crook, BArch(New South Wales), ARAIA

Assistant Staff Architect
A. Lee, ASTC, ARAIA

Staff Engineer
M. E. Edmonds, DipMEE(Queensland), MIEAust

Assistant to Staff Engineer
J. D. O'Donohue

University Counselling Service

Senior Student Counsellor
A. P. T. Loftus, BA(Melbourne), MA, MAPsS

Student Counsellors
Anne H. Furner, BA, DipAppPsych, MAPsS
D. R. Martin, BA, DipEd(Sydney), MAPsS, ABPsS (Temporary Appointment)

Overseas Student Service

Overseas Student Advisor
Robin Loftus, BA(Adelaide)

Amenities Office

Amenities Officer
H. Bradford

Careers and Student Employment Office

Careers Officer
H. Floyer, BEc(Sydney)

Computer Centre

Director
J. A. Lambert, BSc(Sydney), MSc(New South Wales), FBCS, MACS
The University of Newcastle

The University of Newcastle began its existence as the Newcastle University College of the University of New South Wales and by the University of Newcastle Act of 1964, became an autonomous institution on 1st January, 1965.

Enrolments in the first year of the College's existence totalled 370. There are presently seven Faculties — Applied Science, Architecture, Arts, Economics and Commerce, Engineering, Mathematics, and Science and enrolments have increased to 4,177 in 1974. Originally the University was established on a site at Tighes Hill. In 1960 an area of some 200 acres was acquired at Shortland and building commenced in 1964. 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 New South Wales Legislative Council and Legislative Assembly; nominees of the Governor; the Vice-Chancellor and four co-opted members.

The present Chancellor of the University is the Honourable Sir Alister McMullin, KCMG, HonDLitt. The Vice-Chancellor and Principal is the chief executive officer of the University. The Foundation Vice-Chancellor of the University, Professor J. J. Auchmuty, CBE, MA, PhD (Dublin), FAHA, MRIA, FRHistS, retires at the end of 1974 and will be succeeded by Professor D. W. George, BSc, BE, PhD (Sydney), FIEE, FIEAust, AAIP.

The principal academic body in the University is the Senate comprising the Vice-Chancellor, Professors, a representative of each of the Faculty Boards, representatives of the students and certain other ex officio members. Teaching and research in each Faculty are supervised by the Faculty Boards, representatives of the students and certain other ex officio members. 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.

The University is financed by grants from the Australian Government.
Undergraduate Courses Offered

The following Table summarises the courses that are now available. For full details refer to the appropriate Faculty Handbook.

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Departments</th>
<th>Degrees</th>
<th>Full-time</th>
<th>Part-time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science</td>
<td>Metallurgy</td>
<td>BMet</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BSc(Met)</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>or BSc(Eng)</td>
<td>3</td>
<td>plus 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>or BArch</td>
<td>1</td>
<td>plus 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BA</td>
<td>2</td>
<td>or 3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(entry qual. is BSc (Arch) or equivalent)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>Architecture</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>BA</td>
<td>3</td>
<td>or 5\textsuperscript{1}</td>
</tr>
</tbody>
</table>

| Arts                         |             |                     |           |           |
|                              | Classics    | BA                   | 3         | 5\textsuperscript{1} |
|                              | Creative Arts|                     |           |           |
|                              | Economics   |                     |           |           |
|                              | Education   |                     |           |           |
|                              | English     |                     |           |           |
|                              | French      |                     |           |           |
|                              | Geography   |                     |           |           |
|                              | German      |                     |           |           |
|                              | History     |                     |           |           |
|                              | Linguistics |                     |           |           |
|                              | Mathematics |                     |           |           |
|                              | Philosophy  |                     |           |           |
|                              | Psychology  |                     |           |           |
|                              |             | Commerce            | BCom      | 3         | 5\textsuperscript{1} |
|                              | Economics   |                     |           |           |
|                              | Legal Studies|                   |           |           |
|                              | Economics   |                     |           |           |
|                              | Legal Studies|                 |           |           |
|                              | Chemical    | BE                   | 4         | or 6      |
|                              | Civil (includes Surveying) |         |           |           |
|                              | Electrical (includes Computer) | BSc(Eng) in Chemical Engineering | 12         | plus 5    |
|                              | Mechanical (includes Engineering) |         |           |           |
|                              | Industrial and only Naval Architecture | | | |

Normal Duration in years

Faculty | Departments | Degrees | Full-time | Part-time |
---------|-------------|---------|-----------|-----------|
Mathematics | Mathematics | BMath | 3 | or \textsuperscript{1}51 |
Science | Biological Sciences | BSc | 3 | or \textsuperscript{1}51 |

Approval has been given for the development at the University of a Medical course. Information about this development will be available on request from the Student Administration Office after September 1975. The Medical course is expected to commence in 1978.

\textsuperscript{1} Honours — additional 1 year full-time or 2 years part-time.
\textsuperscript{2} The final year may be taken over 2 part-time years.

Undergraduate Courses

Admission

Persons seeking admission to undergraduate courses at the University must

- satisfy matriculation requirements or have other acceptable qualifications, and
- follow the correct application procedures by the closing dates set out below.

Where the number of persons seeking entry to a Faculty exceeds the number for whom places are available it may also be necessary to secure a place in competition with other applicants.

Matriculation

Set out below is information from the By-laws relating to matriculation.

