The University of Newcastle

FACULTY OF ENGINEERING
HANDBOOK

CALENDAR 1989
VOLUME 7
The University of Newcastle Calendar consists of the following volumes:

Volume 1 — Legislation
Volume 2 — University Bodies and Staff
Volume 3 — Faculty of Architecture Handbook
Volume 4 — Faculty of Arts Handbook
Volume 5 — Faculty of Economics and Commerce Handbook
Volume 6 — Faculty of Education Handbook
Volume 7 — Faculty of Engineering Handbook
Volume 8 — Faculty of Medicine Handbook
Volume 9 — Faculty of Science and Mathematics Handbook

Also available are the Undergraduate Guide and Postgraduate Prospectus

This Volume is intended as a reference handbook for students enrolling in courses conducted by the Faculty of Engineering.

The colour band, Lapis Lazuli RCI 150, on the cover is the lining colour of the hood of Bachelors of Engineering of this University.

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THE DEAN'S FOREWORD

On behalf of the staff of the Faculty of Engineering, I wish to extend a very warm welcome to all students, those who are entering the University and the Faculty for the first time and those who are returning to commence another year of studies. A particular welcome is extended to the students of Computer Science who join the Faculty in 1989 as a result of the formation of the new Department of Electrical Engineering and Computer Science.

Having chosen to study in one of the fields of Engineering or in Computer Science or Surveying, you are embarking on a professional career which is both challenging and stimulating. We are living in an age which is witnessing a tremendous growth in scientific and technological development and which is having a marked effect on the modes and characteristics of our society. The future of our society is very much dependent on the solution of a number of very complex technological problems. None more important than those associated with food production, the development of alternative forms of energy and the preservation of our living environment. Graduates in the various disciplines of Engineering and in Computer Science and Surveying, will, in their own way, contribute to the solution of these and other important problems.

The role of universities in modern society is a changed one. Not only is it necessary to preserve the ideals of learning and associated fundamental research, it has become of equal importance for universities to become directly involved in the advancement of science and technology necessary for modern industrial and technological development. In this respect the role of the university engineering faculty in applied and industrially orientated research is an important one. This Faculty of Engineering through its research and associated projects undertaken on behalf of Australian industry, has already made a significant contribution. The extent and quality of the Faculty's research and industrial consulting record was recognised in 1988 in the Report of the Review of the Discipline of Engineering and by the Australian Government's establishment of the Centre for Industrial Control Science within the then Department of Electrical and Computer Engineering.

Tertiary education nationally is currently undergoing a period of change and many issues relating to course matters are expected to be considered during 1989. The Faculty will continue to update course material to meet the highest academic and professional standards and the needs of society, as well as to improve the learning environment. Students are encouraged to take part in the decision-making processes of the Faculty through membership of the Faculty and Departmental Boards and by supporting the students elected to those positions.

A number of the developments to occur in 1989 are already known. As mentioned above, the Faculty will offer a full range of studies in Computer Science as a result of the merger of the Department of Electrical and Computer Engineering and the Department of Computer Science to form the new Department of Electrical Engineering and Computer Science. This is a very welcome development which is expected to enhance all courses offered in the Faculty. Following the decision to discontinue the Materials Engineering programme, a number of specialisation subjects in Materials are to be provided within an expanded programme in the discipline of Mechanical Engineering. In view of the close relationship between "materials" and "design", this development is seen as being of particular significance to the education of engineers for the manufacturing and process industries. The teaching and laboratory facilities of the Faculty are in the process of being greatly expanded through the completion of the new Engineering/Science Building. The year 1989 also marks the commencement of a new University structure which sees Engineering and Architecture linked together through the formation of a new School comprising both Faculties. The opportunity to obtain a well-rounded tertiary educational experience is embodied in the very concept of the university system. The University environment, with its excellent campus and facilities, together with the many extra-curricula activities, creates an opportunity for obtaining a broad experience, indeed a unique experience in one's lifetime. For this reason I would encourage you to take full advantage of the opportunities available to you and, where time permits, take an active interest in the various facets of University life.

The staff of the Faculty will do everything possible to make your work both interesting and enjoyable; they are anxious to help you with any problems you may have. We would be most grateful for any feedback of a constructive nature that you may wish to offer.

In conclusion, I wish you well in your studies at this University. There is no doubt that a course leading to a degree in Engineering, Computer Science or Surveying, requires a great deal of dedication and perseverance, but the task is certainly a rewarding one.

ALAN W. ROBERTS
Dean
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SECTION ONE

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H. C. Gouzon
Laboratory Assistant P. A. Bove
Senior Laboratory Craftman M. H. Lyer
Laboratory Craftman S. Gay
Departmental Office Staff
C. E. Hook
A. Roberts
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G. Wrightson, BE, MCompSc, PhD (Karlsruhe)
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J. Rosenberg, BSc, PhD(Manch)

DEPARTMENT OF MECHANICAL ENGINEERING
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A. W. Roberts, BE, PhD(NSW), ASTC, FIEAust, MIMechE, MIEE (Professor of Industrial Engineering)
Associate Professors
A. J. Chambers, BE(NSW), ME, PhD(Sydney), MIEAust
G. E. Mears, BSc, PhD, DSc(Finn), MACS, MASME
W. A. Oates, BMath, MSc, CEng, FIMechE
FACULTY INFORMATION

About This Section
This section contains general information about the Faculty of Engineering and the degree programmes which are offered within it. Degree Regulations and Undergraduate Course Programmes are given in separate sections of this Handbook.

Advice and Information
Students are assumed to be familiar with the information contained in this Handbook which relates to their own course of study and to general University and Faculty requirements. Additional information will be posted on Notice Boards throughout the academic year. It is each student’s responsibility to ensure that they keep themselves aware of the contents of relevant Notice Boards.

Academic Advice
Academic advice and general enquiries regarding the consent of particular courses may be obtained from the following members of academic staff.

Chemical Engineering
Mr J. Roberts
Dr W.G. Field

Civil Engineering
Mr B. Penfold
Dr J. Rosenberg

Computer Engineering
Mr R. Evans
Mr B. Penfold

Electrical Engineering
Mr G.D. Butler
Mr J. W. Hayes

Mechanical Engineering
Mr G.D. Butler
Mr J. W. Hayes

Personal Counselling
Students may wish to discuss matters relating to course difficulties or options with the Faculty Secretary (Room EA209), the Faculty Administrative Assistant (Room EA213) or any of the persons listed above.

Members of the University Counselling Service are also available for entirely confidential personal consultation on any matter, particularly matters of academic skills and personal growth. The Counselling Service is situated on the courtyard level of the Library Building. An appointment is usually required.
THE FACULTY

The Faculty of Engineering is constituted by the Council of the University under By-law 2.4.1 and is comprised of the Department of Chemical Engineering, the Department of Civil Engineering and Surveying, the Department of Electrical Engineering and Computer Science and the Department of Mechanical Engineering.

The Department of Electrical Engineering and Computer Science is a new department formed from 1 January 1989 by the merger of the Departments of Electrical and Computer Engineering, previously a department of the Faculty of Engineering, and the Department of Computer Science, previously a department of the Faculty of Mathematics.

The Faculty Board, Faculty of Engineering, is charged with conducting the academic affairs of the Faculty and includes the Vice-Chancellor (ex officio), the Dean of the Faculty, the members of the full-time academic staff of the Faculty, representatives of a number of other faculties and departments of the University, and four student members. The Dean is Chairman and executive officer of the Faculty Board.

The responsibilities of Faculty Boards are set out in By-law 2.4.4 and other By-laws and Regulations of the University.

Degrees and Diplomas

The awards which may be made by the University to persons presented by the Faculty of Engineering are listed below.

Undergraduate Degrees

Bachelor of Computer Science (BCompSc)
Bachelor of Engineering (BiEng) which is awarded in the specialities of:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Industrial Engineering
- Materials Science
- Mechanical Engineering

Bachelor of Metallurgy (BMet)
Bachelor of Science (Engineering) (BSc(Eng) - majors)
Bachelor of Science (Metallurgy) (BSc(Met))
Bachelor of Surveying (BSurv)

Postgraduate Diplomas

Diploma in Computer Science (DipCompSc)
Diploma in Computing (DipComp)
Diploma in Industrial Engineering (DipEng)
Diploma in Surveying (DipSurv)

Postgraduate Degrees

Bachelor of Computer Science (Honours) (BCompSc(Hons))
Master of Computer Science (MCompSc)
Master of Computing (MComp)
Master of Engineering Science (MEngSc)

Master of Engineering (ME)
Master of Science (MSc)
Doctor of Engineering (DEng)
Doctor of Philosophy (PhD)
Doctor of Science (DSc)

Undergraduate Degree Courses

Computer Science

The Bachelor of Computer Science (BCompSc) degree will be offered in the Faculty of Engineering from 1 January 1989.

This degree course, which is aimed at those students who have been admitted to the Faculty of Mathematics, has been designed to provide students with the opportunity to study a wide range of subjects in computer science and related areas, and thus equip them with an excellent background for a professional career in the computer industry or as a programmer or systems analyst in industry or commerce.

The programme may be taken over three years of full-time or equivalent study. Combined degree programmes are also available which allow the BCompSc degree to be completed together with a degree in either Arts, Computer Engineering or Mathematics. An outline of the Computer Science programme is given in Section 9.1 and the relevant degree regulations are given in Section 3.3 of this Handbook.

Engineering

Bachelor of Engineering (BEng) degree courses are offered in the following specialities:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Industrial Engineering
- Mechanical Engineering

Each engineering degree programme may be completed by four years of full-time study or equivalent. Part-time attendance is permitted; however, students intending to undertake part-time study should note that many classes are held during the day.

Students may choose to complete their full-time study with a minimum of seven years of part-time study as their commitments permit. It is also possible to follow a "shock sandwich" pattern of attendance by which full-time study and full-time industrial experience are alternately undertaken on an annual basis. It is recommended that at least the final year of study be taken on a full-time basis.

The available attendance patterns are described in more detail in Section 2.

Engineering courses are highly structured and, although each follows a similar pattern, the courses of the nature naturally differ according to the needs of the specialism concerned.

In Year 1 students study mathematics and the basic sciences as well as commencing studies in the engineering sciences. Year II programmes continue studies in mathematics and, where applicable, basic sciences. The scope of engineering studies is also widened. Year III consists of major engineering subjects and is generally regarded as the core of the programme. In the final year these studies are extended by the inclusion of more specialized topics. The programmes also make provision for engineering elective subjects to be included in the degree programmes. The final year project, in which students may undertake extensive studies in an area of special interest, is a particular feature of the engineering programmes at Newcastle.

Engineering programmes are regularly reviewed in order to incorporate the latest technological and professional developments relevant to each specialism. The currently approved Programme for each course is set out in Section 5 of this Handbook.

In addition to the full degree programmes offered in the Faculty, students may commence studies in Mining Engineering and Naval Architecture by completing the first two years of the full time programmes in Civil Engineering or Mechanical Engineering respectively. Students choosing to follow these programmes may complete their studies at the University of New South Wales.

Honours

Honours are awarded on the basis of performance during the entire course programme (see Faculty Policies in Section 4).

Accreditation

Each engineering programme is recognised as meeting the full academic requirements for corporate membership of the Institution of Engineers, Australia (BE Aust) and recognised by a number of overseas professional bodies.

The Computer Engineering Programme is also accredited by the Australian Computer Society as satisfying that organistion's highest level of academic requirements.

The Chemical Engineering Programme also meets requirements for membership of the Institution of Chemical Engineers (Great Britain) and is recognised by the Royal Australian Chemical Institute and the Australian Institute of Energy.

Combined Degree Programmes

Each of the BE programmes may form part of a combined degree programme leading to the award of a second degree by, in most cases, a total of five years of full-time study. Programmes have been approved which lead to the award of the BE degree in any speciality together with Bachelors degrees in Arts (BA), Commerce (BCom), Economics (BSc), Mathematics (BMath) or Science (BSc).

In addition, the following Specialist Combined Degree Programmes have also been approved: BE (Computer Engineering) / BCompSc, BE (Civil Engineering) / BSurv, and BSurv / BMath.

Combined degree programmes are normally offered after completion of the first year of an engineering programme with an average of credit or WAM of 70. In the case of the BE (Civil Engineering) / BSurv programme, a WAM of 55 is required after completion of the first year of either the Civil Engineering or Surveying Programmes. See Section 7 of this Handbook for further details.

Surveying

The Bachelor of Surveying (BSurv) programme is offered as a four year full-time or equivalent study course on a similar basis to that of engineering programmes. In addition to Mathematics and Physics, the course also deals with aspects of Civil Engineering, Economics and Law as well as the technical aspects which are included in the surveying specialisation.

The course is designed to train students to qualify as licensed surveyors in New South Wales and for other professional surveying careers. The current surveying course was approved by the Surveyors Board of New South Wales in 1989.

Surveying degree programmes are flexible and can be adapted to meet the needs of the student and the requirements of the professional surveying bodies.

Postgraduate Diploma Courses

Diploma in Computing

This postgraduate diploma was first offered in 1988 and was designed to meet the needs for a computing qualification that can be completed in one year.

Students admitted to the programme must demonstrate a sound knowledge of Pascal before attempting Diploma subjects. This knowledge can be demonstrated either by passing the Introduction to Programming Examination or by providing evidence of successful completion of an approved Pascal course. Students who cannot demonstrate that they have such knowledge must complete the subject Introduction to Programming prior to undertaking the Diploma subjects.

To complete the Diploma programme, a student must pass ten subjects from those listed in the schedule to the Regulations (see Section 3). This Diploma course will take at least one year to complete the requirements for the award of the Diploma and must complete within three years. Part-time students will take at least two years and must complete within five years.

The Diploma in Computing is a terminating course and does not qualify students for entry to any higher degree course.

Diploma in Computer Science

A post-graduate diploma in Computer Science has undergone a complete revision which took effect in 1987. The new regulations assume that students already have a sound knowledge of basic programming in Pascal. Students who cannot demonstrate that they have such knowledge must complete the introductory subject Introduction to Programming (for Computer Science I) before taking the main subjects.

The new regulations basically require students to complete subjects consisting of about half the second year and half the third year topics of the Bachelor of Computer Science degree (or the equivalent in Mathematics and Physics) and full courses in Computer Science and Computing.
Master of Engineering Science

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 more emphasis on coursework; nevertheless it includes project work for its own value both in the broadening and the consolidation of knowledge, and as an introduction to research.

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 their knowledge 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 engineeringDepartments. At present MEngScs subjects are available in areas of Computer Engineering, Electrical Engineering, Industrial Engineering, Mechanical Engineering and Cost Technology. The EE, OE and ME 500 and 600 level subjects currently approved are listed in Section 6 of this Handbook. However, not all of these subjects are available in each year. Some undergraduate or postgraduate 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.

The Regulations for the Master of Engineering Science degree and the list of approved subjects are set out in Section 8 of this Handbook. This degree programme is currently under review within the Faculty.

Master of Computing

The Master of Computing degree has the primary aim of introducing the student to postgraduate research. Course work may be included in the programme. The quality and standard of work required in this thesis will be at a substantially higher level than that expected of an Honours Bachelor of Engineering graduate. The Regulations for the Master of Engineering Science degree are set out in Section 8 of this Handbook.

Master of Science

This degree is similar to the Master of Engineering degree but is usually taken by students with a non-engineering background or students who are carrying out research in areas related to engineering. The Regulations for the Master of Science degree are set out in Section 8 of this Handbook.

Master of Surveying

The Master of Surveying degree has the primary aim of introducing students to research, and bringing them to the point where they will be able to conduct research effectively under direction. Course work will normally be included in the programme, and the quality and standard of work required in the thesis will be at a substantially higher level than that expected of an Honours Bachelor of Surveying graduate. The Regulations for the Master of Surveying degree are set out in Section 8 of this Handbook.

Doctor of Philosophy

Doctoral research programmes in a number of areas are available within each of the Departments of the Faculty. Initial enquiries regarding these programmes and areas of specialised research activity currently undertaken within Departments may be addressed to the Head of the relevant Department. Enquiries regarding scholarships, the formal requirements for the degree and admission procedures should be addressed to:

The Secretary,
University of Newcastle,
AUSTRALIA 2308.

Centre for Industrial Control Science

The Centre for Industrial Control Science was established in the Department of Electrical Engineering and Computer Science in 1986 under the Special Research Centre scheme of the Australian Government. Additional support is provided by the University and Industry.

The work of the Centre is conducted on two parallel streams. One dealing with theoretical issues in systems science and the other with the design of industrial and signal processing systems. The aim of the Centre is to establish a true synergy between theoretical work and practical applications of control science, particularly in the areas of process control and automation.

The area of control systems design brings basic theoretical ideas in the understanding of nonlinear systems, estimation and information theory together with the associated technologies of computing, communications and industrial electronics.

In addition to the staff of the Centre, a number of the members of the academic staff of the Department of Electrical Engineering and Computer Science are involved with the work of the Centre, as are some 30 postgraduate students. Visiting academics and postdoctoral fellows also contribute to the work of the Centre.

Further information regarding the work of the Centre may be obtained from:

The Director,
Centre for Industrial Control Science,
Dept. of Electrical Engineering and Computer Science,
University of Newcastle,
AUSTRALIA 2308.
UNDERGRADUATE DEGREE REGULATIONS

About This Section
This section contains the University Regulations regarding the Bachelor Degrees offered in the Faculty of Engineering. The Regulations for the Ordinary Degree of Bachelor of Computer Science are included for the first time, following the movement of that discipline to the Faculty of Engineering from 1 January 1989.

The Regulations for postgraduate degrees and diplomas are given in Section 8.

Regulations Governing Bachelor Degrees (Engineering, Metallurgy and Surveying)

General
1. These Regulations are made in accordance with the powers vested in the Council under By-law 5.2.1 and prescribe the conditions and requirements relating to the degrees of Bachelor of Engineering, Bachelor of Metallurgy, Bachelor of Surveying, Bachelor of Science (Engineering) and Bachelor of Science (Metallurgy).

2. Definitions
(1) In these Regulations, unless the context or subject matter otherwise indicates or requires:
   “course” means the total requirements as prescribed in the schedule to qualify a candidate for the award of the degree;
   “Dean” means the Dean of the Faculty of Engineering;
   “degree” means the degree of Bachelor of Engineering, Bachelor of Metallurgy, Bachelor of Surveying, Bachelor of Science (Engineering) or Bachelor of Science (Metallurgy) as the case may be;
   “Department” means the department or departments offering a particular subject and includes any other body doing so;
   “Faculty Board” means the Faculty Board, Faculty of Engineering;
   “responsible department” means the department designated as such in the schedule;
   “Schedule” means the schedule to these Regulations relevant to the degree in which a person is enrolled or proposing to enrol;
   “subject” means any part of the course for which a result may be recorded.

3. Enrolment
(1) In any year a candidate shall enrol only in those subjects approved by the Dean or the Dean’s nominee.

4. Standing
The Faculty Board may grant to a candidate standing in specified and unspecified subjects not exceeding the unit value specified in the Schedule in recognition of work completed in this University or another institution, subject to the following:
(a) Standing in a specified subject shall be granted only on the recommendation of the Head of Department.
(b) Standing in an unspecified subject shall be granted only on the recommendation of the Head of the responsible department.
(c) Where standing has been granted in unspecified subjects the Faculty Board on the recommendation of the Head of the responsible department:
   (i) shall prescribe the course (not inconsistent with that specified in the Schedule) which the candidate is required to undertake;
   (ii) may specify the area of study for which the standing is granted for the purposes of the core programme prescribed by the Senate as required in the Schedule.

5. Prerequisites and Corequisites
(1) The Faculty Board on the recommendation of the Head of Department may prescribe prerequisites and/or corequisites for a subject.

(2) Except with the approval of the Dean, a candidate may not enrol in a subject unless he or she has passed any subjects prescribed as its prerequisites and has already passed or concurrently enrols in or is already enrolled in any subjects prescribed as its corequisites.

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

(2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:
   (a) in the case of a subject offered only in the first semester, the Monday of the 9th week of first semester;
   (b) in the case of a subject offered only in the second semester, the Monday of the 9th week of second semester;
   (c) in the case of any other subject, the Monday of the 3rd week of second semester.

7. Subject Requirements
(1) To complete a subject, a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require. 

(2) To pass a subject a candidate shall complete it and pass such examinations as the Faculty Board shall require.

8. Grading of Degrees
(1) The degree shall be conferred as an ordinary degree except that in cases where a candidate’s performance in the course has reached a standard determined by the Faculty Board the degree may be conferred either with merit or with honours as provided in the schedule.

(2) A degree with honours shall be conferred in one of the following grades:
   (a) Class 1;
   (b) Class II, Division 1; or
   (c) Class II, Division 2.

9. Admission to Degree
To qualify for admission to the degree a candidate shall satisfy the requirements prescribed in the Schedule.

10. Combined Degree Courses
(1) A candidate may complete the requirements for the degree in conjunction with another Bachelor degree by completing a combined course approved by the Faculty Board and also the Faculty Board of the Faculty offering that other Bachelor degree.

(2) Admission to a combined degree course:
   (a) shall be subject to the approval of the Deans of the two Faculties;
   (b) shall, except in exceptional circumstances, be at the end of the candidate’s first year of enrolment in a degree; and
   (c) shall be restricted to candidates who in their first year of enrolment have achieved a standard of performance deemed satisfactory for the purposes of admission to a combined degree course by the Faculty Board.

(3) The work undertaken by a candidate in a combined degree course shall be no less in quantity and quality than if the two courses were taken separately as shall be certified by the Deans of the two Faculties concerned.

(4) To qualify for admission to the two degrees a candidate shall satisfy the requirements for both degrees.

1 Approval has been given for non-traditional students to enrol in Industrial Experience subject courses as Elective units as indicated in the relevant Recommended Part-time Programme. Approval in other cases will only be given in exceptional circumstances. Where required, approval must be obtained in writing prior to making application for enrolment and submitted with that application.

2 Refer also to Faculty Policy on Undergraduate Progress and Performance in Section 4.
11. Exceptional Circumstances

In order to provide for exceptional circumstances arising in a particular case, the Senate on the recommendation of the Faculty Board may relax any provision of these Regulations.

SCHEDULE 1 — BACHELOR OF ENGINEERING

1. The degree may be conferred in the following areas of specialization:
   - Chemical Engineering
   - Civil Engineering
   - Computer Engineering
   - Electrical Engineering
   - Industrial Engineering
   - Materials Engineering
   - Mechanical Engineering

2. For the purposes of these Regulations the responsible department with respect to each area of specialization shall be:
   - Department of Chemical Engineering
     - Chemical Engineering
   - Department of Civil Engineering and Surveying
     - Civil Engineering
   - Department of Electrical and Computer Science
     - Electrical Engineering
   - Computer Engineering
   - Department of Mechanical Engineering
     - Industrial Engineering
     - Materials Engineering
     - Mechanical Engineering

3. (a) To qualify for admission to the degree a candidate shall:
   (i) pass a programme of subjects approved by the Faculty Board on the recommendation of the Head of the responsible department totalling not less than 60 units; and
   (ii) satisfy the industrial experience requirements prescribed by the Faculty Board.

(b) The programme referred to in section 3(a)(ii) of this schedule shall include the core programme prescribed from time to time by the Senate.

4. A person who has satisfied the requirements for admission to the degree in one area of specialization may be admitted to study in any other area of specialization on such conditions as the Faculty Board may prescribe and upon satisfying the requirements for admission to the degree in that other area of specialization shall be eligible to receive a certificate to that effect.

5. A candidate may be granted standing in a maximum of 32 units under the provisions of Regulation 4 of these Regulations.

6. The degree may be conferred as a degree with honours.

SCHEDULE 2 — BACHELOR OF METALLURGY

1. For the purposes of these Regulations the responsible department for the degree shall be the Department of Mechanical Engineering.

2. (a) To qualify for admission to the degree a candidate shall:
   (i) pass a programme of subjects approved by the Faculty Board on the recommendation of the Head of the responsible department totalling not less than 60 units; and
   (ii) satisfy the industrial experience requirements prescribed by the Faculty Board.

(b) The programme referred to in section 2(a)(ii) of this schedule shall include the core programme prescribed from time to time by the Senate.

4. A candidate may be granted standing in a maximum of 25 units under the provisions of Regulation 4 of these Regulations.

5. The degree may be conferred as a degree with merit.

CORE PROGRAMMES

The following core programmes have been approved by the Senate for Engineering, Metallurgy and Surveying degree programmes.

1. Bachelor of Engineering
   - Bachelor of Engineering in Chemical Engineering
     - Mathematics 6 units
     - Science 4 units
     - Engineering 100 level 4 units
     - Engineering 200 level 8 units
     - Engineering 300 level 8 units
     - Engineering 400 level 8 units
     - Bachelor of Engineering in Civil Engineering
     - Mathematics 6 units
     - Science 4 units

2. Bachelor of Metallurgy
   - Mathematics 6 units
   - Physics 4 units
   - Chemistry 4 units
   - Metallurgy 100 level 5 units
   - Metallurgy 200 level 8 units
   - Metallurgy 300 level 11 units
   - Metallurgy 400 level 10 units

3. Bachelor of Surveying
   - Mathematics 6 units
   - Science 4 units
   - Surveying 100 level 4 units
   - Surveying 200 level 6 units
   - Surveying 300 level 6 units
   - Surveying 400 level 6 units
4. Bachelor of Science (Engineering)

- Mathematics: 6 units
- Physics: 4 units
- Chemistry: 8 units
- Engineering 100 level: 1 unit
- Chemical Engineering 100 level: 1 unit
- Chemical Engineering 200 level: 5 units
- Chemical Engineering 300 level: 8 units
- Chemical Engineering 400 level: 1 unit

5. Bachelor of Science (Metallurgy)

- Mathematics: 6 units
- Physics: 4 units
- Chemistry: 4 units
- Engineering 100 level: 5 units
- Metallurgy 200 level: 8 units
- Metallurgy 300 level: 11 units

**Regulations Governing the Ordinary Degree of Bachelor of Computer Science**

1. These Regulations prescribe the requirements for the ordinary degree of Bachelor of Computer Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.2.1.

2. Definitions

   - "course" means the programme of studies prescribed from time to time to qualify a candidate for the degree;
   - "Dean" means the Dean of the Faculty;
   - "the degree" means the degree of Bachelor of Computer Science;
   - "department" means the Department of offering a particular subject and includes any other body so doing;
   - "Faculty" means the Faculty of Engineering;
   - "Faculty Board" means the Faculty Board of the Faculty;
   - "Schedule" means the Schedule of Subjects to these Regulations;
   - "subject" means any part of the course for which a result may be recorded.

3. Enrolment

   - A candidate’s enrolment in any year must be approved by the Dean of the Dean’s office.
   - A candidate may not enrol in any year in any combination of subjects which is incompatible with the requirements for that year.

4. Qualification for Admission to the Degree

   - To qualify for admission to the degree a candidate shall:
     - (a) pass nine subjects, and
     - (b) complete to the satisfaction of the Head of the Department of Electrical Engineering and Computer Science an essay on some aspect of the history or philosophy of computer science or the social issues raised by computer technology.

5. Subject

   - To complete a subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require.
   - To pass a subject a candidate shall complete all and pass such examinations as the Faculty Board shall require.

6. Standing

   - The Faculty Board may grant standing in specified and unspecified subjects to a candidate, on such conditions as it may determine, in recognition of work completed in this University or another institution.
   - A candidate may not be granted standing in more than four subjects which have already counted towards a degree to which that candidate has been admitted or is eligible for admission.
   - The Dean shall determine the classification of each subject in which standing is granted as a Part I, Part II or Part III subject.

7. Prerequisites and Corequisites

   - Except with the permission of the Faculty Board granted after considering any recommendation made by the Head of the Department, no candidate may enrol in a subject unless that candidate has passed any subjects prescribed as its prerequisites at any grade which may be specified and has already passed or concurrently enrols in or is already enrolled in any subjects prescribed as its corequisites.
   - A candidate obtaining a Terminating Pass in a subject shall be deemed not to have passed that subject for prerequisite purposes.

8. Withdrawal

   - A candidate may withdraw from a subject or the 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.

9. Results

   - The result obtained by a successful candidate in a subject shall be:
     - Terminating Pass, Ungraded Pass, Pass, Credit, Distinction, or High Distinction.

10. Time Requirements

    - Except with the special permission of the Faculty Board, a candidate shall complete the requirements for the degree within seven calendar years of the commencement of the degree course. A candidate who has been granted standing in accordance with Regulation 6 of these Regulations shall be deemed to have commenced the degree course from a date to be determined by the Dean.

11. Retaking Provision

    - In order to provide for exceptional circumstances arising in a particular case the Senate on the recommendation of the Faculty Board may relax any provision of these Regulations.

12. Combined Degree Courses

13. General

    - A candidate may complete the requirements for the degree in conjunction with another Bachelor degree by completing a combined degree course approved by the Faculty Board and also where that other degree is offered by another Faculty, the Faculty Board of that Faculty.

14. Admission to a Combined Degree Course

    - A candidate who withdraws from a subject after the relevant date shall be deemed to have failed the subject unless granted permission by the Dean to withdraw without penalty.

The relevant date shall be:
   - (a) in the case of a subject offered only in the first semester, the Monday of the 9th week of the first semester;
   - (b) in the case of a subject offered only in the second semester, the Monday of the 9th week of the second semester;
   - (c) in the case of any other subject, the Monday of the 3rd week of the second semester.
courses were taken separately as shall be certified by the Dean or the Deans of the two Faculties as the case may be.

15. To qualify for admission to the two degrees a candidate shall satisfy the requirements for both degrees except as provided in the following Regulations.

16. Computer Science/Arts

(1) To qualify for admission to the ordinary degrees of Bachelor of Computer Science and Bachelor of Arts, a candidate shall:

(a) pass fourteen subjects, and

(b) complete to the satisfaction of the Head of the Department of Electrical Engineering and Computer Science an essay on some aspect of the history or philosophy of Computer Science or the social issues raised by computer technology.

(2) The following restrictions shall apply to a candidate's choice of subjects, namely:

(a) not fewer than seven subjects shall be selected from the Schedule of Subjects to these regulations in accordance with paragraphs (a), (b) and (c) of Regulation 4(2) of these regulations

(b) none of the subjects shall be selected in accordance with Regulation 9 of the Regulations governing the ordinary degree of Bachelor of Arts

(c) at least one Part III subject being a subject not included in the Schedule of Subjects for the ordinary degree of Bachelor of Computer Science shall be selected from the Schedule of Subjects to the Regulations governing the Ordinary degree of Bachelor of Arts.

17. Computer Science/Engineering (Computer Engineering)

To qualify for admission to the degree of Bachelor of Engineering (Computer Engineering) and the ordinary degree of Bachelor of Computer Science, a candidate shall:

(a) pass Computer Science I, Computer Engineering I, Mathematics I, Computer Science II, Mathematics IICS, Computer Science IIIA and Computer Science IIIB, and

(b) complete to the satisfaction of the Head of the Department of Electrical Engineering and Computer Science an essay on some aspect of the history or philosophy of Computer Science or the social issues raised by computer technology, and

(c) pass other subjects selected from the programme of subjects approved for the degree of Bachelor of Engineering (Computer Engineering), totalling a minimum of 40 units, as calculated for these degrees.

18. Computer Science/Mathematics

(1) To qualify for admission to the ordinary degrees of Bachelor of Computer Science and Bachelor of Mathematics, a candidate shall:

(a) pass fourteen subjects, and

(b) complete to the satisfaction of the Head of the Department of Electrical Engineering and Computer Science an essay on some aspect of the history or philosophy of Computer Science or the social issues raised by computer technology.

(2) The fourteen subjects presented for the degree shall conform to the following requirements:

(a) Not fewer than seven subjects shall be selected from the Schedule of Subjects to these regulations in accordance with paragraphs (a), (b) and (c) of Regulation 4(2) of these Regulations

(b) Nine of the subjects shall be selected in accordance with Regulations 4(1)(b) and (c) and Regulation 4(2) of the Regulations governing the Ordinary degree of Bachelor of Mathematics

(c) At least two Part III subjects shall be selected from the Schedule of Subjects to these regulations

(d) At least two Part III subjects, being subjects not included in the Schedule of Subjects to the Regulations governing the Ordinary degree of Bachelor of Mathematics.

SCHEDULE OF SUBJECTS

<table>
<thead>
<tr>
<th>Subject</th>
<th>Remarks Including</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Computer Science</td>
<td>Prerequisites and Corequisites</td>
</tr>
<tr>
<td>Part I</td>
<td></td>
</tr>
<tr>
<td>Computer Science I</td>
<td>It is assumed that students have studied Higher School Certificate Mathematics at the two-unit level or higher.</td>
</tr>
</tbody>
</table>

Computer Engineering I Corequisite Mathematics I or Mathematics IIS

Part II

Computer Science II

Data Processing II

Mathematics IICS

Computer Engineering II

Prerequisite Computer Science I

Prerequisite Computer Science II

Prerequisite Mathematics I

Prerequisite Corequisite Computer Science I

Part III

Computer Science IIIA

Computer Science IIIB

Computer Engineering III

Prerequisite Computer Science II

Prerequisite Computer Science IIIB

Mathematics IICS

Corequisite Computer Science IIIA

Computer Engineering I

Notes:

The Regulations for the Degree of Bachelor of Computer Science (Honours) are given in Section 8 of this Handbook.

FACULTY POLICIES

About This Section

This section contains Faculty Policies which are relevant to students enrolled in undergraduate programmes within the Faculty. The following matters are included:

- Undergraduate Performance and Progress
- Criteria for Honours Awards
- Weighted Average Mark (WAM) Calculation Method
- Final Dates for Addition of Subjects
- Late Withdrawal from Subjects
- Year/Stage Classification
- Standing for Certificate Holders
- Industrial Experience Requirements
- Exemptions
- Special Consideration
- Special Examinations
- Deferred Examinations
- Submission of Final Year Project Reports

Note:

that Faculty Policies do not remain static. Students are expected to consult Faculty and Departmental notice boards regularly in order to make themselves aware of any proposals or decisions which may affect them. Enquiries regarding Faculty Policy may be directed to the Faculty Secretary.

1. General

(1) The following policies are made under the powers vested in the Faculty Board, Faculty of Engineering, by the Regulations Governing Bachelor Degrees offered in the Faculty of Engineering and various By-laws and Regulations of the University including, but not limited to, By-laws 2.4

- The Faculties, the Examination Regulations, and the Regulations Governing Unsatisfactory Progress.

(2) In these Policies, unless the context or subject matter otherwise indicates or requires:

"course" means the total requirements as prescribed in these Policies and the Regulations Governing Bachelor Degrees offered in the Faculty of Engineering which, when completed, qualify a candidate for the award of the relevant degree.

"Dean" means the Dean of the Faculty of Engineering.

"Degree Regulations" means the Regulations Governing Bachelor Degrees in the Faculty of Engineering (Engineering, Metallurgy and Surveying).

"Department" means a department of the Faculty of Engineering.
“Faculty Board” means the Faculty Board, Faculty of Engineering.

“Responsible Department” means the department designated as such in the relevant Schedule of the Degree Regulations.

“Student” means a person enrolled in an undergraduate course offered in the Faculty of Engineering.

“Sub-dean” means the Sub-dean of the Faculty of Engineering.

2. Reservation

(1) Faculty Board reserves its rights to consider each case on its merits and to amend its policies without notice as it judges to be proper to maintain appropriate standards of attainment.

3. Assessment

(1) Assessment within each subject offered by a Department may take into account work in: assignments, reports, laboratory exercises, tutorials, class tests and formal examinations.

(2) Students will be informed of the method of assessment to be adopted in each subject before the fourth week of lectures in that subject. This information will include an indication of the type of tasks comprising the assessment and the weighting each task will have in the determination of the final result in the subject concerned.

It should be noted that the final result in a subject is not necessarily determined simply by the addition of marks awarded for assessment tasks although the weightings of each task and class ranking will be maintained except where an application for special consideration is granted.

(3) In the case of subjects offered to students enrolled in any undergraduate course in the Faculty by Departments of the Faculty (and any department of another faculty willing to take part in this procedure), the result in each subject will be reported as follows:

Result

Reported as:

Marks in the range of — Percentage Mark

45% to 100% inclusive

Marks less than 45% — FF (Fail)

Other non-passing grades — Grades approved by Senate for specific purposes.

4. Academic Performance

(1) The academic performance of each student enrolled in an undergraduate course offered in the Faculty shall be assessed by means of a WAM.

(2) The WAM is calculated from the results of all subjects taken towards the satisfaction of Degree Requirements, except as provided in Policy 4.5 below, in the following manner:

\[
WAM = \frac{\text{Sum of ( marks)}}{\text{Sum of ( subjects)}}
\]

Where:

- \( m \) = The Mark as defined in Policy 4.3 below.
- \( u \) = The Unit Value of the subject concerned.
- \( w \) = The Weighting of the subject concerned as determined under Policy 4.4 below.

(3) The Mark (‘m’) will be calculated as follows:

- Where the result in a subject is given in the range of 45 to 100 inclusive, its ‘m’ is equal to that percentage mark.
- Where the result in a subject is a grade of FF, AF, AF or WF, ‘m’ is equal to 44.
- Where the result in a subject is a passing grade (other than a percentage mark), the Mark (‘m’) will be deemed to be the relevant number listed below:

<table>
<thead>
<tr>
<th>Grade</th>
<th>‘m’</th>
</tr>
</thead>
<tbody>
<tr>
<td>HD</td>
<td>93</td>
</tr>
<tr>
<td>D</td>
<td>80</td>
</tr>
<tr>
<td>C</td>
<td>70</td>
</tr>
<tr>
<td>P</td>
<td>58</td>
</tr>
<tr>
<td>UP</td>
<td>58</td>
</tr>
<tr>
<td>TP</td>
<td>49</td>
</tr>
</tbody>
</table>

Where grades of W, X, S or 1 are awarded the subject concerned shall not be included in the calculation of the student’s WAM until a mark or a final grade shall be awarded in that subject, at which time, the student’s WAM shall be re-calculated to include the newly approved mark or grade.

(4) Each subject shall have a weighting of 1, 2, 3 or 4 as determined by Faculty Board. The weighting and detailed calculation will be published in the Faculty Handbook. Weightings will be generally determined according to the level at which a subject is offered as set out below.

Engineering Non-engineering Weighting Subject Level Subject Year Level or equivalent

100 Year 1 1

200:

Year II 2

300 Year III 3

400, 500 or 600 Year IV 4

(5) The following will be taken into account when calculating the WAM:

- Subjects taken in satisfaction of course Elective requirements shall be considered to satisfy those requirements in the order in which they are taken during the course.
- Subjects taken towards Degree Requirements shall not be included in the calculation of a student’s WAM.
- Students re-admitted to a course after being granted leave of absence for any previous academic year, shall retain their previous WAM as the basis for future calculations.
- Students permitted to transfer from one course offered in the Faculty to another shall, provided standing in all subjects previously passed in the original course is granted in the new course, retain the WAM achieved in the original course as the basis for future WAM calculations in the new course.
- Students re-admitted to a course without having been granted leave of absence for the previous academic year, shall be considered in the same way as if they had completed their previous studies at another institution and re-commerce calculation of their WAM from the year of their re-admission provided that a student who was last enrolled in course not more than three (3) years prior to the year of their re-admission to that course may request that the WAM is re-calculated at the end of the following academic year. Such a request must be made in the Secretary, in writing, by 30 April in the year of re-admission and may be approved by the Dean or the Dean’s nominee.
- Where a student has been awarded a grade of S, X or 1, the student’s WAM shall be recalculated with the award of the other grades by the Senate for specific purposes.
- Students may elect to repeat any subject in which they were awarded a result in the range of 45 to 54 or a grade of TP, or to enrol in a subject which replaced a subject in that category in the Approved Programme of the course in which they are enrolled. In such a case:

- The subject originally taken remains part of the student’s academic record and continues to be included in the calculation of the student’s WAM as before.
- The repeated subject is included in the WAM calculations of the year in which it is taken.

- If the student is awarded a failing grade in the repeated subject, the failure is treated in the same way as if the subject were attempted for the first time and the subject must be repeated.

Note:

Students will normally be permitted to repeat subjects in which they were awarded a Final Assessment of 55 or more, or a passing grade.

5. Academic Progression and Unsatisfactory Progress

(1) A student who maintains a WAM of 55 or more is considered to be a student in good standing.

(2) If the WAM of a student previously in good standing is less than 55 at the conclusion of an academic year, the student shall be placed on probation for the next academic year in which they enrol in any course offered in the Faculty.

(3) If a student placed on probation withdraws without penalty from all subjects in which they are enrolled whilst on probation, the term of their probation shall be deemed to be extended to the following academic year.

(4) A student on probation is strongly advised to repeat all subjects, other than elective or extramural subjects, which were taken in the academic year in which he or her WAM became less than 55 and for which he or she received a result of less than 55, before enrolling in subjects not previously attempted.

(5) Except as otherwise approved by the Dean or the Dean’s nominee, a student on probation shall not be permitted to enrol in an annual programme of study of more than 12 units.

(6) A student on probation who attains a WAM of 55 or more at the end of their probationary year, shall be released from probation and be considered as a student in good standing.