1. Matriculation Requirements in Terms of the Present New South Wales Higher School Certificate Examination

A candidate for matriculation must

(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

Undergraduate Courses Offered

The following Table summarises the courses that are now available. For full details refer to the appropriate Faculty Handbook.
(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.

The recognised matriculation subjects are:

| 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          |

Mathematics and Science, both passed as full courses, together shall count as three subjects, but otherwise, each counts as one subject.

The qualification for matriculation must be obtained at one examination.

Faculty Assumed Knowledge

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:

<table>
<thead>
<tr>
<th>Faculty or Subject</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science</td>
<td>Second level Short Course Mathematics and Science including Physics and Chemistry options</td>
</tr>
<tr>
<td>Architecture</td>
<td>Second level Short Course Mathematics and Science</td>
</tr>
<tr>
<td>Arts</td>
<td>Second level Short Course Mathematics</td>
</tr>
<tr>
<td>Economics I</td>
<td>Second level Short Course Mathematics</td>
</tr>
<tr>
<td>English I</td>
<td>Second level English</td>
</tr>
<tr>
<td>French IN</td>
<td>Second level French</td>
</tr>
<tr>
<td>German IN</td>
<td>Second level German</td>
</tr>
<tr>
<td>Economics &amp; Commerce</td>
<td>Second level Short Course Mathematics</td>
</tr>
<tr>
<td>Engineering</td>
<td>Second level Short Course Mathematics and Science including Physics and Chemistry options</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Second level Short Course Mathematics</td>
</tr>
<tr>
<td>Science</td>
<td>Second level Short Course Mathematics</td>
</tr>
</tbody>
</table>


Revised matriculation requirements will have effect from July, 1976. Details are available from the Secretary to the University.

3. Other Requirements

Persons who have not satisfied the ordinary matriculation requirements (above) may on application be considered for admission provided they are able to satisfy the University that they have reached a standard of education sufficient for them to pursue the proposed course. Detailed documentary evidence of all qualifications must be submitted with the Application for Admission 1975.

Application Procedure

Persons seeking admission in 1975 are required to lodge an Application for Admission 1975 by the appropriate closing date listed below. Application forms and information about courses available at the University may be obtained from the Student Administration Office, Ground Floor, Arts/Administration Building at the University at Shortland. The office is open from 9 a.m. to 12.30 p.m. and 1.30 p.m. to 5 p.m. Application materials are also available on request by mail to

The Secretary,
The University of Newcastle, N.S.W. 2308.

For full information about courses, please consult the appropriate Faculty Handbook available from the University Cashier at a cost of $1.00 or $1.20 plus postage for an article weighing between 250 and 500 grams if sent to an address in Australia.

Closing Dates

1. Applicants who are attempting Australian* secondary or tertiary examinations in 1974 (including the 1974 N.S.W. Higher School Certificate examination) as soon as possible after the results are known but not later than 5 p.m. on Friday, 17 January 1975.

2. All other applicants as soon as possible but not later than 5 p.m. on Friday, 1 November 1974.

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

* Persons resident outside Australia whose examination results will not be available by 1 November 1974 will not be considered for admission in 1975. They may enquire in September 1975 for admission in 1976.
University of Sydney Matriculation Examination

Applicants attempting to gain a matriculation qualification at the 1975 University of Sydney Matriculation Examination must nevertheless lodge an application for admission on or before 17 January 1975 indicating their intention to take the examination, the subjects and levels to be attempted, and must advise The Secretary of their results as soon as they are known.

Documentary Evidence

Where an application is based on completion of secondary education outside New South Wales or where studies have been undertaken at a tertiary institution documentary evidence confirming all qualifications must be submitted. Documents should list all subjects attempted and give full grade information including failures or withdrawals. Legible photocopies of documents are acceptable. Documents in foreign languages must be accompanied by certified translations into English. Applicants are advised to assemble all required documents well in advance as applications submitted without required documents cannot be considered.

Syllabus Information

Where subjects have been passed at other tertiary institutions a brief extract from the institution's calendar or handbook describing the syllabus content should be submitted.

Selection

It will be appreciated that the University needs to regulate enrolments to ensure that the number of persons admitted does not exceed the number for whom places are available. If selection is necessary it will be based on academic merit. In the past the University has been able to admit all qualified applicants, except in the Faculty of Architecture where some restrictions have been necessary.

Result of Application

All applicants will be advised by mail of the result of their application.

Deferment of Admission

The University does not grant deferments of admission. Persons who are unable to accept an offer of admission should reapply when they are in a position to undertake university studies.

Enrolment

Persons offered admission will be given instructions of the procedure to be followed to complete enrolment. All students should possess a copy of their Faculty Handbook. Before proceeding to enrolment they should have read carefully those sections of the Handbook relating to the programme for their degree, the degree requirements and, where a choice of subjects is available, should have decided on the subjects they would like to include in their programme.

Attendance Status

In accordance with the By-laws, the University defines attendance status as follows:

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.

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.

Note

The Australian Government for the purposes of the Tertiary Education Assistance Scheme normally defines a full-time student as one who enrolls in 75% or more of a usual first year course.

University Skills Assessment

As part of its service to students, the University Counselling Service 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 the results are held in confidence in the Counselling Service. In 1975 it is intended to hold the University Skills Assessment during orientation week. 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.

After Enrolment

At the back of this supplement is a list of people who may be consulted for information on a wide range of matters.
The attention of students is also drawn to the following University requirements affecting continued enrolment.

Change of Address

Students are responsible for notifying the Student Administration Office in writing of any change in their address. A Change of Address form should be used and is available from the Student Administration Office.

Failure to notify changes 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. It should be noted that examination results, re-enrolment and other correspondence will be mailed to students in December and January. Students who will be away during the long vacation from the address given to the University for correspondence should make arrangements to have mail forwarded to them.

Change of Name

Students who change their name should advise the Student Administration Office. Marriage, deed poll or naturalisation etc. certificate should be presented for sighting in order that the change can be noted on University records.

Change of Programme

Approval must be sought for any changes to the programme for which a student has enrolled. This includes adding or withdrawing subjects, changing attendance status (for example from full-time to part-time) or transferring to a different degree, department or faculty.

All changes should be recorded on the Variation of Programme form available at the Student Administration Office. Reasons for changes and where appropriate documentary evidence in the form of medical or other appropriate certificates must be submitted.

Withdrawal without Academic Penalty

Approval to withdraw from a course or a subject is not automatic. It should be noted that a student is regarded as having failed in a subject if he enrols in it and does not pass the annual examinations — that is not sitting for the examination is regarded as not passing the examination (unless withdrawal without penalty has been approved).

Withdrawal from a subject takes effect from the date of receipt of written notification. Unless the Dean of the Faculty grants permission to withdraw without penalty, a student who withdraws after the dates shown below will be deemed to have failed in the subject or subjects.

<table>
<thead>
<tr>
<th>Withdrawal Dates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full Year Subjects</td>
</tr>
<tr>
<td>Sixth Monday in Second Term</td>
</tr>
</tbody>
</table>

Confirmation of Enrolment

In May each year the University mails to all students a form Confirmation of Enrolment which also serves as the application to sit for examinations. This form must be checked carefully, signed and returned by all students (including non-degree students and post-graduate students not taking formal subjects) to confirm that they are actively pursuing subjects for which they are enrolled and that the information on University records is correct and complete. Arrangements may not be made to examine students who do not return the form as it will be assumed that they have discontinued their studies.

Attendance at Classes

Students are expected to be regular and punctual in attendance at all classes in the course or subject in which they are enrolled.

All applications for exemption from attendance at lectures or practical classes must be made in writing to the Head of the appropriate Department. If term examinations have been missed this fact should be noted in the application.

In the case of illness or of absence for some other unavoidable cause a student may be excused by the Head of the appropriate Department for non-attendance at classes.

Applications for exemption from re-attendance at classes, either for lectures or practical work, may only be approved on the recommendation of the Head of the appropriate Department. The granting of an exemption from attendance does not carry with it any waiver of the General Services Charge. Where a student has attended less than 80 per cent. of the possible classes, he may be refused permission to sit for the annual examination in that subject.

General Conduct

In accepting membership of the University the student undertakes 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 administration 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.
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.

Examinations

A notice board has been placed on the wall opposite the entrance to the Main Lecture Theatre (B01) for the specific purpose of displaying examination timetables and other notices about examinations.

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 the Arts/Administration building.

Examinations

Examinations and other exercises may be held in any subject from time to 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

The annual examinations take place in November. 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.

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 Confirmation of Enrolment. While the University cannot guarantee to meet such requests it will be willing to co-operate where possible.

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 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.

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.

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

Examination Results

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 charge of $8.00 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 review charge by 15 January 1975. However, it should be noted that examination results are released only after careful assessment of students' performances and that, amongst other things, marginal failures are reviewed before results are released.

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 Faculty Board 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 the commencement of the 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 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 of the examination.

Deferred Examinations

The Boards of the Faculties of Applied Science, Architecture, Engineering, and Mathematics may grant deferred examinations. Such examinations, if granted, will be held in January-February and results will be published in the same manner as for the annual examinations.

When reviewing the examination results Faculty Boards take into consideration any circumstances such as illness or personal problems which may have seriously affected a student's work during the year or during the examinations. Any student who considers that his work has been affected in this way or who is unable to attend for any reason at the examinations, must apply for special consideration to the Secretary explaining the circumstances and, in the case of illness, enclosing a medical certificate.

If a student is affected by illness during an examination he must report to the supervisor in charge of the examination and then apply to the Secretary as soon as possible after the examination (see By-law 5.9.3.7 above).

Academic Progress Requirements

General

The University has enacted certain By-laws relating to continuation in a subject or a course. They are set out below.

Procedure

It is the responsibility of a student who does not satisfy any of the academic progress requirements to take action as required by the By-laws.

Students who become liable for exclusion from a course after failure at Annual Examinations will be informed accordingly by mail after the release of examination results. They will also be advised of the procedure to be followed if they wish to show cause.

A student who wishes to re-enrol in a subject which he has failed more than once is required to show cause why he should be allowed to re-enrol in the subject and must submit a show cause statement with his re-enrolment form.

Students who are liable for exclusion from a subject or course must lodge their show cause statement and completed re-enrolment form with the Student Administration Office on or before Friday, 3 January 1975.

With regard to continuation in a course, under By-law 5.4.1.2 Faculty Boards have determined policy to regulate the academic progress of students, particularly in relation to the first year or first two stages of enrolment, and students should refer to their Faculty Handbook for this information. 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;
   (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 Admission 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 conditions as it may determine.

By-law 5.4.4 — Appeal Against Exclusion

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

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

Degree 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.