(7) A student on probation who fails to attain a WAM of 55 or more at the end of their probationary year, shall be deemed not to have maintained a rate of progress considered satisfactory to the Faculty Board under Regulation X(1) of the Regulations Governing Unsatisfactory Progress and shall be required to show cause as to why he or she should not be excluded from the Faculty under the terms of those Regulations.

(8) Students required to show cause under Policy 5.7 shall be advised of their rights to make representations either in writing or in person prior to decisions under Regulation X(1) being taken.

The Dean or Sub-dean shall determine the time and place at which persons required to show cause under Policy 5.7 may make representations in person.

In respect of students required to show cause under Policy 5.7, the Dean or Sub-dean shall, after considering any representations made by such a student and on the recommendation of the Head of the responsible Department, either:

- Advise the student that he is not proceeding to the next year.
- Advise the student to appeal to the Senate under Section 4 for the next year.

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of the Regulations Governing Unsatisfactory Progress on behalf of Faculty Board; or
+ refer the case to Faculty Board for consideration.

(11) A student who is required to show cause under Policy 5.7 and permitted to continue studies within the Faculty is deemed to remain on probation and continues to be subject to the provisions of the Policies of Faculty Board as would a student placed on probation under the provisions of Policy 5.2.

6. Satisfaction of Degree Requirements

(1) Students are considered to have passed the programme of subjects approved by Faculty Board in accordance with the relevant schedule of the Regulations Governing Bachelor Degrees Offered in the Faculty of Engineering when they have:
(i) attained a Final Assessment of 45 or more (or a passing grade) in each of the subjects comprising the relevant programme of subjects approved by Faculty Board; and
(ii) attained at the completion of that programme a WAM of 55 or more.

(2) If a student completes the relevant programme of subjects but has not achieved a WAM of 55 or more, the student is regarded as not having passed the programme of subjects approved by Faculty Board and is therefore ineligible for the award of a bachelor degree and is placed on probation under the terms of section 5 of these policies.

(3) A student who is ineligible for the award of a bachelor degree under the terms of Policy 6.2 may repeat any subject in which they were awarded a result in the range of 45 to 54 (in which case the conditions of Policy 4.8 apply) or enrol in such subjects not previously attempted as the Dean, on the recommendation of the Head of the responsible department, may approve until such time as he or she attains a WAM of 55 or is excluded under the provisions of section 5 of these policies.

7. Awards of Honours and Merit

(1) Honours grades will normally be awarded by Faculty Board on the basis of a graduating student's performance as measured by the WAM according to the following schedule:

<table>
<thead>
<tr>
<th>Minimum WAM</th>
<th>Honours</th>
</tr>
</thead>
<tbody>
<tr>
<td>67</td>
<td>Class II Division 2</td>
</tr>
<tr>
<td>72</td>
<td>Class II Division 1</td>
</tr>
<tr>
<td>77</td>
<td>Class I</td>
</tr>
</tbody>
</table>

(2) If a student was granted standing at the time of his or her admission or re-admission to a course offered within the Faculty, the record of that student upon which the standing was based may be considered by Faculty Board in connection with the determination of the award of honours to the student.

(3) A Head of Department may recommend to Faculty Board that a grade of honours be awarded other than that indicated by the WAM of the student concerned, or that no honours be awarded to a particular student. In such a case Faculty Board may make an award of honours in accordance with the recommendation of the Head of the Department concerned or in accordance with the schedule contained in Policy 7.1, as it sees fit.

(4) Merit grades will normally be awarded by Faculty Board to students enrolled in the Bachelor of Science (Metallurgy) programme who attain, as the conclusion of the programme, a WAM of 72 or more. Policies 7.2 and 7.3 shall also apply, where appropriate, to the awarding of Merit grades.

(5) Faculty Board will normally consider recommending graduates who achieve a WAM in the order of 85 or more for the award of a University Medal.

Example WAM Calculation

The following calculation is presented as an example of the method of calculation resulting from the above policies.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Mark or Grade</th>
<th>Unit Value</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MI</td>
<td>Wi</td>
</tr>
<tr>
<td>Year 1</td>
<td>(Full-time attendance: normal Year 1 programme)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics I</td>
<td>P</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Physics IB</td>
<td>STANDING</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GE111</td>
<td>86</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>EE100</td>
<td>65</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>GE101</td>
<td>90</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>GE151</td>
<td>50</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>ME111</td>
<td>76</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>WAM = 794/12 = 66</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Section Four

Subject Mark or Grade

<table>
<thead>
<tr>
<th>Unit Value</th>
<th>Weighting</th>
<th>Wi</th>
<th>(UW)</th>
<th>(M/M)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME4/3</td>
<td>85</td>
<td>1</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>340</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME5/96</td>
<td>72</td>
<td>4</td>
<td>16</td>
<td>340</td>
</tr>
<tr>
<td></td>
<td>1152</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Legal Studies I</td>
<td>C</td>
<td>4</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4/10</td>
<td>70</td>
<td>4</td>
<td>4</td>
<td>280</td>
</tr>
<tr>
<td></td>
<td>280</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4/19</td>
<td>73</td>
<td>4</td>
<td>4</td>
<td>292</td>
</tr>
<tr>
<td></td>
<td>292</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4/28</td>
<td>65</td>
<td>4</td>
<td>4</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>260</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME4/84</td>
<td>67</td>
<td>4</td>
<td>4</td>
<td>268</td>
</tr>
<tr>
<td></td>
<td>268</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>WAM</td>
<td>60 (7655 + 2872 / 100 + 60)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>69</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Honours Recommendation: HONOURS CLASS II, DIVISION 2

Last Dates for Addition or Substitution of Subjects

Students enrolled in courses offered by the Faculty of Engineering should ensure that all applications to add or substitute subjects in their annual programmes of study are submitted by the following dates:

First Semester subjects 30 April (in each year)

Full Year subjects 30 April (in each year)

Second Semester subjects 4th Friday of Second Semester (last week in August)

Applications to add or substitute subjects submitted after these dates will NOT normally be approved.

Note:
1. Only entries on the official university record indicate enrolment in a subject. It is the responsibility of each student to ensure that the University’s record of their enrolment is accurate at all times.

2. Attendance at classes in a subject in which a student is not enrolled does not imply any right to be subsequently enrolled in that subject.

3. The Lecturer of a subject may refuse to mark the work of a student who is not officially enrolled in that subject.

4. The specification of the last dates for enrolment does not imply that all applications made before that date will be approved. Applications to enrol in a subject made before the above dates may be refused on a number of grounds including, for example, that the subject has progressed past the point where enrolment is acceptable or that resources have been fully allocated to students already enrolled. For this reason all applications to add subjects should be made as early as possible.

5. University Regulations and Policy in regard to withdrawal from subjects remains unchanged.

Section Four

FACULTY POLICIES

MUST be accompanied by medical certificates or other relevant documentary evidence as indicated on the form.

Medical Certificates of the kind normally issued to explain absence from employment do not meet the above criteria and are not sufficient to explain absence from an examination.

Where submitted, such reports will normally be taken to indicate a "mild" handicap.

Where a request for Special Consideration is made on the grounds of unforeseen and unavoidable circumstances, all available supporting evidence should be submitted to the application. In some cases the submission of a Statutory Declaration will be appropriate. Statutory Declaration forms are available from the Office of the Registrar.

Requests should be made as soon as possible after the occurrence of the circumstances leading to the request. University Regulations provide that requests must be submitted within 7 days in cases where study during the year or preparation for an examination was affected (or by such later time as the Dean may approve). Requests made regarding attendance or performance in a formal written examination must be made within 3 days of the date of the examination (or by such later time as the Vice-Chancellor may approve). Where a student is unable to make an application personally, another person may take action on the student’s behalf.

When considering requests for Special Consideration it is the intention of the Faculty to take account of circumstances which adversely affect performance such that the performance of the student concerned does not reflect his or her true competence in a subject. In doing so, the Faculty will be conscious that any Special Consideration given should not act to the disadvantage of other students.

Enquiries regarding Special Consideration may be directed to the Faculty Secretary. (Also see Missing an Examination above and Special Examinations below.).

Special Examinations

Special Examinations are NOT awarded automatically. If it is considered to be appropriate, a Special Examination may be awarded following timely lodging of a properly completed Application for Special Consideration, whether the examination in the subject concerned was attended or not. (See Missing an Examination and Special Consideration above.)

Students who are awarded a Special Examination will receive the result of "S" as the result for the subject concerned. Where a Special Examination is awarded, the student should contact the Department offering the subject in order to ascertain whether the examination will be held in the January Examination Period or at some other convenient time. It is the student’s responsibility to ensure that he or she is aware of the time and place at which the Special Examination will be held.

Deferred Examinations

Deferred examinations in subjects offered by Departments of the Faculty will normally be awarded to students other than those whose examination programme of subjects is sufficient to meet degree requirements in the current session.

Where a student fails a single subject and is thereby prevented from qualifying to graduate, a deferred examination may be awarded in that subject. If the subject concerned is a final year project subject special conditions apply (see Submission of Final Year Project Reports below).

Deferred examinations recommended to the Faculty Board by departments of other faculties will normally be approved.

It should be noted that the maximum result which can be awarded on the basis of a deferred examination is that of pass (either a "P" grade or a mark no higher than 64).

Review of Results

Students may apply through the University Examinations Office for a review of final results in subjects (see the General Information section of this Handbook for details of the procedure and the fee involved). All requests for review must be made by this procedure.

If considered necessary, students may attach a statement to the official request for a review in which any facts believed to point to an error or omission having been made may be brought to the attention of the department concerned. Note that any such statement is not a replacement for requests for Special Consideration.

While staff may discuss aspects of performance in examinations with the individual students concerned in a short period after final results have been published in order to provide feedback for educational purposes, the assessment of individual pieces of work will not be discussed.

Submission of Final Year Project Reports

Meeting the deadlines for submission of final year project reports is considered to be an important criterion of the subject concerned. Departments within the Faculty have been requested by Faculty Board to adopt the following policy regarding the submission of final year project reports.

- The time for submission of final year project report will be set at 5.00 pm on a date (to be specified by the Department concerned) during the November examination period. This date is regarded in the same way as a final formal examination. That is, failure to submit the report at or before the due date is regarded in the same way as failure to attend a formal written examination. The result will be failure, subject to any other decision which may be taken as a result of a request for Special Consideration.

- An extension of time for a submission, by way of an informal letter (being awarded in December, may only be granted in response to a formal request for Special Consideration made through the Secretary to the University (see Special Consideration policy above). As students are expected to anticipate some delay or difficulty during the course of their project, Special Consideration will not normally be granted for circumstances involving less than 4 weeks less of the working time of the student.

- Submissions presented by the due date but not up to final presentation standard, or which require an acceptably small amount of additional work, may be granted a result of "Deferred (X)". Final submission of the report will then be required on a date (to be specified by the Department concerned) during the January examination period and the Project will not be awarded a result higher than 64.
Late Withdrawal from Subjects

Applications to withdraw from subjects lodged after the final date for withdrawal without penalty are normally either approved with penalty or not approved.

In exceptional circumstances the Dean may approve withdrawal without penalty. Such applications are viewed in the same light as requests for Special Consideration and should be documented accordingly (see policy on Special Consideration above).

Years/Stage Classification

Full-time students are classified by year.

Part-time students are classified by stage.

Classification is determined by the number of units passed in accordance with the following table:-

<table>
<thead>
<tr>
<th>Full-time BE</th>
<th>Part-time BE</th>
<th>BSc(Met)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Units Year</td>
<td>Units Stage</td>
<td>Units Stage</td>
</tr>
<tr>
<td>0-14</td>
<td>I</td>
<td>0-7</td>
</tr>
<tr>
<td>15-29</td>
<td>II</td>
<td>8-15</td>
</tr>
<tr>
<td>30-44</td>
<td>III</td>
<td>16-23</td>
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<tr>
<td>45+</td>
<td>IV</td>
<td>24-31</td>
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<td>32-39</td>
</tr>
<tr>
<td></td>
<td></td>
<td>40-46</td>
</tr>
</tbody>
</table>

Students enrolled for the final year of any combined course will be classified as Year V.

Standing for TAFE Certificates

Faculty Board has approved the granting of standing to students enrolling in courses who hold certain TAFE Certificates. The standing to be granted will naturally vary according to the TAFE qualification obtained, the course programme in which the candidate is enrolled and the current requirements of that programme. For details of the standing available students should contact the Faculty Secretary.

List of Certificates Courses For Which Standing is Granted

- Cartography Certificate / Associate Diploma
- Civil Engineering Certificate
- Computer Services Technology Certificate
- Electrical Engineering Certificate
- Electronics Engineering Certificate
- Electronics and Communications Certificate
- Engineering Survey Certificate
- Land and Engineering Survey Drafting Certificate
- Marine Engineering Technology Certificate
- Mechanical Engineering Certificate
- Metallurgy Certificate / Associate Diploma
- Naval Architecture Certificate
- Production Engineering Certificate
- Structural Engineering Certificate
- Surveying Certificate / Higher Certificate

Industrial Experience

1. General

Students enrolled in Bachelor of Engineering programmes are required to complete a total of at least 12 weeks of practical work of a nature acceptable to the Faculty Board. This practical experience may be either gained during long vacations or as part of an Industrial Experience elective.

The University can accept no responsibility for finding employment for students wishing to enrol for Industrial Experience units to find employment in order to satisfy industrial experience requirements. Students experiencing difficulty in obtaining suitable employment should contact the University's Careers and Student Employment Office.

2. Full-Time Students

Full-time students will normally gain their practical experience during vacation employment. Students should obtain a statement from their employer certifying the nature and period of the employment undertaken and retain the statement so as to be in a position to provide it when called upon to do so.

3. Part-Time and Sandwich Pattern Students

Students enrolled in the degree of Bachelor of Engineering in a part-time basis may choose to take Industrial Experience units as part of their elective programmes. To be eligible for an Industrial Experience unit, the student must be in approved employment on the 1 November preceding the year in which the unit is to be taken. This approved employment must continue for one calendar year, that is, until the 31 October of the year in which the unit is to be counted. Students enrolled in Industrial Experience units must attend such lectures, seminars, etc. and submit such reports as the relevant Head of Department may require. Normally no Industrial Experience unit will be allowed in the first year of enrolment. The following is a list of the maximum number of Industrial Experience units that may be counted towards the degree in the various courses offered.

- Chemical Engineering - 4 units
- Civil Engineering - 4 units
- Computer Engineering - 4 units
- Electrical Engineering - 4 units
- Industrial Engineering - 3 units
- Mechanical Engineering - 3 units

Students attending on a "sandwich" pattern should consult with the Head of their Departments before enrolling in an Industrial Experience subject.

The successful completion of one Industrial Experience unit satisfies the requirement that students complete 12 weeks practical experience.

Exemptions

1. Failure in a Subject

Failure in a core subject (grades FF, FS, WP or EF) means that the subject must be repeated in full (except where exemption may be given for laboratory classes — see below). Failure in an Elective subject means that either that subject must be repeated...
BACHELOR DEGREE COURSE PROGRAMMES

About This Section
This section contains the detailed undergraduate course programmes which have been approved by Faculty Board in accordance with the Regulations Governing Bachelors Degrees in the Faculty of Engineering. A guide is also provided in the various patterns of attendance by which courses may be completed.

Each course is outlined as an approved full-time programme taken over 4 years. All students complete the relevant approved programme regardless of their pattern of attendance. There are also a number of other sections associated with each approved programme. These cover such aspects as:

- Options within the Approved Programme
- Elective Requirements
- Prerequisites, Corequisites and Assumed Knowledge requirements of Core Subjects
- The Recommended Pattern of Part-time Attendance
- Transition Arrangements

Students are expected to be aware of all aspects of the Approved Programme and associated requirements of the course in which they are enrolled.

Enquiries may be directed to the Faculty Secretary or the Head of the Department indicated in the course entry concerned.

Guide on Course Attendance Patterns

An Approved Programme is given in this Section for all undergraduate courses. All students must complete the requirements of the relevant Approved Programme regardless of their attendance pattern.

The Faculty of Engineering offers a flexible array of attendance patterns which are designed to suit the individual needs of students. There is no restriction on students choosing a pattern of attendance each year which suits them, so long as academic progress is satisfactory and other course requirements are met.

The attendance patterns available are summarised below. Further enquiries may be directed to the Faculty Secretary.

Full-time Attendance

The great majority of students enrolled in the Faculty of Engineering attend as full-time students. Full-time attendance allows full concentration on course requirements during the academic year and is therefore the recommended pattern of attendance. Each course may be completed in a minimum of 4 years of full-time study. The criterion for classification as a full-time student is enrolment in three-quarters or more of the normal full-time programme. Thus a student enrolled in 13 units or more is regarded as a full-time student.

Part-time Attendance

All or part of each Approved Programme may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. Although a 6 year pattern of attendance, of which the last year is full-time, is possible in the Chemical Engineering programme.

The first two part-time stages of all courses are timetabled to permit a single day work release attendance pattern with some evening lectures. In the latter years of each course, attendance will be required at various times during the day depending upon the subjects in which the student is enrolled and the requirements of the timetable. Full-time study is recommended after Stage 2.

While each student enrolled in 11 units or less is regarded as a part-time student, there is no minimum number of subjects in which part-time students must enrol in each year. It is therefore possible to enrol in only one subject if such a programme is desired. Part-time students may also choose to enrol in Industrial Experience subjects and count these units as Elective units as permitted by the Elective Requirements of the relevant course.

Sandwich Programmes

Each course may be undertaken on a 'thick' sandwich attendance pattern in which full-time attendance at University is alternated with full-time employment on an annual basis. This allows work experience to be undertaken in 15 month periods between Years I and II, Years II and III and Years III and IV. Such a pattern would require a minimum of 7 years to complete degree requirements. The number of years of work experience undertaken may vary according to the needs of the student. As this attendance pattern does not require attendance at University when gaining work experience, employment may be undertaken in areas remote from the University thereby adding to the diversity of the experience which may be gained and increasing the opportunities to obtain work experience employment.

Students following this pattern should obtain Leave of Absence from their course for each year of work experience and apply for re-admission to their course through UCAC.

Traineeship Pattern

Some traineeships may continue to be offered on the basis of a part-time attendance pattern, however the following programme is recommended as the most suitable method of combining academic course requirements with work experience.

Year 1 Stage 1 Part-time attendance at University plus vacation work
Year 2 Stage 2 Part-time attendance at University plus vacation work
Year 3 Year II Full-time attendance at University plus vacation work
Year 4 Year III Full-time attendance at University
Year 5 — Full-time work experience — 15 months (approx.)
Year 6 Year IV Full-time attendance at University - completion of studies

A further 13 month period of work experience could be included between Years II and III resulting in a 7 year minimum programme. This attendance pattern allows both the employer and employee a period of assessment in Stages I and 2. After completing first year studies, trainees are in a position to give their full attention to their academic studies in Years II, III and IV of their course and to gaining valuable practical experience during the 15 month period(s) of work experience. The length of the major work experience period(s) makes it possible for the trainee to experience a full annual cycle of the operation his or her employer's forces and give full attention to participating in the work of that organisation. The length of the major period of work experience enables trainees to gain practical experience in locations outside Newcastle.

Finding Employment

While the Careers and Student Employment Office of the University will assist students to find employment to complement their chosen attendance pattern, the University cannot accept any responsibility for finding appropriate positions for students.
Chemical Engineering

The Department of Chemical Engineering is the department responsible, under the Regulations Governing Bachelor Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialisation of Chemical Engineering. The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (BEng) in the specialisation of Chemical Engineering.

APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year I</td>
<td>Chemistry I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Physics I A</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CheE141</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CheE153</td>
<td>2</td>
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<tr>
<td></td>
<td>GEI151</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Year II</td>
<td>Chemistry IIC</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CheE242</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CheE262</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>CheE291</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EM2CO</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EM2BD</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Year III</td>
<td>CheE343</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CheE355</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CheE363</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CheE391</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Electives</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Year IV</td>
<td>CheE463</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CheE483</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CheE486</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>CheE491</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CheE496</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CheE497</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. Physics II may be taken in lieu of Physics I A.
2. Standing will be granted to Mathematics I to students who complete both Mathematics 15 and Mathematics 102. Students who wish to do so will be permitted to enrol in Mathematics 15 and, after successful completion of that subject, permitted to enrol in Mathematics 102. Note that these subjects must be completed over a minimum of two years. Neither Mathematics 15 nor Mathematics 102 contributes to WAM calculations.
3. Mathematics II A (Topics CO, B, and D) may be taken in lieu of HMD2CO, EMB2BD and one unit of Elective.

ELECTIVE REQUIREMENTS

Six Elective units may be chosen comprising any subjects offered within the Faculty of Engineering or other Faculties, subject to the approval of the Head of the Department of Chemical and Materials Engineering and of the Department responsible for the subject.

Part-time students may count up to four units of Industrial Experience Subjects (CheE003 to CheE008) as Elective units.

Note:
Elective subjects taken outside the Faculty of Engineering may only be selected from those subjects approved by Faculty Board. The List of Approved Elective Subjects is presented at the end of Section 6.

RECOMMENDED PART-TIME ATTENDANCE PATTERN

The Approved Programme in Chemical Engineering may be completed in 6 years as given below or in 7 years by dividing the final year into two part-time years. Students considering part-time study are advised to consult the Guide to Attendance Patterns at the beginning of this Section of the Handbook.

Chemical Engineering

Stage 1
Mathematics 1
CheE141
CheE153
GEI151 8 units
EM2BD 9 units
Stage 2
Physics I A
CheE002 9 units
CheE343
CheE355
CheE371
CheE383 10 units
Stage 3
Chemistry IIC
CheE262 10 units
EM2CO
CheE005 10 units
Stage 4
CheE242
CheE291
CheE363
EM2BD 9 units

Year IV (Full-time)

15 units

Enrolment

In order to provide for exceptional circumstances arising in particular transition cases the Dean may determine the transition programme to be followed.

SUBJECTS ENTRY REQUIREMENTS

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.

Also note that Year III subjects may not normally be taken until Year I is complete and that Year IV subjects may not normally be taken until Year II is complete (see Regulation 3).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>CheE002</td>
<td>Part-time Enrolment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Chemistry IIC</td>
<td>Chemistry I</td>
<td>-</td>
<td>Mathematics I (or IS)</td>
</tr>
<tr>
<td>CheE242</td>
<td>Mathematics I (or IS)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE262</td>
<td>Chemistry IIC</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE291</td>
<td>CheM, Mics I (or IS), CheE141</td>
<td>-</td>
<td>CheE262</td>
</tr>
<tr>
<td>EM2CO</td>
<td>Mathematics I (or IS)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE343</td>
<td>CheE242</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE355</td>
<td>CheE262, Chem IIC, EM2CO</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE363</td>
<td>CheE262</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CheE371</td>
<td>Chem IIC</td>
<td>-</td>
<td>CheE262</td>
</tr>
<tr>
<td>CheE372</td>
<td>-</td>
<td>CheE262</td>
<td></td>
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<tr>
<td>CheE373</td>
<td>-</td>
<td>CheE262</td>
<td></td>
</tr>
<tr>
<td>CheE394</td>
<td>-</td>
<td>CheE262 and permission of Head of Department (elective offered only if sufficient enrolments)</td>
<td></td>
</tr>
<tr>
<td>CheE383</td>
<td>-</td>
<td>CheE355, CheE363</td>
<td></td>
</tr>
<tr>
<td>CheE391</td>
<td>-</td>
<td>EM2CO, EM2BD, CheE242 and CheE262</td>
<td></td>
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<tr>
<td>CheE392</td>
<td>-</td>
<td>-</td>
<td></td>
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<td>CheE394</td>
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<td>-</td>
<td></td>
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<td>CheE473</td>
<td>-</td>
<td>-</td>
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<td>CheE474</td>
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<tr>
<td>CheE555</td>
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</tr>
</tbody>
</table>

* Students may choose to take a full unit of Elective in place of CheE300, in which case they will complete a programme of 60 and one half unit.
<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>CBE475</td>
<td>CBE372, CBE373</td>
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<tr>
<td>CBE476</td>
<td>CBE355</td>
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<tr>
<td>CBE481</td>
<td>CBE342</td>
<td>CBE383</td>
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<tr>
<td>CBE483</td>
<td>CBE371</td>
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<tr>
<td>CBE484</td>
<td>CBE483</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE485</td>
<td>EM2CO, CBE383</td>
<td>CBE485</td>
<td>-</td>
</tr>
<tr>
<td>CBE486</td>
<td>EM2CO</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE490</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE491</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE492</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE493</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE494</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE495</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE496</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CBE497</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Undergraduate students may only enrol in 500 or 600 level subjects with the permission of the Head of the Department of Chemical and Materials Engineering.

### APPROVED PROGRAMME

#### Subject Units Notes:

**Year I**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics IB</td>
<td>4</td>
</tr>
<tr>
<td>CR111 Mechanics and Structures</td>
<td>1</td>
</tr>
<tr>
<td>GE101 Introduction to Engineering</td>
<td>1</td>
</tr>
<tr>
<td>GE151 Introduction to Materials Science</td>
<td>1</td>
</tr>
<tr>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td>SV111 Surveying I</td>
<td>4</td>
</tr>
</tbody>
</table>

**Year II**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chemistry IS</td>
<td>2</td>
</tr>
<tr>
<td>CR212 Mechanics of Solids</td>
<td>1</td>
</tr>
<tr>
<td>CR213 Theory of Structures I</td>
<td>1</td>
</tr>
<tr>
<td>CR223 Engineering Geology</td>
<td>2</td>
</tr>
<tr>
<td>CR224 Civil Engineering Materials</td>
<td>2</td>
</tr>
<tr>
<td>CE231 Fluid Mechanics I</td>
<td>1</td>
</tr>
<tr>
<td>CE232 Fluid Mechanics II</td>
<td>1</td>
</tr>
<tr>
<td>EM2CO Vector Calculus and Differential Equations</td>
<td>1</td>
</tr>
<tr>
<td>GE204 Engineering Computations I</td>
<td>1</td>
</tr>
<tr>
<td>GE205 Engineering Computations II</td>
<td>1</td>
</tr>
<tr>
<td>GE250 Principles of Electrical Engineering</td>
<td>1</td>
</tr>
</tbody>
</table>

**Year III**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE314 Theory of Structures II</td>
<td>1</td>
</tr>
<tr>
<td>CE315 Structural Design</td>
<td>2</td>
</tr>
<tr>
<td>CE316 Stress Analysis</td>
<td>1</td>
</tr>
<tr>
<td>CE324 Soil Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>CE325 Concrete and Metals Technology</td>
<td>1</td>
</tr>
<tr>
<td>CE333 Fluid Mechanics III</td>
<td>1</td>
</tr>
<tr>
<td>CE334 Open Channel Hydraulics</td>
<td>1</td>
</tr>
<tr>
<td>CE341 Hydrology</td>
<td>1</td>
</tr>
<tr>
<td>CE351 Civil Engineering Systems</td>
<td>1</td>
</tr>
<tr>
<td>CE372 Transportation Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE381 Statistical Methods</td>
<td>1</td>
</tr>
<tr>
<td>GE301 Technology and Human Values</td>
<td>2</td>
</tr>
</tbody>
</table>

**Elective Requirements**

Five Elective units may be chosen from the following list of subjects offered by the Department of Chemical Engineering and Surveying subject to the approval of the Head of that Department. Not all Elective subjects may be offered in any one year.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE418 Masonry and Timber Design</td>
<td>1</td>
</tr>
<tr>
<td>CE419 Dynamics and Stability of Structures</td>
<td>1</td>
</tr>
<tr>
<td>CE427 Rock Mechanics</td>
<td>1</td>
</tr>
<tr>
<td>CE435 River and Coastal Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE473 Engineering Surveying II</td>
<td>1</td>
</tr>
<tr>
<td>CE474 Highway Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE482 Finite Element Methods</td>
<td>1</td>
</tr>
</tbody>
</table>
TRANSITION ARRANGEMENTS

The Approved Programme of the Civil Engineering course was amended with effect from the 1988 academic year. All students then enrolled in this course or a combined degree course of which it forms part, are required to meet the requirements of the new Approved Programme subject to the transition arrangements given below.

Year By Year Transition

Year Completed in 1987

Year 1

Year II

Year III

Subject

Elective: GE150

Elective: GE211

Elective: GE250

Elective: GE231

Subject

Corresponding

Electrical Engineering

Surveying I

Electrical Engineering

Mathematics I (or 102)

Mathematics I (or 102)

Mathematics I (or 15)

Mathematics I (or 15)

Assumed Knowledge

Elective: GE111

Elective: GE212

Elective: GE111

Elective: GE224

Elective: GE250

Elective: CE213

Elective: CE212

Elective: CE232

Elective: CE250

Elective: CE314

Elective: CE315

Elective: CE316

Elective: CE324

Elective: CE333

Elective: CE341

Elective: CE351

Elective: CE372

Elective: CE381

Elective: CE391

Elective: CE417

Elective: CE418

Elective: CE419

Elective: CE426

Elective: CE427

Elective: CE435

Elective: CE442

Elective: CE443

Elective: CE452

Elective: CE453

Elective: CE454

Elective: CE455

Elective: CE456

Elective: CE473

Elective: CE474

Elective: CE482

Elective: CE490

Elective: CE491

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE111</td>
<td>4</td>
</tr>
<tr>
<td>GE101</td>
<td>1</td>
</tr>
<tr>
<td>GE151</td>
<td>1</td>
</tr>
<tr>
<td>ME111</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Stage 2</td>
<td></td>
</tr>
<tr>
<td>SV111</td>
<td>4</td>
</tr>
<tr>
<td>CE392</td>
<td>9</td>
</tr>
</tbody>
</table>

In the latter years of each course, attendance will be required at various times during the day depending upon the subjects in which the students are enrolled and the requirements of the timetable. Full-time study is recommended after Stage 2. Students considering part-time study are advised to consult the Guide to Attendance Patterns at the beginning of this Section of the Handbook.

1 Industrial Experience subjects may be taken by part-time students as units of Elective. If so to be taken off 10 units, CE000 should be taken in Stage 2 otherwise this unit may be deleted from Stage 2.
Computer Engineering

The Department of Electrical Engineering and Computer Science is responsible, under the Regulations Governing Bachelors Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialisation of Computer Engineering. The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (B.E.) in the specialisation of Computer Engineering.

APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Year I</td>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Physics IA</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EE100 Electrical and Computer Engineering I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GE101 Introduction to Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GE151 Introduction to Materials Science</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>CE111 Mechanics and Structures</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>Year II</td>
<td>Computer Science I</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Mathematics IIA</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EE200 Electrical Engineering II</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Ph221 Electromagnetics and Quantum Mechanics</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Year III</td>
<td>Computer Science II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EE320 Electronics</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>EE350 Communications</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EE370 Computer Engineering II</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>GE360A Automatic Control</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
<tr>
<td>Year IV</td>
<td>EE483 Computer Engineering Project</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>EE485 Seminar</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Computer Engineering Electives</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>General Electives</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. All students enrolled prior to 1988 should carefully note the Transition Requirements and amended Elective Requirements published later in this section.
2. Standing will be granted in Mathematics I to students who complete both Mathematics IS and Mathematics 102.

ELECTIVE REQUIREMENTS

General Electives must be chosen from the list given below, except that:

- Part-time students may count up to 4 units of Industrial Experience subjects (EE093-5) as General Electives; and
- In exceptional circumstances, the Head of the Department of Electrical Engineering and Computer Science may permit students to take subjects approved by Faculty Board for Elective purposes (see Section 6) in place of those listed below in satisfaction of General Elective requirements. Enrolment in subjects other than those listed below will not be approved by the Dean unless the application is accompanied by written permission of the Head of Department.

General Electives *(part/one)*

<table>
<thead>
<tr>
<th>Subject Units</th>
<th>Corresponding Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE100 Electrical and Computer Engineering</td>
<td>EE313 and EE314</td>
</tr>
<tr>
<td>EE333</td>
<td>EE333</td>
</tr>
<tr>
<td>EE414 and EE417</td>
<td>EE414 and EE417</td>
</tr>
<tr>
<td>EE421 and EE422</td>
<td>EE421 and EE422</td>
</tr>
<tr>
<td>EE345 and EE447</td>
<td>EE345 and EE447</td>
</tr>
<tr>
<td>EE426 and EE525</td>
<td>EE426 and EE525</td>
</tr>
<tr>
<td>EE4683 and EE485</td>
<td>EE4683 and EE485</td>
</tr>
</tbody>
</table>

In the later years of each course, attendance will be required at various times during the day depending upon the subjects in which the student is enrolled and the requirements of the timetable. Full-time study is recommended after Stage 2. Students considering part-time study are advised to consult the Guide to Attendance Patterns at the beginning of this Section of the Handbook.

TRANSITION ARRANGEMENTS

The Approved Programme in Computer Engineering was amended with effect from the 1988 academic year to complete the revision commenced in 1987. All students enrolled in this course or a combined degree course of which it forms part, are required to meet the requirements of the new Approved Programme subject to the transition arrangements given below.

Students who commenced studies in 1987 are not affected by the transition unless they were granted standing in subjects counting in Years III or IV.

Other students were individually advised of the transition programme which they were required to follow in order to complete degree requirements. This programme, when taken with the subjects completed prior to 1988 will total 63 units for students first enrolled in the course in 1987 and 60 units for students who were enrolled in the course prior to 1987.

Note that only Computer Engineering students who have completed Computer Science I may enrol in Computer Science II. Students who were granted standing in Computer Science I under the 1987 transition arrangements were advised of the transition subjects to be completed in lieu of Computer Science II.

Subject by Subject Transition

The transition arrangements determined for 1988 were generally based on the table of corresponding subjects presented below. The table is presented here as a master of record.

1. Industrial Experience subjects may be taken by part-time students as units of Elective. If it is intended to take at least 8 such units, EE095 should be taken in Stage 2 otherwise the unit may be deleted from Stage 2.
SUBJECTS ENTRY REQUIREMENTS

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.

Also note that Year III subjects may not normally be taken until Year I is complete and that Year IV subjects may not normally be taken until Year II is complete (see Regulation 3).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Co-requisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE/09</td>
<td>Part-time Enrolment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mathematics IIA</td>
<td>Mathematics I (or 102)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE200</td>
<td>EE100 and Mathematics I (or 102)</td>
<td>-</td>
<td>Physics IA</td>
</tr>
<tr>
<td>Ph221</td>
<td>Physics IA</td>
<td>-</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>Computer Science II</td>
<td>Computer Science I</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE320</td>
<td>EE200</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE350</td>
<td>EE200</td>
<td>-</td>
<td>Ph221</td>
</tr>
<tr>
<td>EE370</td>
<td>EE100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GE361</td>
<td>Mathematics IIA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE420</td>
<td>EE320</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE440</td>
<td>GE361</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE450</td>
<td>EE350</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE460</td>
<td>Computer Science II</td>
<td>-</td>
<td>EE370</td>
</tr>
<tr>
<td>EE470</td>
<td>EE370</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE483</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE/485</td>
<td>EE483</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Undergraduate students may only enrol in 500 or 600 level subjects with the permission of the Head of the Department of Electrical Engineering and Computer Science.

The prerequisite requirements of transition subjects are given in the relevant subject descriptions.

Electrical Engineering

The Department of Electrical Engineering and Computer Science is the department responsible, under the Regulations Governing Bachelor Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialisation of Electrical Engineering.

The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (BEng) in the specialisation of Electrical Engineering.

APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Subjects</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>Physics IA</td>
<td>4</td>
</tr>
<tr>
<td>EE100 Electrical and Computer Engineering</td>
<td>4</td>
</tr>
<tr>
<td>GE101 Introduction to Engineering</td>
<td>1</td>
</tr>
<tr>
<td>GE111 Introduction to Materials Science</td>
<td>1</td>
</tr>
<tr>
<td>GE111 Mechanics and Structures</td>
<td>1</td>
</tr>
<tr>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Year II</td>
<td></td>
</tr>
<tr>
<td>Mathematics IIA</td>
<td>4</td>
</tr>
<tr>
<td>EE200 Electrical Engineering II</td>
<td>5</td>
</tr>
<tr>
<td>EE265 Electrical Engineering Computations</td>
<td>2</td>
</tr>
<tr>
<td>ME231 Dynamics</td>
<td>2</td>
</tr>
<tr>
<td>Ph221 Electromagnetics and Quantum Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Year III</td>
<td></td>
</tr>
<tr>
<td>EE310 Power and Machines</td>
<td>2</td>
</tr>
<tr>
<td>EE320 Electronics</td>
<td>3</td>
</tr>
<tr>
<td>EE350 Communications</td>
<td>2</td>
</tr>
<tr>
<td>EE370 Computer Engineering II</td>
<td>4</td>
</tr>
<tr>
<td>GE361 Automatic Control</td>
<td>2</td>
</tr>
<tr>
<td>GE309 Mechanical Engineering Science</td>
<td>2</td>
</tr>
<tr>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td>Year IV</td>
<td></td>
</tr>
<tr>
<td>EE484 Electrical Engineering Project</td>
<td>4</td>
</tr>
<tr>
<td>EE485 Seminar</td>
<td>1</td>
</tr>
<tr>
<td>Electrical Engineering Electives</td>
<td>6</td>
</tr>
<tr>
<td>General Electives</td>
<td>4</td>
</tr>
<tr>
<td>-</td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. Students enrolled prior to 1987 are not required to complete GE101.
2. All students enrolled prior to 1988 should carefully note the

ELECTIVE REQUIREMENTS

General Electives must be chosen from the list given below, except that:

- Part-time students may count up to 4 units of Industrial Experience subjects (EE/09-5) as General Electives; and
- In exceptional circumstances, the Head of the Department of Electrical Engineering and Computer Science may permit students to take subjects approved by Faculty Board for Elective purposes (see Section 6) in place of those listed below, in satisfaction of General Elective requirements. Enrolment in subjects other than those listed below will not be approved by the Dean unless the application is accompanied by written permission of the Head of Department.

General Electives (*preferred) | Units
---|---
GEB01 Technology & Human Values I | 2
MM481 Engineering Administration | 1
MEB251 Engineering Economics I | 1
Economics I | 4
Psychology I | 4
Philosophy I | 4
Mathematics IIC | 4
Mathematics IICS | 4

Electrical Engineering Electives must be chosen from the list given below.

Electrical Engineering Electives | Units
---|---
EE410 Advanced Power and Machines | 2
EE420 Advanced Electronics | 2
EE440 Advanced Control | 2
EE450 Advanced Communications | 2
EE470 Computer Systems | 2

Not all Electrical Engineering Electives may be available in any one year.

PART-TIME ATTENDANCE

All or part of the Approved Programme in Electrical Engineering may be completed by part-time study. Part-time students will normally take two years for each equivalent full-time year. The first two part-time stages of the course are timed to permit a single day work release attendance pattern with some evening lectures. They are:
### ELECTRICAL ENGINEERING COURSE PROGRAMME

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>EE100 Electrical and Computer Engineering I</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Stage 2</th>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics IA</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>GE101 Introduction to Engineering</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>GE151 Introduction to Materials Science</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CE111 Mechanics and Structures</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>EE092 Industrial Experience</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td>9</td>
</tr>
</tbody>
</table>

In the latter years of each course, attendance will be required at various times during the day depending upon the subjects in which the student is enrolled and the requirements of the timetable. Full-time study is recommended after Stage 2. Students considering part-time study are advised to consult the Guide to Attendance Patterns at the beginning of this Section of the Handbook.

### TRANSITION ARRANGEMENTS

The Approved Programme in Electrical Engineering was amended with effect from the 1988 academic year to complete the revision commenced in 1987. All students enrolled in this course or a combined degree course of which it forms part, are required to meet the requirements of the new Approved Programme subject to the transition arrangements given below.

1. Students who commenced studies after 1986 are not affected by the transition unless they were granted standing in subjects coating in Years III or IV.

2. Other students were individually advised of the transition programme which they are required to follow in order to complete degree requirements. This programme, when taken with the subjects completed prior to 1988 will total 64 units for students commencing the course after 1986 and 60 units for students who were enrolled in the course prior to 1987.

### Subject by Subject Transition

The transition arrangements determined for 1988 were generally based on the table of corresponding subjects presented below.

The table is presented here as a matrix of record.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Corresponding Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics IIB Parts 1 and 2</td>
<td>Mathematics IIA</td>
</tr>
<tr>
<td>ME131 and ME232</td>
<td>ME231 Dynamics</td>
</tr>
<tr>
<td>EE313 and EE314</td>
<td>EE310 Power and Machines</td>
</tr>
</tbody>
</table>

---

### SUBJECTS ENTRY REQUIREMENTS

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subjects without notice.