For details of degree requirements reference should be made to the appropriate Faculty Handbook.

Leave of Absence

A student who does not wish to re-enrol for any period up to three years should apply for leave of absence. Leave of absence is normally granted to those students who have passed the equivalent of half the
first year course and are in good standing. Applications should be submitted before the end of first term in the first year for which leave of absence is sought. Leave of absence will not be granted for more than three years and will not be granted retrospectively. Any student who does not enrol for a period of two years and does not obtain leave of absence, must apply for re-admission to the University when he wishes to resume his studies.

**Re-enrolment in Undergraduate Courses**

Re-enrolment materials will be mailed to all undergraduate students early in November. Those who wish to re-enrol in 1975 and who are eligible to do so (see academic progress requirements page 23) should complete the re-enrolment form as soon as possible after the release of the 1974 Annual Examination results, and forward it to The Secretary, University of Newcastle, N.S.W. 2308.

*Re-enrolment forms are due 3 January 1975 except in the case of a student who is required to take a special or deferred examination in which case the re-enrolment form must be submitted within seven days of the release of those examination results.*

Submission of re-enrolment forms after the due date will render the student liable to a late lodgement charge of $14.00.

Students who, for good reasons, are unable to submit their Re-enrolment Forms by the due date, may apply for an extension of time. The request, with details of reasons for the extension must reach the Secretary by the due date if the late lodgement charge is to be avoided.

The By-laws provide that no enrolment will be accepted after 31 March without the approval of the Secretary which shall be given only in exceptional circumstances.

**Approval of Re-enrolment**

When the re-enrolment programme has been approved, a form *Authority to Complete Enrolment* will be mailed to the student showing charges payable. Students are required to complete enrolment by payment of all charges due by 25 February 1975 otherwise late charges become payable.

The following time schedule summarises the steps involved in re-enrolment without payment of a late charge.

1974

Nov.  Re-enrolment forms mailed to students.
Mid Dec. Examination results mailed to students.

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1975

Jan. 3  Last date for submission of re-enrolment forms with requested programme for 1975.
Jan./Feb. (Progressively) re-enrolment forms approved, forms *Authority to Complete Enrolment* mailed to students with details of Charges payable and approved programme for 1975.
Feb. 25  Last date for lodging with Cashier the *Authority to Complete Enrolment and charges due.*
Mar. 3   Term One commences.

**Re-admission after Absence**

A person who has been enrolled previously at the University of Newcastle, but not enrolled in 1974, is required to lodge an *Application for Re-admission* if further undergraduate enrolment is desired. Applications are available from the Student Administration Office and close on 17 January 1975.

**Non-Degree Students**

A person who is qualified to matriculate may apply for enrolment as a non-degree student in a subject or subjects. Persons enrolled as non-degree students are expected to comply with normal university requirements. Permission to enrol as a non-degree student is granted for one year at a time and a new application is required each year. Persons seeking non-degree enrolment should lodge the *Application for Admission* by the closing date (1 November 1974).

**Postgraduate Courses**

Postgraduate courses are offered in each of the Faculties of the University. They include—

- postgraduate diploma courses
- higher degrees by coursework
- research master and doctoral degrees.

**Postgraduate Diplomas**

The following postgraduate diploma courses will be offered in 1975:

<table>
<thead>
<tr>
<th>Faculty</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arts</td>
<td>Diploma in Education</td>
</tr>
<tr>
<td>Economics &amp; Commerce</td>
<td>Diploma in Business Studies</td>
</tr>
<tr>
<td>Engineering</td>
<td>Diploma in Industrial Engineering</td>
</tr>
<tr>
<td>Mathematics</td>
<td>Diploma in Computer Science</td>
</tr>
<tr>
<td>Science</td>
<td>Diploma in Psychology*</td>
</tr>
</tbody>
</table>

Application Procedure
Persons wishing to enrol for a postgraduate diploma should complete the appropriate application for registration and lodge it with all required documents with the Student Administration Office not later than Friday 17 January 1975.

For further information about a particular course please consult the appropriate Faculty handbook.

Higher Degrees by Coursework
Higher degrees by coursework are offered in the following faculties:
- Architecture: Bachelor of Architecture
- Arts: Bachelor of Educational Studies
- Economics & Commerce: Master of Commerce (in Economics)
- Engineering: Master of Engineering Science in Chemical, Civil, Electrical and Mechanical Engineering

Persons wishing to register for one of the above awards must lodge the Application to Register form with all required documents with the Student Administration Office not later than Friday, 17 January 1975.

Research Higher Degrees
The following research higher degrees are available:
- Master of Architecture (MArch)
- Master of Arts (MA)
- Master of Education (MEd)
- Master of Engineering (ME)
- Master of Mathematics (MMath)
- Master of Science (MSc)
- Doctor of Philosophy (PhD)

The By-laws also provide for the conferring of higher doctoral degrees. Applications for registration for a research higher degree, together with all required documents, must be lodged on the prescribed form with the Student Administration Office at least one full month before the beginning of the term in which registration is to commence. Applications received after the due date may be considered for the following term.

Confirmation of Enrolment
In May each year the University forwards to all students a form Confirmation of Enrolment which contains details of a candidate's registration and any formal subjects for which he has enrolled. This form must be checked carefully, signed and returned by the due date to confirm active enrolment for the course listed.

Change of Address
Students are required to notify the University of any changes in their address for correspondence, and must make arrangements for mail to be forwarded to them during short absences.