Also note that Year III subjects may not normally be taken until Year I is complete and that Year IV subjects may not normally be taken until Year II is complete (see Regulation 3).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>EE09 subjects</td>
<td>Part-time enrolment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mathematics IIA</td>
<td>Mathematics I (or 102)</td>
<td>-</td>
<td>Physics IA</td>
</tr>
<tr>
<td>EE200</td>
<td>EE100 and Mathematics I (or 102)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE265</td>
<td>Mathematics I (or I5)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ME231</td>
<td>Mathematics I (or I5)</td>
<td>(Maths 102)</td>
<td>Phys IA or IBE, CE111</td>
</tr>
<tr>
<td>PS221</td>
<td>Physics IA</td>
<td>-</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>EE310</td>
<td>EE200</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE320</td>
<td>EE200</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE350</td>
<td>EE200</td>
<td>-</td>
<td>Ph221</td>
</tr>
<tr>
<td>EE370</td>
<td>EE100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>GE361</td>
<td>Mathematics IIA</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>ME309</td>
<td>-</td>
<td>-</td>
<td>Maths I, Physics IA</td>
</tr>
<tr>
<td>EE410</td>
<td>EE310</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE420</td>
<td>EE320</td>
<td>-</td>
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<td>EE440</td>
<td>GE301</td>
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<td>EE450</td>
<td>EE350</td>
<td>-</td>
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</tr>
<tr>
<td>EE470</td>
<td>EE370</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EE484</td>
<td>All Year III subjects</td>
<td>-</td>
<td>EE484</td>
</tr>
</tbody>
</table>

Undergraduate students may only enrol in 500 or 600 level subjects with the permission of the Head of the Department of Electrical Engineering and Computer Science.

The prerequisite requirements of subjects are given in the relevant subject descriptions.
## Industrial Engineering

The Department of Mechanical Engineering in the department responsible, under the regulations governing Bachelor's degrees offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialization of Industrial Engineering.

The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (BEng) in the specialization of Industrial Engineering.

### APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV</td>
<td>ME483 Production Scheduling</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME484 Engineering Economics I</td>
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<tr>
<td></td>
<td>ME485 Numerical Control and Computer Aided Manufacturing</td>
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<tr>
<td></td>
<td>MB496 Project/Seminar</td>
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<tr>
<td></td>
<td>Electives</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

**Notes:**
1. Physics IA may be taken in lieu of Physics IB. This is recommended for students with a strong mathematics and/or physics background who may wish to follow a combined degree programme or otherwise undertake further studies in Physics.
2. Standing will be granted in Mathematics I to students who complete both Mathematics IS and Mathematics 102. Students who wish to do so will be permitted to enrol in Mathematics IS and, after successful completion of that subject, permitted to enrol in Mathematics 102. Note that these subjects must be completed over a minimum of two years. Neither Mathematics IS nor Mathematics 102 contributes to WAM calculations.
3. The final year project may be expanded by the selection of Project/Directed Reading Elective Units ME497 or ME498.

### ELECTIVE REQUIREMENTS

Eight elective units shall be chosen in accordance with the following rules:
1. Elective units shall be selected from the list of Approved Elective Subjects (as provided below).
2. At least one unit of Elective must be chosen from ME400 level subjects.
3. Part-time students may select up to 3 units from the Industrial Experience units offered by the Department of Mechanical Engineering.

### TRANSITION ARRANGEMENTS

The approved Programme of the Industrial Engineering course was amended with effect from the 1987 academic year. All students enrolled in this course or a combined degree course of which it forms part, are required to meet the requirements of the new approved Programme subject to transition arrangements given below.

**SUBJECTS ENTRY REQUIREMENTS**

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.
Materials Engineering

The Department of Mechanical Engineering is the department responsible, under the Regulations Governing Bachelor Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialisation of Materials Engineering.

The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (BEng) in the specialisation of Materials Engineering.

**NO FURTHER ENROLMENTS ARE TO BE ACCEPTED IN THIS COURSE.**

Students enrolled in the Materials Engineering programme in 1988 are invited to consider transfer to either the Chemical Engineering or Mechanical Engineering programmes in 1989. Credit on transfer may be discussed with the relevant Head of Department or with the Faculty Secretary.

A number of Materials Engineering subjects may be included within the Mechanical Engineering programme with the permission of the Head of Department (see Mechanical Engineering transition arrangements). Other Materials Engineering subjects may be taken as elective subjects within most degree programmes.

**APPROVED PROGRAMME**

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Mathematics I</td>
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</tr>
<tr>
<td></td>
<td>Chemistry I</td>
<td>4</td>
</tr>
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<td></td>
<td>Physics IA*</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>CE111 Mechanics and Structures</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>GE101 Introduction to Engineering*</td>
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</tr>
<tr>
<td></td>
<td>GE151 Introduction to Materials Science</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16</td>
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<tr>
<td>II</td>
<td>EM2CO Vector Calculus and Differential Equations</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>EM2BD Complex Analysis and Linear Algebra</td>
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</tr>
<tr>
<td></td>
<td>GE204 Engineering Computations I</td>
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</tr>
<tr>
<td></td>
<td>GE205 Engineering Computations II</td>
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<tr>
<td></td>
<td>ME214 Mechanics of Solids I*</td>
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<td></td>
<td>ME215 Mechanical Engineering Design I</td>
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<td></td>
<td>Mac202 Properties of Materials</td>
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<td></td>
<td>Mac204 Examination of Materials</td>
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<td>Mac205 Materials Engineering Laboratory</td>
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<td></td>
<td>Mac211 Selection and Use of Materials</td>
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<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
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</thead>
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<tr>
<td>III</td>
<td>ChemE371 Kinetics and Thermodynamics</td>
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<tr>
<td></td>
<td>ME316 Mechanical Engineering Design II</td>
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<td>Mac305 Materials Engineering Laboratory II</td>
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<td></td>
<td>Mac311 Selection and Use of Materials III</td>
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<td></td>
<td>Mac312 Ceramic Science and Technology</td>
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</tr>
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<td></td>
<td>Mac313 Polymer Science and Technology</td>
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<td>Mac314 Composites in Engineering</td>
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<td>Mac315 Fabrication of Metals</td>
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<td></td>
<td>Mac316 Porous Alloys in Mechanical Design</td>
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<tr>
<td></td>
<td>Mac355 Electrochemistry and Corrosion</td>
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<tr>
<td></td>
<td>Electives</td>
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<td></td>
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<table>
<thead>
<tr>
<th>Year</th>
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<th>Units</th>
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<tbody>
<tr>
<td>IV</td>
<td>ME482 Engineering Economics I</td>
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<td>ME484 Engineering Economics II</td>
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<td>Mat491 Seminar</td>
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<td>Mat496 Research Project</td>
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<td>Mat400 level Electives</td>
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<td>Electives</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. With the approval of the Head of Department: Physics II may be taken in lieu of Physics IA*; ChemE141 may be taken in lieu of GE101; and GE212 may be taken in lieu of ME214.
2. Standing will be granted in Mathematics I to students who complete both Mathematics 15 and Mathematics 102. Students who wish to do so will be permitted to enrol in Mathematics 15 and, after successful completion of that subject, permitted to enrol in Mathematics 102. Note that these subjects must be completed over a minimum of two years. Neither Mathematics 15 nor Mathematics 102 contributes to WAM calculations.

**ELECTIVE REQUIREMENTS**

Mat400 level Electives

These Elective units may be selected from any Mat400 level subjects that are not included in the Approved Programme.

Part-time students may count Industrial Experience subjects (Mat003 - Mat006) as Mat400 level Elective units.

Electives

Subject to the approval of the Head of the Department of Chemical and Materials Engineering, Elective units may be selected from additional Mat400 level subjects; subjects offered in other engineering specialisations within the Faculty of Engineering, or from the Faculty of Engineering list of Approved Elective Units (see Section 6).

Part-time students may count Industrial Experience subjects (Mat003 - Mat006) as Elective units.

**SUBJECTS ENTRY REQUIREMENTS**

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subject in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.

Also note that Year III subjects may not normally be taken until Year I is complete and that Year IV subjects may not normally be taken until Year II is complete (see Regulation 3).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
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<td>Mat003-6</td>
<td>Part-time Enrolment</td>
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<tr>
<td>EM2CO</td>
<td>Mathematics I (or 102)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>EM2BD</td>
<td>Mathematics I (or 102)</td>
<td>-</td>
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<tr>
<td>GE204</td>
<td>Mathematics I (or 105)</td>
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<td>GE205</td>
<td>Mathematics I (or 105), GE204</td>
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<td>Mat202</td>
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<td>Mat211</td>
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<tr>
<td>Mat214</td>
<td>CE111, ME111, ME214</td>
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<td>Mat311</td>
<td>GE151</td>
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<td>Mat211</td>
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<td>Mat316</td>
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<tr>
<td>Mat413</td>
<td>GE151, Mat211</td>
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</tr>
</tbody>
</table>

Mat400 level subjects (other than Mat412 and Mat413) will not be offered in 1989.
Mechanical Engineering

The Department of Mechanical Engineering is the department responsible, under the Regulations Governing Bachelor's Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the specialization of Mechanical Engineering.

The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Engineering (BEng) in the specialization of Mechanical Engineering.

APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Year</th>
<th>Subjects</th>
<th>Units</th>
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<tr>
<td>I</td>
<td>Mathematics I</td>
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<tr>
<td></td>
<td>Physics II</td>
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<tr>
<td></td>
<td>CE111 Mechanics and Structures</td>
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<tr>
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<td>EE100 Electrical and Computer Engineering</td>
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<td>GE101 Introduction to Engineering</td>
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<td>GE151 Introduction to Materials Science</td>
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</tr>
<tr>
<td></td>
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<tr>
<td>II</td>
<td>EM22S Applied Statistics</td>
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<tr>
<td></td>
<td>EMSCO Vector Calculus and Differential Equations</td>
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<tr>
<td></td>
<td>GE304 Engineering Computations I</td>
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<td>GE305 Engineering Computations II</td>
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<td>MA211 Selection and Use of Materials I</td>
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<td>ME204 Experimental Methods I</td>
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<td>ME214 Mechanics of Solids I</td>
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<td>ME215 Mechanical Engineering Design I</td>
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<td>ME231 Dynamics</td>
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<td>ME251 Fluid Mechanics I</td>
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<td>ME271 Thermodynamics I</td>
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<tr>
<td>III</td>
<td>GE211 Theory and Applications of Electrical Energy Conversion</td>
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<td>GE301 Technology and Human Values I</td>
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<td>GE361 Automatic Control</td>
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<td>MA211 Selection and Use of Materials II</td>
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<td></td>
<td>ME305 Experimental Methods II</td>
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<td>ME316 Mechanical Engineering Design II</td>
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<td>ME333 Dynamics of Machines</td>
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<td>ME343 Mechanics of Solids II</td>
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<tr>
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<td>ME353 Fluid Mechanics and Heat Transfer</td>
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<td>ME373 Thermodynamics II</td>
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Year IV

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Units</th>
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<tbody>
<tr>
<td>ME413 Mechanical Engineering Design III</td>
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<td>ME406 Project/Seminar</td>
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<tr>
<td>Electives</td>
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<tr>
<td></td>
<td>15</td>
</tr>
</tbody>
</table>

Notes:
1. Physics IA may be taken in lieu of Physics IB. This is recommended for students with a strong mathematics/physics background who may wish to follow a combined degree programme or otherwise undertake further studies in Physics.
2. Studies will be granted in Mathematics I to students who complete both Mathematics IS and Mathematics 102. Students who wish to do so will be permitted to enrol in Mathematics IS and, after successful completion of that subject, permitted to enrol in Mathematics 102. Note that these subjects must be completed over a minimum of two years. Neither Mathematics IS nor Mathematics 102 contributes to WAM calculations.
3. The final year project may be expanded by the selection of Project/Directed Reading Elective Units ME497 or ME498. Students may enrol in either of these electives only with the written approval of the Head of the Department, after suitable supervisory arrangements have been made.
4. Subject to the approval of the Head of the Department, Materials Engineering subjects may be substituted for Mechanical Engineering subjects in the third and fourth years of the course.

ELECTIVE REQUIREMENTS

Ten elective units shall be chosen in accordance with the following rules:
1. Elective units shall be selected from the list of Approved Elective Subjects (except as provided in rules 3 and 4 below).
2. At least four units of Elective must be chosen from ME400 level subjects.
3. No more than 4 units may be selected from Strand 7 - Humanities.
4. Part-time students may select up to 3 units from the Industrial Experience units offered by the Department of Mechanical Engineering.
5. In exceptional circumstances, the Head of the Department of Mechanical Engineering may approve the selection of elective units not listed in the list of Approved Elective Subjects.

Approved Elective Subjects

The following subjects have been approved for selection by Mechanical Engineering, and Industrial Engineering students in accordance with the Elective Requirements of their respective courses.

It is strongly recommended that students concentrate their choice of elective units in at least one of strands 1 to 5.

Note:
1. Not all of the subjects listed below may be available in every year. Before selecting Electives, students should consult the University Timetable.
2. Timetables clash may prevent the selection of certain combinations of Elective subjects.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Engineering Science</th>
<th>Units</th>
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<tbody>
<tr>
<td>1</td>
<td>Engineering Science</td>
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<tr>
<td></td>
<td>EM2BD Complex Analysis and Linear Algebra</td>
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<td>MA311 Selection and Use of Materials II</td>
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<tr>
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<td>ME335 Fluid Mechanics and Heat Transfer</td>
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<td>ME343 Mechanics of Solids</td>
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<td>ME344 Fluid Mechanics</td>
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<td>ME345 Fluid Mechanics</td>
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<td>ME346 Thermodynamics</td>
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<td>ME347 Heat Transfer and</td>
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<td>Elective Subjects</td>
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<td>2</td>
<td>Computing</td>
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<td></td>
<td>EM2IP Introduction to Programming</td>
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<tr>
<td></td>
<td>EM2AL Assembler Language</td>
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<tr>
<td></td>
<td>EM2DSA Data Structures and Algorithms</td>
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</tr>
<tr>
<td></td>
<td>GE333 Microprocessor Systems and Applications</td>
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<tr>
<td></td>
<td>MA405 Advanced Numerical Programming</td>
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<td>ME414 Computer Aided Design and Manufacturing</td>
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<td>ME433 Robotics</td>
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<td>Design and Materials</td>
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<td>CE314 Theory of Structures II</td>
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<td>CE315 Structural Design</td>
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<td>MA311 Selection and Use of Materials II</td>
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<td>MA312 Ceramic Science and Technology</td>
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<td>MA315 Fabrication of Metals</td>
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<td>MA316 Powder Alloys in Mechanical Design</td>
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<td>MA317 Failure of Materials in Mechanical Design</td>
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<td>MA318 Mechanical and Physical Properties of Materials</td>
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<td>ME410 Advanced Design Concepts</td>
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<td>ME411 Finite Element Methods in Mechanical Engineering Design</td>
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<td>ME414 Computer Aided Design and Manufacturing</td>
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<tr>
<td>4</td>
<td>Systems Analysis, Operations Research and Industrial Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ME381 Methods Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME383 Quality Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME384 Finite Element Methods in Mechanical Engineering Design</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME414 Computer Aided Design and Manufacturing</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA421 Convoying of Bulk Solids</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA442 Maintenance Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA443 Robotics</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA481 Engineering Administration</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA482 Engineering Economics</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA483 Production Scheduling</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA484 Engineering Economics</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>MA487 Operations Research: Fundamental Techniques</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Engineering</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ME407 Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME409 Introduction to Noise Pollution Control</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SV472 Land Valuation</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>SV473 Town Planning</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>Project/Directed Reading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ME497 Project/Directed Reading</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>ME498 Project/Directed Reading</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Humanities</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GE302 Technology and Human Values II</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Any subject offered by the departments of the Faculty of Arts or the Faculty of Economics and Commerce, subject to the approval of the Head of the Department of Mechanical Engineering.</td>
<td></td>
</tr>
</tbody>
</table>

PART-TIME ATTENDANCE

All or part of the Approved Programme in Mechanical Engineering may be completed by part-time study. Part-time students will normally take two years for each equivalent full-time year. The first two part-time stages of the course are timetabled to permit a single day week release attendance pattern with some evening lectures. They are:

<table>
<thead>
<tr>
<th>Stage</th>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>Engineering Science</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>Computing</td>
<td>1</td>
</tr>
<tr>
<td>4</td>
<td>Systems Analysis, Operations Research and Industrial Engineering</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Environmental Engineering</td>
<td>1</td>
</tr>
<tr>
<td>6</td>
<td>Project/Directed Reading</td>
<td>1</td>
</tr>
<tr>
<td>7</td>
<td>Humanities</td>
<td>1</td>
</tr>
</tbody>
</table>
MECHANICAL ENGINEERING COURSE PROGRAMME

Stage 2
Physics IA 1
EE100 Electrical and Computer Engineering 1 1
ME092 Industrial Experience 1 9

In the latter years of each course, attendance will be required at various times during the day depending upon the subjects in which the student is enrolled and the requirements of the timetable. Full-time study is recommended after Stage 2. Students considering part-time study are advised to consult the Guide to Attendance Patterns at the beginning of this Section of the Handbook.

TRANSITION ARRANGEMENTS

The Approved Programme of the Mechanical Engineering course was amended with effect from the 1987 academic year. All students enrolled in this course or a combined degree course of which it forms part, are required to meet the requirements of the new Approved Programme subject to the transition arrangements given below.

Year by Year Transition

Year Completed in 1986 Required to Complete Subsequent Years
Year I
ME231 plus EE131T, Year II less ME215 and ME212, ME232 and 1 unit of Elective
Year II
EM2AS Year III and Year IV
EM211 Year III less ME305 plus Elective
EM232 Year IV less 1 unit of Elective
EM233 Year IV

Subject by Subject Transition

Students out of phase with year progression in the Approved Programme and who have completed a particular subject or subjects in the list below will not be required to complete the corresponding subject or subjects listed.

Subject Corresponding Subjects
ME123 GE101
CE111 Statics CE111 Mechanics and Structures
Chemistry IS, EE131 and 1 unit of Elective EE100 Electrical and Computer Engineering I
EM202 1 unit of Elective

Notes:
1. Students who completed Chemistry IS prior to 1987 but have not completed EE131, must complete EE130 and 1 unit of Elective. They will then be required to complete EE100 Electrical and Computer Engineering I.
2. Students who completed ME202 prior to 1987 but have not completed GE360, must complete GE361, ME202 will then count as 1 unit of Elective.

MATERIALS ENGINEERING TRANSITION

Students transferring from the Materials Engineering programme in 1989 will be permitted to count Chemistry I in lieu of EE100 and to substitute GE250 for GE231. The Head of the Department may approve the substitution of a suitable group of Materials Engineering subjects for an equivalent number of Mechanical Engineering units in the third year of the Approved Programme.

Exceptional Circumstances Arising in Transition

In order to provide for exceptional circumstances arising in particular transition cases the Dean may determine the transition programme to be followed.

SUBJECTS ENTRY REQUIREMENTS

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.

Also note that Year III subjects may not normally be taken until Year I is complete and that Year IV subjects may not normally be taken until Year II is complete (see Regulation 3).

Subject Prerequisite(s) Corequisite(s) Assumed Knowledge
EM202-4 Part-time Enrolment - -
EM210 Mathematics I - -
EM215 Mathematics I - -
GE204 Mathematics I (or IS) - -
GE205 GE204 - -
Mat211 GE151 - -
ME204 - - Maths I (or IS), Physics IA or IB
ME214 ME111, ME111 ME214 - Maths I (or IS)
ME215 ME111, ME111 ME214 - Maths I (or IS)
ME216 ME111, ME111 ME214 - Maths I (or IS)
ME231 Mathematics I (or IS) Maths I (or IS), Physics IA or IB
ME251 Maths I (or IS), Physics IA or IB
ME271 - - Maths I (or IS), Physics IA or IB
GE211 EE100 - -
GE301 - - -
GE361 EM2CO - -
Mat311 Mat211 - -
Mat312 GE151 - -
Mat313 GE151 - -
Mat314 GE151 - -
Mat315 GE151 - -
Mat316 GE151 - -
Mat317 GE151 - -
ME305 ME204 - -
ME316 ME215 - -
ME333 ME231 - -
ME334 ME214 - -
ME353 ME251 - -
ME373 ME271 - -
ME381 All Year II subjects - -
ME383 EM2AS - EM2CO, ME215
ME384 ME215 - -
Mat412 GE151, Mat211 - -
Mat413 GE151, Mat211 - -
ME405 GE205 - -
ME407 All Year II subjects - -
ME409 All Year II subjects - -
ME410 ME316 - -
ME411 ME316 - -
ME413 ME215 - -
ME414 Permission of Head of Department of Mechanical Engineering - -
ME414B Permission of Head of Department of Mechanical Engineering - -
ME419 All Year II subjects - -
ME420 ME419 - -
ME421 All Year II subjects - -
ME422 All Year II subjects - -
ME423 ME231 - -
ME424 All Year II subjects - -
ME445 ME343 - -
ME453 ME353 - -
ME473 ME373 - -
### MECHANICAL ENGINEERING COURSE PROGRAMME

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>ME474</td>
<td>ME353</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME481</td>
<td>All Year II subjects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME482</td>
<td>All Year II subjects</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>ME483</td>
<td>All Year II subjects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME484</td>
<td>All Year II subjects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME485</td>
<td>All Year II subjects</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>ME486</td>
<td>All Year III subjects</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME497</td>
<td>Permission of Head of Department of Mechanical Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ME498</td>
<td>Permission of Head of Department of Mechanical Engineering</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Undergraduate students may only enrol in 500 or 600 level subjects with the permission of the Head of the Department of Mechanical Engineering.

### SECTION FIVE

#### Surveying

The Department of Civil Engineering and Surveying is the department responsible, under the Regulations Governing Bachelor Degrees Offered in the Faculty of Engineering (see Section 3) and the policies of the Faculty Board (see Section 4), for matters relating to the discipline of Surveying.

The programme of subjects set out below has been approved by the Faculty Board and leads to the award of the degree of Bachelor of Surveying (BSurv).

#### APPROVED PROGRAMME

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Year I</strong></td>
<td></td>
</tr>
<tr>
<td>Mathematics I</td>
<td>4</td>
</tr>
<tr>
<td>Physics I</td>
<td>4</td>
</tr>
<tr>
<td>CE111 Mechanics and Structures</td>
<td>1</td>
</tr>
<tr>
<td>GE101 Introduction to Engineering</td>
<td>1</td>
</tr>
<tr>
<td>GE151 Introduction to Materials Science</td>
<td>1</td>
</tr>
<tr>
<td>ME111 Graphics and Engineering Drawing</td>
<td>1</td>
</tr>
<tr>
<td>SV111 Surveying I</td>
<td>4</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE212 Mechanics of Solids</td>
<td>1</td>
</tr>
<tr>
<td>CE223I Engineering Geology</td>
<td>2</td>
</tr>
<tr>
<td>CE231 Fluid Mechanics I</td>
<td>1</td>
</tr>
<tr>
<td>CE232 Fluid Mechanics II</td>
<td>1</td>
</tr>
<tr>
<td>BMSC0 Vector Calculus and Differential Equations</td>
<td>2</td>
</tr>
<tr>
<td>SV213 Surveying II</td>
<td>3</td>
</tr>
<tr>
<td>SV214 Hydrographic Surveying</td>
<td>1</td>
</tr>
<tr>
<td>SV232 Survey Computations I</td>
<td>1</td>
</tr>
<tr>
<td>SV233 Survey Computations II</td>
<td>1</td>
</tr>
<tr>
<td>SV291 Introduction to Legal Studies</td>
<td>1</td>
</tr>
<tr>
<td>SV292 Property and Survey Law</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE324 Soil Mechanics</td>
<td>2</td>
</tr>
<tr>
<td>CE341 Hydrology</td>
<td>1</td>
</tr>
<tr>
<td>CE351 Civil Engineering Systems</td>
<td>1</td>
</tr>
<tr>
<td>CE372 Transportation Engineering</td>
<td>1</td>
</tr>
<tr>
<td>CE381 Statistical Methods</td>
<td>1</td>
</tr>
<tr>
<td>SV313 Surveying III</td>
<td>2</td>
</tr>
<tr>
<td>SV334 Surveying Computations III</td>
<td>1</td>
</tr>
<tr>
<td>SV351 Geodesy I</td>
<td>2</td>
</tr>
<tr>
<td>SV361 Photogrammetry I</td>
<td>2</td>
</tr>
<tr>
<td>SV371 Principles of Economics</td>
<td>2</td>
</tr>
<tr>
<td>SV393 Land Boundary Definition</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>16</strong></td>
</tr>
</tbody>
</table>

**Notes:**
1. Physics I may be substituted for Physics II, with the approval of the Head of Department. This option is recommended for students with a strong mathematics/physics background who may wish to follow a combined degree programme requiring Physics or otherwise undertake further studies in Physics.
2. Standing will be granted in Mathematics I to students who complete both Mathematics IS and Mathematics 102. Students who wish to do so will be permitted to enrol in Mathematics IS and, after successful completion of that subject, permitted to enrol in Mathematics 102. Note that these subjects must be completed over a minimum of two years. Neither Mathematics IS nor Mathematics 102 contributes to WAM calculations.
3. SV111 involves a compulsory five-day series of surveying field exercises.
4. CE223I involves two compulsory one-day field excursions.
5. GE312 may replace CE223 Engineering Geology and 2 units of Elective.
6. SV213 includes a 5-day survey camp.
7. SV313 includes a 10-day live-in survey camp.

#### ELECTIVE REQUIREMENTS

Three units of electives may be chosen from the following list of subjects offered by the Department of Civil Engineering and Surveying.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV452 Geodesy II</td>
<td>1</td>
</tr>
<tr>
<td>SV462 Photogrammetry II</td>
<td>1</td>
</tr>
<tr>
<td>SV465 Advanced Cartography</td>
<td>1</td>
</tr>
<tr>
<td>SV091 Industrial Experience</td>
<td>1</td>
</tr>
<tr>
<td>SV092 Industrial Experience</td>
<td>1</td>
</tr>
<tr>
<td>SV093 Industrial Experience</td>
<td>1</td>
</tr>
</tbody>
</table>

Electives may also be chosen from the Approved Electives subjects or any subjects offered within the Faculty of Engineering subjects to the approval of the Heads of the Department of Civil Engineering and Surveying and of the Department responsible for the subject.

#### PART-TIME ATTENDANCE

All or part of the Approved Programme in Surveying may be completed by part-time study. Part-time students will normally...
Subject by Subject Transition

Students out of phase with year by year progression in the Approved Programme and who have completed a particular subject or subjects in the list below will not be required to complete the corresponding subject or subjects listed.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Corresponding Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economics I</td>
<td>ME111, GE101, GE151 and 1 unit of Elective</td>
</tr>
<tr>
<td>SV271</td>
<td>SV371</td>
</tr>
<tr>
<td>SV314</td>
<td>SV214</td>
</tr>
<tr>
<td>EM2AS</td>
<td>CE101</td>
</tr>
<tr>
<td>Geography III* plus CE302*</td>
<td>CE311, CE232, CE324, CE341 and CE443</td>
</tr>
<tr>
<td>SV452 Geodesy II</td>
<td>1 unit Elective</td>
</tr>
<tr>
<td>SV462 Photogrammetry II</td>
<td>1 unit Elective</td>
</tr>
<tr>
<td>SV465 Advanced Cartography</td>
<td>1 unit Elective</td>
</tr>
</tbody>
</table>

* Additional Transition Requirements

1. Students who have completed either Geography IIB or CE302 Civil Eng III prior to 1988 must complete CE032 or Geography IIB respectively. Students who have completed Geography IIB must enrol in CE032 in 1988.

2. In exceptional circumstances, the Head of the Department may permit students to enrol in GE301 Technology and Human Values in lieu of SV371 Principles of Economics.

Exceptional Circumstances Arising in Transition

In order to provide for exceptional circumstances arising in particular transition cases the Dean may determine the transition programme to be followed.

Subjects Entry Requirements

Students are advised to carefully note the prerequisite, corequisite and assumed knowledge requirements of the subjects in which they wish to enrol. Students who are found to have acted contrary to these requirements without a formal waiver being granted, may be withdrawn from the relevant subject(s) without notice.

Also note that Year III subjects may not normally be taken until Year I is completed and that Year IV subjects may not normally be taken until Year II is completed (see Regulation 3).

<table>
<thead>
<tr>
<th>Subject</th>
<th>Prerequisite(s)</th>
<th>Corequisite(s)</th>
<th>Assumed Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>SV209 subjects</td>
<td>Part-time Enrolment</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CE122</td>
<td>CE111</td>
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<td>Mathematics I (or IS)</td>
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<tr>
<td>CE223</td>
<td>-</td>
<td>-</td>
<td>Mathematics I (or IS), Physics IA or IB</td>
</tr>
<tr>
<td>CE231</td>
<td>-</td>
<td>-</td>
<td>Mathematics I (or IS), Physics IA or IB</td>
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<td>CE322</td>
<td>CE231</td>
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<td>-</td>
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<tr>
<td>EM220</td>
<td>Mathematics I (or IS)</td>
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<td>-</td>
</tr>
<tr>
<td>SV213</td>
<td>SV111</td>
<td>SV233</td>
<td>-</td>
</tr>
<tr>
<td>SV214</td>
<td>-</td>
<td>SV213</td>
<td>-</td>
</tr>
<tr>
<td>SV232</td>
<td>Mathematics I (or IS)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV233</td>
<td>-</td>
<td>SV111</td>
<td>-</td>
</tr>
<tr>
<td>SV291</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV292</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CE324</td>
<td>-</td>
<td>-</td>
<td>CE212</td>
</tr>
<tr>
<td>CE341</td>
<td>-</td>
<td>-</td>
<td>CE232, CE381</td>
</tr>
<tr>
<td>CE351</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CE371</td>
<td>-</td>
<td>-</td>
<td>EM210</td>
</tr>
<tr>
<td>SV310</td>
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<td>-</td>
</tr>
<tr>
<td>SV334</td>
<td>SV233</td>
<td>SV111</td>
<td>-</td>
</tr>
<tr>
<td>SV351</td>
<td>SV235, SV232, SV233</td>
<td>SV313, SV334</td>
<td>-</td>
</tr>
<tr>
<td>SV361</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV371</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV393</td>
<td>SV291, SV292</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>CE443</td>
<td>-</td>
<td>-</td>
<td>CE341, CE351</td>
</tr>
<tr>
<td>SV416</td>
<td>SV313, SV334</td>
<td>-</td>
<td>-</td>
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<td>SV441</td>
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<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV452</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV462</td>
<td>SV361</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV465</td>
<td>SV361</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV472</td>
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<td>-</td>
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</tr>
<tr>
<td>SV473</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV475</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>SV481</td>
<td>All Year III subjects</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
SUBJECT DESCRIPTIONS

About This Section

This section sets out detailed descriptions of the subjects offered by the Departments of the Faculty of Engineering and those subjects offered by other faculties which are prerequisites in the undergraduate programmes offered in the Faculty of Engineering.

A list of Approved Elective Subjects is also included. Students will need to consult the subject descriptions for these subjects in the relevant Faculty Handbook.

A Guide to Subject Descriptions is given on this page.

Guide to Subject Descriptions

Units

In undergraduate engineering subjects, one unit involves a total of 42 hours per year (1.5 hours per week for the whole year, or 3 hours per week for half a year) of lectures, laboratories, and tutorials. Where subjects from other faculties form part of an Engineering course, the unit value is determined by the Faculty Board.

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 as postgraduate students are expected to do more work per contact-hour than undergraduate students.

Weightings

Each subject undertaken as part of an undergraduate programme in the Faculty has a weighting for use in Weighted Average Mark (WAM) calculations (refer to Faculty Policies in Section 4). Unless otherwise determined by Faculty Board, each engineering subject has a weighting associated with the level at which it is offered as set out below.

<table>
<thead>
<tr>
<th>Level</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1</td>
</tr>
<tr>
<td>200</td>
<td>2</td>
</tr>
<tr>
<td>300</td>
<td>3</td>
</tr>
<tr>
<td>400/500/600</td>
<td>4</td>
</tr>
</tbody>
</table>

Computer Numbers

The six digit number which precedes the subject number and title of each subject is the Computer Code Number. The computer code numbers of relevant subjects should be quoted on all enrolment and variation of programme forms. The computer code numbers of all subjects offered within the Faculty of Engineering appear with the subject descriptions and are also listed in Section 8 of this Handbook.

Subject Numbers

Each subject offered by Departments within the Faculty of Engineering has been given an identification number with prefixed letters to aid identification of subjects. This is known as the Subject Number.

Assumed Knowledge

Many subjects are taught on the basis of an assumption that students have previously completed certain other subjects although these subjects have not been determined to be prerequisites. The particular subject(s) which are assumed to have been completed in each case are indicated in the Subject Entries set out in the following pages.

The content of the subject is determined by the subject in which they are enrolled. If in doubt, students should discuss the matter with the lecturer of the subject in which they intend to enroll.

Examinations and Assessment

Examinations and assessment policies refer to the Faculty’s Policies on Undergraduate Performance and Progress published in Section 4 of this Handbook.

Subject Title

Each subject is provided with a title which, together with the subject number, forms the subject name as described below.

Subject Name

The Subject Name of each subject contains the subject number and title in the following way:

Computer Number  
Subject Name  
Number Title  
For Example:

| S21105 | Mechanics and Structures |

The Computer Number and Subject Name of appropriate subjects should be included on all enrolment and variation of programme forms.

Prerequisites and Corequisites

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

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

The Dean, on the recommendation of the Head of Department, may relax prerequisites and corequisites. However, relaxation will only be granted in the most exceptional circumstances.

Students who wish to enrol in a subject for which they do not have the required prerequisites must apply to the Head of the Department offering the subject on the appropriate form. Forms are available from the offices of the Departments of the Faculty of Engineering.

Students who enrol contrary to subject entry requirements may be withdrawn from the relevant subjects without notice.

Withdrawal from a subject will normally result in withdrawal from any corequisite subjects without notice.

Assumed Knowledge

Many subjects are taught on the basis of an assumption that students have previously completed certain other subjects although these subjects have not been determined to be prerequisites. The particular subject(s) which are assumed to have been completed in each case are indicated in the Section Entries set out in the following pages.

It is the responsibility of each student to ensure that they have met the assumed knowledge requirement of each subject in which they enrol. If in doubt, students should discuss the matter with the lecturer of the subject in which they intend to enroll.

It should be noted that students may enrol only in those subjects approved by the Dean. Such approval may be withheld or may be revoked where it becomes apparent that a student has not attained the level of knowledge assumed by a subject in which enrolment has been sought.

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Withdrawal from a subject will normally result in withdrawal from any corequisite subjects without notice.
SECTION SIX

CHEMICAL ENGINEERING SUBJECT DESCRIPTIONS

INDUSTRIAL EXPERIENCE

511104 ChE8002 1 unit
511105 ChE8003 1 unit
511106 ChE8004 1 unit
511107 ChE8005 1 unit

Prerequisite: Part-time enrolment.

These subject units are designed to formalise periods of Industrial Experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students will be required to present a report giving a connected account and critical evaluation of their engineering activities and experience during the year. These units may be counted by students towards satisfaction of Elective requirements. (see also Section 4 of this Handbook)

511108 ChE141 INDUSTRIAL PROCESS PRINCIPLES

1 unit


511109 ChE151 INDUSTRIAL CHEMICAL PROCESSES AND EQUIPMENT

1 unit

This subject is only available in 1989 to students requiring it for transition purposes.

An introduction to the structure and organisation of the chemical and process metallurgical industries in Australia, with reference to the world scene.

Descriptions of the processes used in the manufacture of the major industrial chemicals, including hydrometallurgical and smelting operations. Outline of typical unit operations.

Text

Strive & Brink


511111 ChE153 CHEMICAL AND MANUFACTURING PROCESSES

2 units

An introduction to the structure and organisation of the chemical and process metallurgical industries in Australia, with reference to the world scene. Descriptions of the processes used in the manufacture of the major industrial chemicals, including hydrometallurgical and smelting operations. Outline of typical unit operations. Description of various processes used in the fabrication and utilisation of materials. Visits to a number of industrial plants. Illustrative of the course material, and preparation of process flow diagrams.

Text

Austin, G. T.


511224 ChE241 PROCESS ANALYSIS I

1 unit

This subject is only available in 1989 to students requiring it for transition purposes.

Prerequisite: ChE151

Visits to selected plants in the Newcastle (or Sydney) area. Detailed reports required on specified plants.

511233 CM242 PROCESS ANALYSIS II

3 units

Prerequisite: Mathematics (or 15)

Part 1

Elementary statics, equilibrium in two-dimensional force systems, axial and shear forces, bending and twisting of bars, first and second moments of area with applications to design of simple structures and piping systems. Design of unified pressure vessels. Membrane theory, stresses in thin-walled vessels. Code requirements.

Texts:

S.A.A. Code

Engineering Drawing Practice (AS C21-1983)

S.A.A. Code

Unified Pressure Vessels (AS 1210-1977)

Gonenc, B.

Steel Designers Handbook (NSW University Press 1984)

Nash, W. A.

Theory and Problems of Strength of Materials (Schaum 1977)

Part 2

Computer programming with particular emphasis on programming style. The use of terminals files and editing techniques will be covered. Also some aspects of computer hardware and data handling will be considered. Some numerical analysis techniques will be discussed to provide examples for programming. These will include solutions of single non-linear equations, interpolation, curve fits, differentiations, integration and systems of equations, linear and non-linear.

Text

Handbook for VAX/VMS

(University of Newcastle Computing Centre)

Boillot, M.

Understanding FORTRAN 77 (West 1984)

Part 3

Development of a student's ability to write and understand computer programmes that use numerical analysis techniques to solve problems in engineering. An outline of theories as behind the numerical analysis techniques is given but the main emphasis is on computing methods. Topics include numerical solution of single ordinary differential equations by stepwise and multistep methods including step optimisation and stability, convergence criteria, systems of differential equations, "stiff" equations and stability; boundary value problems. Numerical solution of partial differential equations, the usual terminology. Explicit and implicit methods of computation; solution of elliptic equations by the grid, iterative and relaxation methods. Solution of hyperbolic equations by the grid method. Solution of parabolic equations by explicit, implicit methods.

Text

Chapra, S.C. and Canale, R.P.

Numerical Methods for Engineers (McGraw-Hill 1985)

Roberts, J.

Lecture Notes on Numerical Methods of Solving Ordinary Differential Equations and Partial Differential Equations

(Department of Chemical Engineering).

511225 ChE252 STRUCTURES AND PRESSURE VESSEL DESIGN

1 unit

This subject is only available in 1989 to students requiring it for transition purposes.

Elementary statics, equilibrium in two-dimensional force systems, axial and shear forces, bending and twisting of bars, first and second moments of area with applications to design of simple structures and piping systems. Design of unified pressure vessels. Membrane theory, stresses in thin-walled vessels. Code requirements.

Texts:

S.A.A. Code

Engineering Drawing Practice (AS C21-1983)

S.A.A. Code

Unified Pressure Vessels (AS 1210-1977)

Gonenc, B.

Steel Designers Handbook (NSW University Press 1984)

Nash, W. A.

Theory and Problems of Strength of Materials (Schaum 1977)

511230 ChE261 SEPARATION PROCESSES I

2 units

Prerequisite: Chemistry I, Mathematics I, ChE141


Texts

Craik, J.M. and Richardson, J.F.

Chemical Engineering, Vol. I (S.J. units)

(Pergamon 1977)

Pitz, R.D. & Sittan L.E.

Heat Transfer (Schaum 1977)

Perry, J.H. & Chilton, C.H.

Chemical Engineers Handbook 5th edn

(McGraw-Hill 1973)

Searlemin, A.C. & Wall, T.W.

Notes on Radiation Heat Transfer

(University of Newcastle)

511233 ChE262 TRANSFER PROCESSES I

3 units

Prerequisite: Chemistry I, Mathematics I (or 15), ChE141

Part 1


Texts

S.A.A. Code

Engineering Drawing Practice (AS C21-1983)

S.A.A. Code

Unified Pressure Vessels (AS 1210-1977)

Gonenc, B.

Steel Designers Handbook (NSW University Press 1984)

Nash, W. A.

Theory and Problems of Strength of Materials (Schaum 1977)
SECTION SIX

CHEMICAL ENGINEERING SUBJECT DESCRIPTIONS

Texts
Condon J.M. and Richardson, J.F.
Chemical Engineering, Vol. I (S.I. units) (Pergamon 1977)

Fitz, R.D. & Sittan L.E.
Heat Transfer (Schum 1977)

Perry, J.H. & Chilton, C.H.
Chemical Engineers Handbook 5th edn (McGraw-Hill 1985)

Sarofim, A.C. & Wall, T.F.
Notes on Radiation Heat Transfer (University of Newcastle)

Part 2


Text
Streeter, V.L. and Wylie, E.B.
Fluid Mechanics 7th edn (McGraw-Hill 1979)

CHE229 LABORATORY

Corequisite CHE226

A set of experiments illustrating the fundamentals of fluid flow, heat and mass transfer.

Text
Holman, J.P.

CHE300 SELECTED TOPICS IN CHEMICAL ENGINEERING

This subject may only be taken by students requiring it for transition purposes.

Content
A topic in Chemical Engineering to be approved by the Head of Department.

CHE319

Part 3

Fuel types, their origin and characteristics. Combustion stoichiometry. The classification of coals, the comparison of Australian coals with those of the northern hemisphere, and allocation for combustion and conversion. Burners for solid, liquid and gaseous fuels. Brief outline of combustion mechanisms. Furnace efficiency and losses.

Text
Wall, T.F. (ed)
Coal Properties, Analysis and Effective Use (Institute of Coal Research 1982)

Part 4

Principles and current technology and fundamentals in the process metallurgy of ferrous and non-ferrous metals.

Text
Gichtist, J.D.
Fuels, Refractories and Furnaces 2nd edn (Pergamon)

CHE222 FLUID MECHANICS

This subject is only available in 1989 to students requiring it for transition purposes.