Variations to Programmes
Any requests for variations to postgraduate programmes must be submitted through the Student Administration Office for approval.

Re-enrolment of Postgraduate Students
All postgraduate and higher degree students who are eligible to continue their enrolment will be sent re-enrolment materials and details of the procedure to be followed to re-enrol.

Ownership of Students 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.

Charges
Charges are determined by the University Council and are subject to alteration without notice. The due date for payment of charges for 1975 is 25 February, 1975. Enrolment is completed by lodging with the Cashier the approved form Authority to Complete Enrolment with a remittance to cover all charges due or evidence that a sponsor will meet these charges. The By-laws provide that enrolment will not be accepted after 31 March 1975 without the Secretary's written approval which will be given only in exceptional circumstances.

Payment of Charges
The Union Entrance charge and General Services charge must be paid in full at the time of enrolment. Payment by mail is encouraged. Money Orders should be made payable at the Newcastle University Post Office, New South Wales 2308. The Cashier's Office is located on the first floor of the Arts/Administration Building, and is open during term from 9 a.m. to 4.30 p.m. and during vacation periods from 9 a.m. to 12.30 p.m. and 1.30 p.m. to 4.30 p.m.
Scholarship Holders and Sponsored Students

Students holding scholarships or receiving other forms of financial assistance must lodge with the Cashier their Authority to Complete Enrolment together with warrants or other forms of documentary evidence that charges will be paid by sponsors. The University looks to sponsors to provide a separate voucher, warrant or letter for each student sponsored.

Charges

1. General Services Charge
   
   (a) Students Proceeding to a Degree or Diploma
       All students must pay a General Services charge of $63.00 per annum. In addition, students joining Newcastle University Union for the first time, are required to pay an amount of $10.00. These charges must be paid in full by the prescribed date.
   
   (b) Non-Degree Students
       Non-degree students must pay a Union charge of $34.00 per annum. This fee must be paid in full by the prescribed date. Non-degree students are not required to pay the General Services charge or the Union Entrance charge.

2. Late Enrolment and Re-enrolment Charges
   
   (a) Late re-enrolment charge where a continuing student does not lodge a re-enrolment form with the Student Administration office by 3 January 1975 $14
   
   (b) Late enrolment charge where a student does not lodge the Authority to Complete Enrolment form with the Cashier by 25 February 1975 $14
   
   (c) Late payment charge where an application to sit for examination is accepted after closing date $6
   
   (d) Late payment charge if General Services charge is not paid by 25 February 1975 $8
   
   (e) Additional amount payable if General Services charge is not paid within an extended time after 25 February 1975 $6

3. Other Charges
   
   (a) Examination under special supervision, per paper $10
   
   (b) Review of examination results, per subject $8
   
   (c) Statement of matriculation status for non-members of the University $8
   
   (d) Academic statements in excess of six per annum 15c a copy
   
   (e) Replacement of student identity cards 50c each

Higher Degree Candidates

General Services Charge

Higher Degree candidates are required to pay the General Services charge and Union Entrance charge, if applicable. Where the enrolment for a Higher Degree candidate is effective from First or Second Term, the General Services charge 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 enrolls on or after the first day of Third Term, the General Services charge paid will cover liability to the end of the long vacation following the next academic year.

Tertiary Education Assistance Scheme

Under this scheme the Australian Government provides a living allowance and other allowances to students who are undertaking tertiary study for the first time and who

* are permanent residents of Australia
* enrol as full-time students
* enrol in approved courses
* qualify for a living allowance on a means test.

Information and application forms may be obtained from the Regional Director, Department of Education, 333 Castlereagh Street, Sydney, (Telephone 02/20929). Postal address Box 596, Post Office, Haymarket 2000.

Teacher Education Scholarships

The N.S.W. Department of Education each year offers a large number of Scholarships to persons wishing to enter the teaching profession.

Information and application forms may be obtained from the Teacher Education Scholarship Branch, N.S.W. Department of Education, Blackfriars Street, Chippendale, N.S.W. 2008.
General Information

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

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.

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.

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

Bus
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 under the Tertiary Education Assistance Scheme, or to holders of Teacher Education 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
Concessions 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) between 9 a.m. and 5 p.m. Monday to Friday at the Attendants' Office in the north-eastern corner of the lowest floor of the Auchmuty Library building.

The Auchmuty Library
The Library, totalling approximately 275,000 volumes and made up of monographs, pamphlets, serials, microform sets and audiovisual materials, exists to acquire, preserve and make available for use all research and learning materials needed by the staff and students of the University. The seating capacity of the Library in 1975 will be approximately 1,000.

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 its procedure for borrowing.

Hours of Opening
During academic year
Monday — Friday 8.30 a.m. to 10.00 p.m.
(long vacations excepted)
Saturday and Public Holidays
(aside from Easter Weekend,
Friday-Tuesday inclusive, and
Anzac Day, when the Library
is closed)

Sunday

During long vacation

Monday, Wednesday, Friday
Tuesday, Thursday

9.00 a.m. to 5.00 p.m.
(all vacations excepted)

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

9.00 a.m. to 5.00 p.m.
9.00 a.m. to 7.00 p.m.

Amenities Office

The Amenities Office is located in the temporary building adjacent to
the Mathematics/Classrooms building. Students are assisted in the
following fields:

Sport

The Amenities Officer, liaison officer for all sporting matters between
the Sports Union, the University and outside sporting organisations,
assists student sporting clubs at club level and with Inter-varsity
contests.