Prerequisites: Mathematics I, Physics I A or IB


56

CHE3239

5 CHE335 TRANSFER PROCESSES II

Prerequisites: CHE226, Chemistry IIC, EMSCO

Part 1


Part 2


Texts
McCabe, W.L. and Smith, J.C.
Unit Operations of Chemical Engineering (McGraw-Hill 1983)

Shaw, D.C.
Introduction to Colloid and Surface Chemistry (Butterworth 1980)

Part 3

Heat and mass transfer in unsteady state conditions, transport theory for heat and mass transfer in laminar and turbulent flow conditions; mass transfer with chemical reaction.

Text
Bird, R.B., Stewart, W.E. and Lightfoot E.N.
Transport Phenomena (Wiley 1960)

CHE321 SOLIDS HANDLING AND MINERALS PROCESSING

This subject is only available in 1989 to students requiring it for transition purposes.

Prerequisite: CHE272

513234 CHE373 FURNACE HEAT TRANSFER
Prerequisite CHE262
Furnace type and uses; high temperature transfer mechanisms. Generalised model of furnace efficiency and losses. Convective heat transfer on large surfaces, from impinging jets; heat transfer in packed beds. Conductive thermal storage losses. Radiative exchange between surfaces; exchange areas.

513241 CHE374 THEORY OF METALLURGICAL PROCESSES
Prerequisite CHE262 and Permission of Head of Department

513242 CHE383 MODELLING OF PROCESSES
Assumed Knowledge EM2CO, EM2BD, CHE242 and CHE262
An introduction to the unsteady-state behaviour of chemical plant and modelling of selected processes. Revision of Laplace transformations, transfer-function concepts, unsteady-state material and energy balances as a technique for system modelling, first order systems, second order systems, extraction, response to disturbances - modelling of steam jacketed reactor, gas absorber and simple heat exchanger. The principles of process control instrumentation, applied to flow, temperature, pressure, liquid level, etc. measurement, with laboratory experiments. Sample data methods, the z-transform.

513246 CHE391 LABORATORY
Corequisites CHE355 and CHE363
A number of open-minded investigations illustrating Year III lecture topics, including experiments on instrumentation and control of process plant.

514125 CHE434 PROCESS EVALUATION AND OPTIMIZATION
Prerequisites CHE343, CHE355 and CHE363
An extension of Process Analysis II into optimisation and comparative evaluation of processes.

514132 CHE436 ENVIRONMENTAL CONTROL
This subject is only available in 1989 to students requiring it for transition purposes.
Prerequisites CHE362, CHE371

514149 CHE463 SAFETY AND ENVIRONMENT
CHE343, CHE355

514127 CHE471 INDUSTRIAL SAFETY
Prerequisite CHE351

514130 CHE474 SELECTED TOPICS IN HEAT AND MASS TRANSFER
Prerequisite CHE355
An extension of studies in CHE355 Part 2 into practical applications.

514131 CHE475 ADVANCED COMBUSTION
Prerequisites CHE372 and CHE373
An extension of Fuel Technology I into current practices.

514132 CHE476 FLUID AND PARTICLE MECHANICS
Prerequisite CHE355
An extension of theoretical aspects of fluid-particle systems.

514133 CHE481 ADVANCED COMPUTATIONS
Prerequisite CHE242
Assumed Knowledge CHE383
The modelling of particular systems using elements of various unit operations.

514135 CHE483 REACTION ENGINEERING
Prerequisite CHE371

514136 CHE484 ADVANCED REACTION ENGINEERING
CHE483
An in depth study of aspects of Reaction Engineering.
514137 1 unit
**CHE405 ADVANCED PROCESS CONTROL**
Prerequisite EM2CO, CHE383
Corequisite CHE406
A detailed study of process control within Chemical Engineering unit operations.

514150 2 units
**CHE406 PROCESS CONTROL**
Prerequisite EM2CO

Text
Doebelin, E.O.  
*Control System Principles and Design*  
(Wiley Int.SEd. 1985)

or
Stephanopoulos, G.  
*Chemical Process Control*  
(Prentice-Hall Int.Ed. 1984)

514138 2 units
**CHE490 DESIGN PROJECT**
Prerequisite All Year III subjects
Preparation of a design report for a specified plant for chemical production, including mass and energy balances, preparation of process flow diagrams, and the detailed design of one or more items of equipment, or equivalent. In addition to the report, students are required to take a two-day design paper.

514139 1 unit
**CHE491 SEMINAR**
Prerequisite All Year III subjects
Regular two-hour seminar sessions will be held during the year for discussion of literature reviews, chemical engineering practice and research within the department. Each student will present not less than two half-hour papers in the course of the year.

514140 3 units
**CHE492 RESEARCH PROJECT**
Prerequisite All Year III subjects
An assigned task of experimental investigation, or the design, construction and testing of experimental equipment to be reported formally in a thesis.

514143 3 units
**CHE493 DESIGN PROJECT**
Prerequisite All Year III subjects
Preparation of a design report for a specified plant for chemical production, including mass and energy balances, preparation of process flow diagrams, and the detailed design of one or more items of equipment, or equivalent. In addition to the report, students are required to take a design paper.

514144 2 units
**CHE494 LABORATORY PROJECT**
Prerequisite All Year III subjects
A minor experimental investigation of a nominated project.

514145 2 units
**CHE495 DESIGN PROJECT**
Prerequisite All Year III subjects
A minor design report of a nominated small chemical factory.

514146 4 units
**CHE496 RESEARCH PROJECT**
Prerequisite All Year III subjects
An assigned task of experimental investigation, or the design, construction and testing of experimental equipment to be reported formally in a thesis.

514147 4 units
**CHE497 DESIGN PROJECT**
Prerequisite All Year III subjects
Preparation of a design report for a specified plant for chemical production, including mass and energy balances, preparation of process flow diagrams, and the detailed design of one or more items of equipment, or equivalent.

510157 2 units
**CHE511 COAL COMBUSTION**
The course will cover the current understanding of the principles of coal combustion, including some properties and classification, combustion calculations, devolatilisation, ignition, burn-out of char. Emphasis will be given to coal mineral reactions in furnaces and the relation with ash formation, deposition, ash collection, SOx emissions, and trace elements; the relationship between nitrogen and NOx emissions; spontaneous combustion. These principles will finally be used to evaluate the present laboratory techniques for characterising coal.

510158 2 units
**CHE512 COAL TECHNOLOGY**
The course will cover the existing technologies associated with coal use, particularly those for coal fired plant. Topics covered may include: an introduction to coal geology and mining; coal transport, handling and storage; pulverizing mills; boilers and furnaces; slagging, fouling, erosion, corrosion; ash collection, NOx and SOx; ash handling. An outline of developing firing techniques such as airflow firing, fluidised bed and clean up for gases and solids will also be given.

510159 2 units
**CHE513 FURNACE TECHNOLOGY**
Furnace construction and refractories. Heat balances and efficiency. The importance of convection and radiative transfer. The treatment of radiation in furnaces, emitters in coal fired furnaces, surface emissivities and the thermal conductivity or ash layers. The use of the well-mixed furnace model in quantifying the effects of fuel changes (from oil to gas and coal) and operational changes. An introduction to the zone method of analysis. Flames and jets, entrainment and mixing, swirled jets. The modelling of flame processes and furnace heat transfer.
Civil Engineering Subject Descriptions

INDUSTRIAL EXPERIENCE

S21092 C8992 1 unit
S21093 C8993 1 unit
S21094 C8994 1 unit
S21095 C8995 1 unit

Prerequisite: Part-time enrolment

These subject units are designed to formalise the Industrial Experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students will also be required to present a report giving a connected account and critical evaluation of their engineering activities and experience during the year. Each unit may be counted by part-time students as electives. (See Section 4 of this Handbook.)

S21105 1 unit

CE111 MECHANICS AND STRUCTURES

Introduction to the behaviour of structures. Statics; forces as vectors, resultant, equilibrium in two dimensions. Beams, trusses; method of joints, method of sections. Statical determinacy. Compatibility, properties of sections, stress, strain, Mohr’s circle. Columns; stability, Euler’s formula. Texts

Atkins, K.J. et al Mechanics and Structures (Science Press)

Atkins, K.J. Teaching Programmes in Mechanics and Structures (Science Press)

Atkins, K.J. and Darvell, P. Mechanics and Structures: Worked Problems (Science Press)

S22113 1 unit

CE212 MECHANICS OF SOLIDS

Prerequisite: CE111

Assumed Knowledge Mathematics I (or IS)

Revised stress and strain, extension of bars. Simple statically indeterminate problems, thermal stresses, superposition, strain energy, nonlinear deformation in axially loaded bars. Thin shells subject to internal pressure, Mohr’s circle of stresses. Shear strain, generalised stress-strain relations. Axial force, shear force and bending moment diagrams in beams and statically determinate frames. Revisit geometrical properties of planes figures, Bending stresses and strains, shear stresses in beams, deflection of beams. Shear centre of open thin walled sections, torsion of circular sections, combined stress, failure criteria. Column stability.

S22114 1 unit

CE213 THEORY OF STRUCTURES I

Prerequisite: CE111

Assumed Knowledge Mathematics I (or IS)

Revised redundancy, stable and unstable structures. Simple 62

S2333 2 units

CE302 CIVIL ENGINEERING III

This subject is only available with the permission of the Head of Department for Surveying students requiring it for transition purposes.

Assumed Knowledge CE201


Giles, R.Y. Fluid Mechanics and Hydraulics 2nd edn (Schaum 1962)

S2334 1 unit

CE314 THEORY OF STRUCTURES II

Prerequisite: CE213

Assumed Knowledge CE212


S2335 2 units

CE315 STRUCTURAL DESIGN

Prerequisite: CE212

Assumed Knowledge CE213

Loads and loading combinations. The design process, conceptual design. The design of reinforced concrete and steel members and connections.

Text


S2336 1 unit

CE333 FLUID MECHANICS III

Prerequisite: CE231

Assumed Knowledge CE232


S2334 1 unit

CE334 OPEN CHANNEL HYDRAULICS

Prerequisite: CE231

Corequisite: CE333

Assumed Knowledge CE232


Text

Henderson, F.M. Open Channel Flow (Pitman 1988)
SECTION SIX

CIVIL ENGINEERING SUBJECT DESCRIPTIONS

523115
CE341 HYDROLOGY
Corequisites CE323, CE331

523119
CE351 CIVIL ENGINEERING SYSTEMS
Prerequisite EM2CO
General introduction to the systems approach. Economics of large civil engineering projects in the public domain. Mathematical modelling, mathematical programming techniques, networks, CPM. Examples in civil engineering practice.

523108
CE372 TRANSPORTATION ENGINEERING
Elements of regional planning, land-use/transport interactions; transportation modes and system characteristics; transportation demand estimates, data collection; traffic engineering; highway engineering; driver, vehicle and road characteristics, road geometric; road construction, drainage, pavements, maintenance.
Texts
Lay, M.G.
Source Book for Australian Roads (Australian Road Research Board)
Inservice Guide to Geometric Design of Rural Roads (NAASRA 1980)

523116
CE381 STATISTICAL METHODS
Prerequisite EM2CO
Assumed Knowledge GE204 or SV212

524065
CE417 THEORY OF STRUCTURES III
Assumed Knowledge CE314, CE315, CE316
Plastic analysis of frames. Lower bound design, main code requirements, plastic stability. Yield line analysis of slabs, strip method of design, flat slab systems. Retaining walls. Basic design of prestressed concrete structures.

524073
CE418 MASONRY AND TIMBER DESIGN
Assumed Knowledge CE314, CE315
The properties and behaviour of masonry and its components. The design of masonry structures including recent developments in high rise construction. The properties and behaviour of timber. The design of timber structures.

524074
CE419 DYNAMICS AND STABILITY OF STRUCTURES
Assumed Knowledge CE314

524066
CE426 GEOTECHNICAL ENGINEERING
Assumed Knowledge CE324
Site investigation, design of shallow foundations, piled foundations, soil improvement, design of embankments, cuttings, earth dams, buried pipes.
Text
Bowles, J.E.

524075
CE427 ROCK MECHANICS
Assumed Knowledge CE324
Index properties and classification, rock strength and failure criteria, deformation of rocks, in situ stress, planes of weakness, foundations on rock, underground openings, rock slopes.

524076
CE435 RIVER AND COASTAL ENGINEERING
Assumed Knowledge CE334
Text
Henderson, F.M.
Open Channel Flow (Collier-Macmillan, 1966)

524068
CE442 PUBLIC HEALTH ENGINEERING
Assumed Knowledge Chemistry IS
Elements of microbiology; self-purification of natural waters; water quality management; municipal water supply and sewage systems.

524067
CE443 WATER RESOURCES ENGINEERING
Assumed Knowledge CE314, CE315
This course covers several areas of applied water resources engineering emphasizing synthesis of basic principles and design. Urban drainage: layout and design, runoff routing, retaining basins. Flood management: mitigation schemes. Water supply systems: objectives, economics, stochastic behaviour, design, operation, modelling.

524069
CE452 CIVIL ENGINEERING MANAGEMENT
Management: construction company failures and the need for efficient management; principles of management, management functions and techniques; nature and type of organisational structures. Industrial relations and law. Administration: costing; estimating; engineering contracts; drawings and specifications; tendering. Project Planning and Control: planning; constructing and analysing networks; resource levelling; cost minimization; presentation of information; control.

524070
CE453 CIVIL ENGINEERING CONSTRUCTION
Construction Plant: classification, selection and use of plant; plant organisation; plant cost, purchase or hire; site establishment and temporary works. Construction Methods and Equipment: earthmoving; drilling and blasting; concrete; foundation drilling; piling; bridge and building construction.
Text
Antill, J.M. and Ryan, P.W.S.
Civil Engineering Construction (Angus and Robertson, 1973)

524071
CE454 CIVIL ENGINEERING DESIGN
Prerequisite All Year III subjects
Examples of Civil Engineering design in steel and concrete structures, geomechanics and water resource systems. Visits to works of interest. Interaction with other professions; regulatory authorities and practising engineers.

524072
CE455 PROJECT
Prerequisite All Year III subjects
Literature review, analytical and/or experimental investigation of one or more civil engineering design problems. Presentation of seminar.

524079
CE456 PROJECT
Prerequisite All Year III subjects
In exceptional circumstances and with the permission of the Head of the Department of Civil Engineering and Surveying a four unit project may be taken in lieu of CE454 Civil Engineering Design and CE455 Project. The nature of the investigation will depend upon the topic.

524080
CE473 ENGINEERING SURVEYING II
Prerequisite SV111 (or CE171)
Precise levelling, trigonometric levelling, barometric levelling, single-second theodolites, approximate adjustment of plane triangulations.
Text
Frey, J.G. and Elfrick, M.H.
Elementary Surveying SI (Harper and Row 1986)

524077
CE474 HIGHWAY ENGINEERING
Assumed Knowledge CE372
Structure of road pavements; failure modes; pavement design methods. Material requirements, strength, strain at failure, fatigue, skid resistance. Testing of materials, subgrade, granular and stabilized bases, bituminous materials.
Texts
Lay, M.G.
Source Book for Australian Roads (Australian Road Research Board)
NAASRA
Guide to the Structural Design of Road Pavements

524078
CE482 FINITE ELEMENT METHODS
Prerequisites GE204, GE205
Introduction to the finite element method. Emphasis on the generality of the technique. Topics covered include Lagrange interpolation, numerical integration, solution to linear equations, truss elements, beam elements, 2-dimensional solid elements and the solution of fluid problems. Theory is reinforced by programming assignments which use the NAG finite element library.

524048
CE490 SPECIAL TOPIC

524049
CE491 SPECIAL TOPIC
SECTION SIX
ELECTRICAL AND COMPUTER ENGINEERING SUBJECT DESCRIPTIONS

Electrical and Computer Engineering Subject Descriptions

INDUSTRIAL EXPERIENCE

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Description</th>
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<td>531306</td>
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<td>1 unit</td>
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</table>

Prerequisite: Part-Time Enrolment

These subject units are designed to formalise periods of industrial experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students will also be required to present a report giving a connected account and critical evaluation of their engineering activities and experience during the year. Such units may be counted by part-time students as electives. (See Section 4 of this Handbook).

EE107

INDUSTRIAL EXPERIENCE II

Prerequisite: Permission of Head of Department

This 2-unit elective is available to "sandwich" course students only. The student must be in appropriate full-time employment for one calendar year from 1st July in the year preceding enrolment to 30th June in the year of enrolment. A diary must be kept, a seminar presented, and a detailed report submitted to the student’s adviser. The report must indicate that the student has been engaged in a major engineering project.

EE108

ELECTRICAL AND COMPUTER ENGINEERING I

Enrolment is limited to students enrolled in the BE programmes in Computer Engineering, Electrical Engineering, Industrial Engineering and Mechanical Engineering.

Electrical and Computer Engineering I is an introductory course in electrical circuits and digital systems. The lectures are supported by tutorials and extensive laboratory work. The laboratory component includes an introduction to oscilloscopes, function generators, electronic power supplies and other laboratory instruments.

Part 1


Part 2


Texts

Karni, S. Applied Circuit Analysis (Wiley 1988)

EE200

ELECTRICAL AND COMPUTER ENGINEERING II

Prerequisite EE100 and Mathematics I (or 102)

Assumed Knowledge: Physics IIA

The fundamental concepts of electrical engineering are expounded. The subject builds on and expands the year 1 circuits topics. The student is also introduced to semiconductor devices, which form the basis of future courses in electronics, and to electro-mechanical energy conversion principles which form the basis of future power courses.

Part 1


Part 2


Part 3


Texts

Weedy, B.M. Electrical Power Systems (John Wiley)
Weedy, B.M. Electrical Power Systems (John Wiley)

EE301

POWER SYSTEMS

This subject is only available in to Electrical or Computer Engineering students requiring it for transition purposes.

Prerequisite EE221

Structure of electrical power systems, energy sources; the synchronous machine; transmission lines; surge phenomena; switchgear; watt and VAR flow control; substations and control rooms; distribution systems; reliability.

Texts

Weedy, B.M. Electrical Power Systems (John Wiley)

EE302

ELECTRICAL MACHINES

This subject is only available in to Electrical or Computer Engineering students requiring it for transition purposes.

Prerequisite EE211


Texts

Elliott, H. Machines - Course notes

EE303

POWER ELECTRONICS

This course is only available to Electrical or Computer Engineering students requiring it for transition purposes.

Prerequisite EE232

Power supplies, voltage regulators, power devices - JT’s Mos Fets, SCR’s and Triacs (device limitations and protection). Converter topologies and analysis. Inverter topologies and analysis.

EE304

ELECTRONICS

Prerequisite EE200

This course will consist of approximately 65 hours of lectures, 40 hours of laboratory and 15 hours of tutorials. The course consists of three topics.

Topical: EE315

Discrete Component Electronics. Material covered will include: FET and BJT switching circuits, amplifier circuits, current sources, matched devices, introduction to amplifier frequency response.

Topical: EE316


Texts

Mitchell, P.H. and Mitchell, F.H. Introduction to Electronics Design (Prentice-Hall 1988)
SECTION SIX

ELECTRICAL AND COMPUTER ENGINEERING SUBJECT DESCRIPTIONS

533118 1 unit
EE324 LINEAR ELECTRONICS II
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Prerequisite EE323
Text
Mitchell, F.H. and Mitchell, F.H.
Introduction to Electronics Design (Prentice-Hall 1988)

533119 1 unit
EE326 DIGITAL DESIGN AND TECHNOLOGY
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Prerequisite EE362 or consent of instructor

533133 1 unit
EE344 COMMUNICATIONS
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Prerequisites EE323 and Maths IIA
Spectral Analysis; Random Signals and Noise; Fundamentals of Analog Signal Processing; Amplitude modulation, frequency modulation, phase modulation, pulse modulation; Noise in communications systems; Analysis of commercial communications systems: AM and FM radio, colour television.
Text
Stember, F.G.
Introduction to Communication Systems 2nd edn (Addison-Wesley 1982)

633222 1 unit
EE362 SWITCHING THEORY AND LOGIC DESIGN
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Prerequisite EE364 or consent of instructor
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, race and hazards. Logic subsystems: registers, adders, counters, converters, coders, etc. Basic architecture of digital computers.