Sporting Facilities

Administration of all campus sporting facilities, which at present in­
clude four squash courts, four tennis courts, two ovals and an outside
basketball court, is the responsibility of the Amenities Officer and his
staff.

Auchmuty Sports Centre

The sports centre provides for the following activities: Basketball,
Volleyball, Badminton, Weight training, Gymnastics and other assoc­
iated sporting activities.

Non-competitive Pastimes and Diversions

Classes in Bridge, Pottery, Keep Fit, Leatherwork, Yoga, Jazz Ballet
and Ballroom Dancing are arranged for students and staff.

Student Accommodation

The Student Accommodation Service maintains a register of rooms,
flats and private board available in Newcastle, and will deal with any
accommodation problem which students may encounter while attending
the University.

Insurance

The Personal Accident Insurance Scheme is administered by the
Amenities Officer on behalf of the Sports Union and the Students’
Representative Council.

Amenities Officer — H. Bradford
Activities Organiser — S. D. Barwick

Careers and Student Employment Office

The Careers and Student Employment Office (then the Appointments
Office) was established in 1971 primarily to help students obtain
information about careers and to assist graduating students to find
employment. It is located in the temporary building adjacent to the
Mathematics/Classrooms building.

Careers Counselling

All new students are invited to consult the Careers and Student Employ­
ment Office at some time 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 Careers and Student Employment 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 disappoint­
ment can be avoided after graduation. Students in the last year or
stage of their degree, who may need help in finding suitable employ­
ment upon graduation, should consult the Careers and Student Employ­
ment Office during the July-September period prior to the final
examinations.

Careers Library

1. A section of the Careers Library contains books, periodicals,
articles, etc. giving general information about the 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.
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, 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 Careers and Appointments Service, University of Sydney has indicated that where a Newcastle University student proves that he is a bona-fide student, he may obtain copies of the “Notices of Vacancies” prepared by that Service, 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 Careers and Student Employment Office at the commencement of each year and complete a card indicating their needs. As opportunities are notified to the Careers and Student Employment Office, appropriate students are informed.

Industrial Experience and Vacation Employment

The Careers and Student Employment 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 organisations in the ensuing year. The Careers and Student Employment Office arranges distribution of this Directory; a few spare copies are available to undergraduates upon request.

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

Careers Officer — H. Floyer, BEc(Sydney)

Chaplaincy Service

The Chaplaincy Service for the benefit of students and staff is provided by the Christian Churches of Newcastle. The Chaplains’ office is situated in the University Union but the Chaplains may also be contacted at their private addresses.

The service offers personal counselling, guidance, assistance in biblical and doctrinal studies, and opportunities for liturgical worship.

Anglican
The Reverend Canon E. H. V. Pitcher, MA(Sydney), ThSchol (Acting Chaplain), The Rectory, Merewether 2291. Telephone 63 1388

Baptist
The Reverend T. H. Binks, 133 Kemp Street, Hamilton 2303. Telephone 61 4048

Methodist
The Reverend B C, Walker, BA(Sydney), MDiv(Garrett), 95 Macquarie Grove, Caves Beach 2281. Telephone 71 1654

Presbyterian
The Reverend H. G. Durbin, ED, BA, 40 Stewart Avenue, Hamilton 2303. Telephone 61 1455

Roman Catholic
The Reverend Father E. Neira, OP, LST, BA(Oakland), MA, PhDSoSc(Santo Tomas), The Presbytery, Shortland 2307. Telephone 55 9364.

Edwards Hall

Edwards Hall is situated on the University Campus near the southeastern boundary of No. 1 Sports Oval, and is approximately one mile by road from the University Library. While the Hall is an integral part of the University and as such is subject to the decisions and directions of the University Council, major responsibility for the government of the Hall has been entrusted by Council to a Board of Trustees made up of three Council members, one Senate member, two senior resident students, one resident subwarden and the Warden.

Three buildings comprise Edwards Hall; a central amenities building flanked by two residential buildings providing 222 residential places for University students and staff, including six positions for residential subwardens.
Residential fees for 1975 have not been determined at the time of printing but as a guide the 1974 residential fees were: Term 1 (11 weeks $286); Term 2 (10 weeks) $260; Term 3 (12 weeks) $312. These fees entitle a member to a bed/study room and its maintenance including fresh linen and 16 meals a week, being breakfast and dinner each day and lunch on Saturday and Sunday.

Residence application forms for 1975 may be obtained from and should be returned to the Warden, Edwards Hall, The University of Newcastle, N.S.W. 2308, by 7 February 1975. Applications received after this date will not necessarily be considered.

Warden — M. W. Blackmore, BSc, PhD(Queen's Belfast), ARIC, ARACI, AFCIA

University Counselling Service

The University Counselling Service is located in the Administration building (entrance at N.W. end). The Service is divided into three major divisions — Personal Counselling; Study Skills Training; 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 Counsellors assist students — past, present and future — in a wide variety of matters, all contacts with a counsellor being regarded as completely confidential. 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, and at this University approximately one third of students utilise the Counselling Service.

A student should not wait for 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 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. Counsellors are available for evening appointments.

Study at the University Level

The University Counselling Service published a brief but comprehensive book on this subject in 1967 and a revised edition in 1969. Although produced specifically for students of this University, it is widely used in other tertiary institutions. It may be purchased from the University Cashier at 40 cents per copy.

Senior Student Counsellor — A. P. T. Loftus, BA(Melbourne), MA, MAPsS

Student Counsellors — Anne H. Furner, BA, DipAppPsych, MAPsS — D. R. Martin, BA, DipEd(Sydney), MAPsS, ABPsS (Temporary Appointment

Secretary — Joy HoesE

Overseas Students Service

The Overseas Student Advisor is on campus solely to help overseas students with any problems which may arise. Because of her specialized knowledge, she may be able to give direct assistance, may refer the student to someone in an appropriate field, (e.g., legal, health, insurance, etc.) or she may speak at the student’s request and on his behalf with government officers, staff members or others.

Any discussion with the Overseas Student Advisor is completely confidential. She may be contacted either through the University Counselling Service or in the University Union.

Overseas Student Advisor — Robin Loftus, BA(Adelaide)

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). This loan is now supplemented by government grant.

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 loan to any one undergraduate shall not normally exceed $600 at any one time and an undergraduate granted a loan is required to enter into an agreement. In special circumstances the Committee may grant a loan to a student other than an undergraduate.

Repayment must commence not later than twelve months after graduation or if 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.
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.

**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. John Raschke, attends each Tuesday and Thursday morning 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 Student Legal Referral Service**

Members of the Department of Legal Studies conduct a Student Legal Referral Service for students with problems of a legal nature. Students are given, without liability, free legal advice and are advised how and where they may obtain legal aid and representation.

The times that the Service operates are shown on the Legal Studies Notice Board.

**University Co-operative Bookshop Ltd**

The University Co-operative Bookshop, located in the Union building, supplies text and reference books and caters for a wide range of general reading. On payment of $5, refundable on request, students become shareholders and receive a yearly rebate on all purchases.

**The Citizen Military Force's Unit**

The University of Newcastle Company, the Citizen Military Force's Unit affiliated with the University, was formed in 1957 as a Sub-Unit of the University of Technology Regiment which is now called The University of New South Wales Regiment. Its function 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 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. The current strength of the Company is 100.

**Benefits**

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.
- Opportunities for attendance at Regular Army Courses and short time attachments to Army units in Malaysia or New Guinea.
- Free meals and accommodation at camps and bivouacs.
- Free Uniforms.

Enquiries should be made at the Training Depot, King Street, Newcastle West.

*Officer Commanding — Capt. P. Groves*

*Full-time Staff — WO2 M. Grovenor*

*S/Sgt P. Toohey*

**Other Facilities**

Newcastle University Post Office and branches of the Commonwealth Bank and the Bank of New South Wales are available on the campus.
University Organisations

Newcastle University Students' Association

Membership
All students proceeding to a degree or a diploma are members of the Students' Association.

Included in the General Services charge, is $10.75 subscription to the Newcastle University Students' Association (N.U.S.A.). You are all financial members of this Association and have every right—and a duty to yourselves—to take part in the running of the Association and the administration of its collective assets.

Students' Representative Council
Each year, the Students' Association elects a number of students (27 at present) to the Students' Representative Council. This Council's purpose is:
1. to work for student welfare: in matters both academic and social, both internal and external to the University community. The S.R.C. has been instrumental in the formation of the Food Co-Op.; the installation of a Pharmacy on campus; the provision of medical services; the provision of automatic insurance cover for students; and other welfare schemes.

The S.R.C. is also responsible for printing various student publications such as Opus, the student newspaper, the Orientation Handbook, Nimrod, the annual literary magazine, and the weekly Bulletin of N.U.S.A. activities.

2. to implement student association policy on matters academic, political or administrative. N.U.S.A. policy is decided at official lunchtime meetings where all students may attend and vote.

3. to give money and other aid to the various clubs and societies, including religious, political and social groupings on campus;

4. when needed, to act as the students' voice in submissions to the University administration, the mass media, and various government departments;

With its various committees, for example, the Welfare and Education Committees, and its officers such as the Education Campaign Director, the Services Officer and so on, N.U.S.A. attempts to facilitate as many expressions of cultural activity as possible, as well as organizing action to effect student policy on environment, aboriginal rights, apartheid and so on.

Each year, the Association organises, with some help, Orientation week and early in July, Autonomy Day, which is the equivalent of Commem. Foundation Day, or similar activities at other universities.

Australian Union of Students

As the Students' Association is a constituent member of theAustralian 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 the World University Service, national campaigns on education, and the national student newspaper, National 'U'.

The Association, by way of 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.

It is more important than ever that new students help run the association. At the moment too few students do much of the work, and as the older students leave, the new ones must fill the gap or the association will collapse as a functioning unit. How can you help? Come to the general student meetings and vote; vote also in the S.R.C. elections and stand for positions that interest you. In general, try not to be apathetic or disinterested.

President — G. Chilvers
Secretary — G. Wicks

Newcastle University Union

Objects
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 cooperation of University men and women in furthering the interests of the University.

Facilities
The Union maintains a fine building on the campus and facilities provided include a complete range of catering services (a liquor licence has been approved), recreational and common room areas, a reading room, rooms for meetings and functions of all kinds, for 16 mm film projection, for T.V., and for music practice. A games complex on the lower level provides billiards, table tennis, chess, and music listening outlets. A Student Counsellor, the Overseas
Student Advisor and the Chaplains are also on this lower level whilst a Student Health Centre with a doctor in attendance is located in the main building.

The new commercial area includes the Union Shop, which provides for the academic needs of members, a University Co-operative Bookshop, an A.U.S. Travel Service and an A.U.S. pharmacy, operative from 1st Term 1975, together with premises operated by the Bank of New South Wales and David Jones Ltd.

The office of the Students' Representative Council is located within the new extensions, together with Union administrative offices.

Membership
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.

Board of Management
The Board of Management, elected each April, conducts the affairs of the Union. Membership consists of:
- 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
- one representative of the staff of the Union elected by the Union Staff and
- the Secretary Manager of the Union.

President — R. B. Griffiths
Secretary Manager — W. V. Bridgwater

The University of Newcastle Sports Union

The Sports Union/Amenities office is located in the temporary building adjacent to the Mathematics/Classrooms building. The Sports Union is the student organisation responsible for the promotion and control of sporting activities within the University. Students interested in participating in any sport should contact the Amenities Officer or one of the Sports Union Executive.

Membership
The annual income of the Sports Union is derived from a portion of the General Services charge, payment of which entitles a student to membership of the Sports Union. Associate membership is available to staff and graduates on payment of a special charge.

Affiliated Clubs
Athletics, Australian Rules, Badminton, Men's and Women's Basketball, Canoeing, Cricket, Fencing, Golf, Men's and Women's Hockey, Mountaineering, Netball, Men's and Women's Rowing, Rugby Union, Rugby League, Sailing, Sking, Soccer, Softball, Squash, Surfing, Swimming, Table Tennis, Taekwondo, Tennis, Underwater, Volleyball.

Inter-Varsity and Inter-Faculty Contests
Inter-varsity contests are hosted by a different university each year. Clubs participating are subsidised by the Sports Union. Inter-Faculty contests stimulate friendly rivalry and encourage higher sport participation.

Blues & Colours
For outstanding individual performances in sport, Blues and Sporting Colours are awarded.

Sports Union Committee
Each club is represented on the Sports Union Committee. The Executive Committee consists of the President, Vice-President, Honorary Secretary, Treasurer, a University Council representative, two General Committee delegates and the Amenities Officer.

President — B. P. O'Shea, BCom
Secretary — P. Hunt, BA
Treasurer — I. R. Beaman, BSc(New South Wales), DipIndEng
Amenities Officer — H. Bradford

Convocation
Convocation provides an opportunity for graduates to maintain a positive interest and influence in University affairs. It has the right to discuss and to pronounce an opinion on any matter relating to the University, and to communicate directly with the Council or Senate of its own volition or at the request of either body. Convocation elects five members of the University Council.

Public meetings at which topics of interest are discussed are conducted by Convocation as well as general meetings. Convocation is controlled through a Standing Committee consisting of a Chairman, who is called the Warden of Convocation; the Immediate Past Warden, who is the Deputy Chairman; twelve members who are members of Convocation elected by Convocation; and members of Council elected by Convocation who are not already members of the Standing Committee.
Membership is automatic for graduates of this University, and for those graduates of the University of New England and of the University of New South Wales who spent at least three years as students of Newcastle University College; for present and past members of the University Council; and for present full time members of the academic staff and graduate permanent members of the administrative, library and technical staff.

Council may admit as members of Convocation upon payment of $10

(a) graduates of other universities who are resident in the Hunter Valley or North Coast areas; and

(b) such other university graduates as the Council may approve.

Warden — Professor K. R. Dutton, MA(Sydney), DU(Paris), MACE

Secretary — E. J. Buckman, BSc(New South Wales), MEngSc, ASTC, MIEAust

Treasurer — G. Mitchell, BCom

Immediate Past Warden — W. G. Derkenne, LLB(Sydney), BA

Standing Committee Members

J. W. Armstrong, BA
A. J. Chambers, BE(New South Wales), ME, PhD(Stanford), GradIEAust
Nina L. Cornelius, BMath
E. Gwen Hamilton, BA(New South Wales), ALAA
Katalin Heiner, BCom
Carmen J. Johanson, MA
J. A. Lambert, BSc(Sydney), MSc(New South Wales), FBCS, MACS
Barbara J. Lord, BSc(Sydney), BA
P. A. Marquet, BA(Sydney), AASA, ALCM, STSD
G. Mitchell, BCom
F. O. J. Purdue, CBE, HonDSc
B. W. Relf, BA

Standing Committee and University Council Members

C. B. Belcher, MSc(New South Wales), ASTC, FRACI, FIM(Lond.)
E. J. Buckman, BSc(New South Wales), MEngSc, ASTC, MIEAust
C. J. A. Cornelius, BCom
W. G. Derkenne, LLB(Sydney), BA
K. H. White, MB, BS(Sydney), BA; DCP(Lond.), FRCPA
Where to Obtain Information

Locations of Officers and Amenities

\( A = \text{Arts/Administration building} \)
\( LG = \text{Lower ground floor} \)
\( G = \text{Ground floor} \)
\( 1 = \text{First floor} \)
\( M = \text{Temporary building adjacent to Mathematics/Classrooms building} \)
\( S = \text{Social Sciences Building} \)

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Where to Obtain Information

If you have any problems about your course you should generally seek the advice of the academic staff, particularly the Dean or Sub-Dean. The list below indicates other officers or amenities who may be consulted about appropriate problems. The location of these officers or amenities is given on the reverse of this page.

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