GENERAL INFORMATION

Principal Dates 1989
(See separate entry for Faculty of Medicine)

January
1 Monday Public Holiday — New Year's Day
6 Tuesday Last day for return of Applications for Re-Enrolment Forms — Continuing Students
9 Monday Deferred Examinations begin
10 Tuesday Deferred Examinations end

February
3 Wednesday
10 TO New student's term in person to enrol and pay charges
21 TO
5 Friday
16 Tuesday
23 Tuesday Late enrolment session for new students
24 Friday Late enrolment session for continuing students
27 Thursday First semester begins
31 Saturday Easter weekend

March
24 Friday Good Friday — Easter Recess commences

April
5 Monday Lectures resume
9 Monday Examinations begin
16 Monday Last day for withdrawal without academic penalty from first semester subjects (See page (ii) for Dean's discretion)
23 Tuesday Public Holiday — Anzac Day

May
1 Monday Lectures resume
8 Monday Examinations begin
15 Monday Public Holiday — Queen's Birthday
22 Monday Examinations end
28 Friday Closing date for applications for selection to the Bachelor of Medicine and the Diploma in Aviation Science courses in 1990

June
1 Monday Second Semester begins
15 Monday Last day for withdrawal without academic penalty from full year subjects (See page (ii) for Dean's discretion)

July
22 Monday Last day for withdrawal without academic penalty from first semester subjects (See page (ii) for Dean's discretion)

August
5 Thursday Mid-semester break begins

September
1 Monday Labour Day
9 Monday Lectures resume
16 Monday Deferred Examinations end
24 Monday Annual Examinations begin
30 Monday Public Holiday — Australia Day

October
1 Monday Public Holiday — Labor Day
9 Monday Lectures resume
27 Friday Second semester ends

November
5 Monday Annual Examinations begin
12 Monday Annual Examinations end

December
5 Monday First Term begins

TERM DATES FOR THE BACHELOR OF MEDICINE PROGRAMME: 1989

Year 1
Term 1 Jan 20 — May 5
11 weeks: 10 week term
1 week AVVC vacation 27/5/89
1 week examination period 31/5/89

Term 2 May 8 — Aug 4
11 weeks: 9 week term
1 week vacation 3/7/89
1 week examination period 31/7/89
1 week consolidation 23/8/89

Term 3 Aug 7 — Dec 27
11 weeks: 9 week term
1 week AVVC vacation 25/9/89
1 week examination period 31/10/89
1 week consolidation 2/11/89
1 week consolidation 23/11/89

Note: Date not fixed.
LOANS
Students who do not have sufficient funds to pay charges should seek a loan from their bank, building society, credit union or other financial institution. Applications for a loan from the Student Loan Fund should be made to Mr. J. Birch, Student Administration Office. Arrangements should be made well in advance to avoid the risk of a late charge.

REFUND OF CHARGES
A refund of the General Services Charge paid on enrolment or part thereof will be made when the student notifies the Student and Faculty Administration Office of a complete withdrawal from studies by the following date:
- Notice on or before 24th February 1989: 100% refund
- Notice on or before 10th March 1989: 90% refund
- Notice on or before 23rd June 1989: 50% refund
After 23rd June 1989: No refund.
A refund cheque will be mailed to a student or if applicable to a sponsor. Any change of address must be advised.
A refund will not be made before 31 March 1989.

HIGHER DEGREE CANDIDATES
Higher degree candidates are required to pay the General Services charge and Union Entrance charge, if applicable. Where the enrolment is effective from First or Second Semester, the General Services charge covers the period from the first day of the term to the Friday immediately preceding the first day of First Term in the following academic year. Where enrolment is 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.

SECTION SIX
LECTURES AND ELECTRICAL AND COMPUTER ENGINEERING SUBJECT DESCRIPTIONS

Lectures will be supplemented by practical assignments on logic trainers and some tutorial sessions.

Text
Mano, M.M.
Digital Design (Prentice-Hall 1984)

533170
4 units

E8370 COMPUTER ENGINEERING II
Pre-requisite EE100
A course of lectures and practical exercises on the hardware and software aspects of computer systems design, with particular emphasis on microprocessor systems.

For 1987 the course will be taught in four sections:
(a) Logic design & computer architecture (EE362)
(b) Multiprogramming and operating systems (EE463)
(c) Digital design (EE262)
(d) Microprocessor interfacing & assembly language (EE325)

Texts
Mayhew, P.J.
Assembly Language for Engineers (Ellis Horwood 1987)
Mano, M.M.
Digital Design (Prentice-Hall 1984)

533288
1 unit

E8390 PROJECT/DIRECTED READING
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Pre-requisite Written permission of the Head of Department.
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.

534152
2 units

EE410 ADVANCED POWER AND MACHINES
Pre-requisite EE310
The subject comprises 2 advanced topics in power engineering.
The lectures are supplemented by laboratory work and tutorials.

Topic A: Power Systems
Power flow analysis, economic dispatch; fault calculations; synchronous machine transients; protection; automatic generation control; power system stability; system expansion studies.

Topic B (EE417)
Application of converters and choppers to d.c. machine drive systems; Performance analysis of d.c. machines under transient conditions. Control systems for variable speed d.c. drives. Application of cycloconverters and inverters to a.c. machine drives. Performance analysis of a.c. machines under transient conditions. Control systems for variable speed a.c. drives.

Text
Bergen, A. R.
Power System Analysis (Prentice-Hall 1986)

531449
1 unit

EE413 POWER SYSTEM ANALYSIS AND OPERATION
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Pre-requisite EE313
Power flow analysis, economic dispatch; fault calculations; synchronous machine transients; protection; automatic generation control; power system stability; system expansion studies.

Text
Bergen, A. R.
Power System Analysis (Prentice-Hall 1986)

534146
1 unit

EE417 VARIABLE SPEED DRIVE SYSTEMS
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Pre-requisite EE315
Application of converters and choppers to d.c. machine drive systems; Performance analysis of d.c. machines under transient conditions. Control systems for variable speed d.c. drives. Application of cycloconverters and inverters to a.c. machine drives. Performance analysis of a.c. machines under transient conditions. Control systems for variable speed a.c. drives.

534153
2 units

EE420 ADVANCED ELECTRONICS
Pre-requisite EE320
This course consists of approximately 55 hours of lectures and 25 hours of laboratories.

Topic A (EE421)
Advanced Amp. circuits, instrumentation amplifiers, noise and interference in electronic circuits, shielding and grounding, high speed circuits and techniques.

Topic B (EE422)
Broadband amplifiers, Narrowband amplifiers, i, y, h and s parameters, oscillators, phase locked loops, f o V and V to f converters, Analog multiplexers, A-D Converters, D-A Converters.

Texts
Horowitz & Hill
The Art of Electronics (Cambridge University Press)

534109
1 unit

EE421 ELECTRONIC DESIGN A
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes.
Pre-requisite EE323
Advanced Amp. circuits, instrumentation amplifiers, noise and interference in electronic circuits, shielding and grounding, high speed circuits and techniques.

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SECTION SIX

ELECTRICAL AND COMPUTER ENGINEERING SUBJECT DESCRIPTIONS

Text
Horowitz & Hill
The Art of Electronics (Cambridge University Press)

EE3418 1 unit

EE447 DIGITAL COMMUNICATIONS
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes. Prerequisite EE344 or Consent of Instructor
Fundamentals of information theory and channel capacity, baseband data transmission, digital carrier modulation, quantisation schemes, pulse code modulation, timing recovery, matched filters, equalisation, error control coding, local area networks, satellite communications, fibre optic transmission.

EE450 ADVANCED COMMUNICATIONS
Prerequisite EE350
This subject covers three main areas: Filtering, classical filter design. Filter approximations, passive and active analogue filter synthesis. Switched capacitor filters, matched filters. Finite and infinite impulse response digital systems.
Digital communications, information theory and channel capacity, Baseband data transmission, Digital carrier modulation, Linear and non-linear quantisation, Pulse code modulation, Error control coding, Satellite communications. Fibre optic transmission.
The subject consists of lectures, laboratories and assignments, with the emphasis on implementation and realisation of relevant digital processes.

EE451 ELECTROMAGNETIC PROPAGATION AND ANTENNAS
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes. Prerequisite Ph221 and Mathematics 1A
Revision of Maxwell's equations. Solutions to various media, reflection, refraction, partial reflection, Power flow theory. Antennas and wave propagation, Free space and guided wave propagation including coaxial, waveguide and strip line configurations. Electromagnetic sources and potential functions, radiation and elementary antenna theory. Techniques for obtaining the surface current distribution on an arbitrary antenna by analytical and computational methods. Solutions of potential equations, near and far field distributions. Characteristics of common antenna configurations including primary source, wire antennas, antenna arrays and secondary source antennas. Ground wave and tropospheric propagation.

EE452 ELECTRONIC DESIGN B
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes. Prerequisite EE323

EE462 ADVANCED DIGITAL SYSTEMS
This subject is only available to Electrical or Computer Engineering students requiring it for transition purposes. Prerequisite EE360
Computer architecture covering parallel computing, multiprocessor architectures, and interconnection techniques.

EE470 COMPUTER SYSTEMS
Prerequisite EE370
A course consisting of 84 hours of lectures, tutorials and laboratory work covering the design and real-time system design. Multiprocessor architecture and system design. The course is divided into two main topics as follows:
Topic A: (EE470)
Computer architecture covering parallel computing, multiprocessor architectures and interconnection techniques.
Topic B: (EE351)
Real-time systems design which is a laboratory based component dealing with the interrelationship between hardware and software in real-time systems.
Topic C: (EE352)
Introduction to large scale integrated circuit design.

EE511 ADVANCED POWER SYSTEMS
Prerequisite EE310
A selection of the following subjects will be offered each year subject to adequate enrollments.

EE512 VARIABLE SPEED DRIVE SYSTEMS
Prerequisite EE310
As for EE410 Topic B with additional material.

EE513 VLSI AND DESIGN AUTOMATION
Prerequisite EE310
Advanced digital design techniques with particular emphasis on VLSI.

EE541 COMPUTER CONTROL THEORY
Prerequisite EE341
As for EE410 Topic B with additional material.

EE551 COMPUTER ENGINEERING PROJECT
Prerequisite Completion of all Year III subjects in the Computer Engineering Course.
The final year project for Computer Engineering students. Usually consisting of literature survey, and review, analytical and/or experimental investigation of an electrical engineering problem. Two (2) copies of the Project Report are required.

LIST OF EE560-600 SUBJECTS
A limited selection of the following subjects will be offered each year subject to adequate enrollments.

EE563 ELECTRICAL AND COMPUTER ENGINEERING PROJECT
Prerequisite Completion of all Year III subjects in the Electrical Engineering Course.
The final year project for Electrical Engineering students. Usually consisting of literature survey, and review, analytical and/or experimental investigation of an electrical engineering problem. Two (2) copies of the Project Report are required.
530120  1 unit
EE543  OPTIMIZATION TECHNIQUES
Assumed knowledge Mathematics IIA
Nonlinear programming, convex optimization theory, optimal control.
Text
Luenberger, D.

530152  1 unit
EE544  LINEAR SYSTEMS THEORY
Assumed Knowledge EE440
Advanced treatment of multivariable linear systems from
frequency domain, matrix fraction, state-space and/or geometric
viewpoints.

530168  1 unit
EE545  NONLINEAR SYSTEMS ANALYSIS
Assumed Knowledge EE261
Basic techniques in nonlinear systems analysis: Lyapunov stability
theory, Gershgorin Lemma, input-output methods, oscillations,
singular perturbations.
Text
Vidyasagar, M.

530169  1 unit
EE546  TOPICS IN SYSTEM DESIGN
A topic oriented to students concerned with advanced design
rather than basic research.

530170  1 unit
EE547  TOPICS IN SYSTEM DESIGN
A topic oriented to students concerned with advanced design
rather than basic research.

530171  1 unit
EE551  DIGITAL COMMUNICATIONS
Assumed Knowledge EE350 Topic A
As for EE450 Topic A with additional material.

530172  1 unit
EE552  ADVANCED DIGITAL SIGNAL PROCESSING
Assumed Knowledge EE450 Topic B
Advanced techniques in recursive filter design: bandwidth,
ambiguity functions, two-dimensional imaging, array processing.

530173  2 units
EE560  COMPUTER SOFTWARE
Assumed Knowledge EE370
As for EE460 with additional material.

530174  2 units
EE570  COMPUTER SYSTEMS
Assumed Knowledge EE200
As for EE470 with additional material.

530135  2 units
EE580  PROJECT
Available to M.Eng.Sci students only.

530139  3 units
EE580  PROJECT
Available to M.Eng.Sci students only.

530161  4 units
EE580  PROJECT
Available to M.Eng.Sci students only.

530111  1 unit
EE590  SEMINAR
A series of seminars for research postgraduate students. Each
student will prepare approximately one seminar per semester.

530137  1 unit
EE591  SEMINAR
A series of seminars for research postgraduate students. Each
student will prepare approximately one seminar per semester.

530138  1 unit
EE592  SEMINAR
A series of seminars for research postgraduate students. Each
student will prepare approximately one seminar per semester.

530151  1 unit
EE542  ESTIMATION AND SYSTEM IDENTIFICATION
Prerequisite EE440
Models for systems, noise and disturbances. Estimators and their
properties, linear estimation including Kalman filtering. Output
and prediction error methods. Advanced topics.
Text
de Souza and Goodwin
Estimation and System Identification (to appear)

530175  1 unit
EE543  NONLINEAR CONTROL
Prerequisite EE544
Emphasizes modern theory for synthesis of controllers for
nonlinear multivariable systems.
Text
Nisoli, A.
Nonlinear Control Systems: An Introduction
(Springer-Verlag 1985).

530176  1 unit
EE564  INTERCONNECTED SYSTEM STABILITY THEORY
Prerequisite EE545
Dissipative system theory including Kalman-Yakubovich Lemma
and generalizations to nonlinear systems; input-output and
Lyapunov stability results; application to power systems, curcuits;
adaptive and optimal control.
Text
Hill, D.J. and Moylan, P.J.
Dissipativeness and Stability of Nonlinear Systems

530177  1 unit
EE545  ADVANCED TOPICS IN CONTROL
Variable content emphasizing recent developments.

530162  1 unit
EE561  COMPUTER NETWORKS
Assumed Knowledge EE350, EE370
Network architectures and topologies. Local network and
examples. Distributed operating systems.
Text
Tanenbaum, A.S.
Computer Networks (Prentice-Hall 1981)

530178  1 unit
EE562  ADVANCED TOPICS IN COMPUTERS
Variable content emphasizing recent developments.
SECTION SIX
GENERAL ENGINEERING SUBJECT DESCRIPTIONS

General Engineering Subject Descriptions

50103
1 unit: weight 0
GE5001 INTRODUCTION TO ENGINEERING
A course of lectures, seminars and plant visits intended to encourage an understanding of the role of the professional engineer in industry and society.

50102
1 unit
GE5101 INTRODUCTION TO MATERIALS SCIENCE
The course provides a general introduction to materials of engineering significance and to the relationships which exist between structures, properties and applications. The detailed treatment of various aspects is left to the later stages of the degree programme. The following sections are given approximately equal amounts of time and effort. Atomic bonding; atomic arrangements in metals, glasses and polycrystalline; the effects of stress and temperature on simple metals; the control of metallic structures by composition and thermal treatment; common metals of engineering importance; the structures and properties of ceramics and concrete products. Polymer, rubbers and woods; engineering applications for polymers; the mechanical testing of materials; composite material; the electrical, magnetic, optical and thermal properties of solid materials.

Text
Asteckland, D.R.
The Science and Engineering of Materials
(P.W.S. Publishers 1964)
or
Flinn, R.A. and Trojan, P.K.
Engineering Materials and Their Applications
2nd or 3rd edn. (Homerton, Millfin 1981)

52001
1 unit
GE5201 ENGINEERING COMPUTATIONS I
Prerequisite Mathematics I (or IS)
This course is concerned with computer programming, with particular emphasis on programming style. The use of terminals, files and editing techniques will be covered. Also some aspects of computer hardware and data handling will be considered. Some numerical analysis techniques will be discussed to provide examples for programming. These will include solution of single non-linear equations, interpolation and integration.

Text
Browne, L.W.B.
A FORTRAN Primer (Prentice-Hall 1982)
Rallfors, A. and Marwick, D.H.
Programming in Standard FORTRAN 77
(Heinemann 1979)
Handbook for VAX/VMS
(The University of Newcastle Computing Centre)

52002
1 unit
GE5202 ENGINEERING COMPUTATIONS II
Prerequisite Mathematics I (or IS), GE5201
This course is concerned with developing a student's ability to write computer programs that use numerical analysis techniques to solve problems in the engineering field. Some discussion of the theories behind the numerical analysis techniques is given but the main emphasis is on computing.

The programming work of Engineering Computations is intended to include some advanced Fortran programming techniques, the use of graph-plotting routines and the use of computer libraries such as the NAG library. Emphasis is placed on curve fitting to well-ordered data and on experimental data and the differentiation and integration of such data. Systems of equations, both linear and non-linear are considered. Other material covers the numerical solution of ordinary differential equations and partial differential equations.

Text
Gerard, C.F. and Wheatley, P.O.
Applied Numerical Analysis 3rd edn
(Addison-Wesley 1968)
Handbook for VAX/VMS (The University of Newcastle Computing Centre)

52003
1 unit
GE5206 COMPUTATIONAL METHODS I
This subject is only available in 1989 to students requiring it for transferral to another degree.

Prerequisite Mathematics I

This course is concerned with computer programming, with particular emphasis on programming style. The use of terminals, files and editing techniques will be covered. Also some aspects of computer hardware and data handling will be considered. Some numerical analysis techniques will be discussed to provide examples for programming. These will include solution of single non-linear equations, interpolation and integration.

Text
Handbook for VAX/VMS
(The University of Newcastle Computing Centre)
Chenery, W. and Kimclad, D.
Numerical Mathematics and Computing
(Brooks/Cole 1986)
Home, J.N.P. and Holt, R.C.
Programming in FORTRAN 77 (Keston Publishing Co. 1970)

52004
1 unit
GE5207 COMPUTATIONAL METHODS II
This subject is only available in 1989 to students requiring it for transferral purposes.

Prerequisite GE5206

This course is concerned with developing a student's ability to write and understand computer programs that use numerical analysis techniques to solve problems in engineering. An outline of the theories behind the numerical analysis techniques is given but the main emphasis is on computing.

Topics dealt with include: numerical solution of single ordinary differential equations by stepwise and multiple methods including Richardson extrapolation and stability convergence criteria systems of differential equations, "stiff" and stability; boundary value problems. Numerical solution of partial differential equations, the usual terminology. Explicit and implicit methods of computation; solution of elliptic equations by the grid inverse and relaxation methods. Solution of Hyperbolic equations by the grid method. Solution of Parabolic equations by explicit, implicit methods.

Text
Roberts, J.
Lecture Notes on Numerical Methods of Solving Ordinary Differential Equations and Partial Differential Equations
(Department of Chemical Engineering)

52005
1 unit
GE5211 THEORY AND APPLICATIONS OF ELECTRICAL ENERGY CONVERSION

Prerequisite EE1101 or EE1103
Discussion of Energy Conversion possibilities. Examination of typical Electrical supply systems; Magnetic Circuits; Transformers; Three Phase Power; Elementary Rotating Machines; Direct Current Machines; Induction Machines; Demonstration of DC Machines in Lab; Synchronous Machines; Electric Power Conversion and Control Systems.

52006
1 unit
GE5220 PRINCIPLES OF ELECTRICAL ENGINEERING
Students enrolled in the Computer, Electrical, Mechanical or Industrial Engineering programmes may not enrol in this subject.

A series of lectures and tutorials offered by the Department of Electrical and Computer Engineering as a service course for students enrolled in the Civil Engineering programme. Elementary circuit theory for reactive circuits. Introduction of load impedance and power. Transient response of RL and RC circuits. Extension of circuit theory to simple AC circuits. Overview of Electrical Machines.

52001
2 units
GE5301 TECHNOLOGY AND HUMAN VALUES I

A course of lectures and discussions focusing on the ethical, social, political and economic issues that arise in technological decisions. The course is presented in two parallel strands: Strand A is based on an examination of Australian energy policy. This example of decision making is used to develop an awareness of (i) how non-technical dimensions enter decisions and (ii) a systematic approach to public policy making.

Strand B complements Strand A by introducing a range of additional topics which enhance the association and deepen the treatment of specific features of decision making.

Text
Strand (Strand A)
Commens, B.
The Poverty of Power (Random 1977)
Dietzfelbinger, M. (ed)
Energy and People (Soc.Sci. Resp.Sci.)
Hawker, C.A. et al.
Energy and the Quality of Life
(University of Toronto Press 1981)
Sadler, H.
Energy in Australia (Geo. Allen and Unwin 1983)

Text
Strand (Strand B)
Brown, L.R.
The Twenty Ninth Day (W.W. Norton 1978)
Schumacher, E.F.
Small is Beautiful (Abacus 1974)
Teich, A.H. (ed)
Technology and Man's Future (St. Martin's Press 1977)

53002
2 units
GEM2 TECHNOLOGY AND HUMAN VALUES II
Corequisite GGHE21
A team project on the role of technical and value factors in technological decision making. Students will form small teams under staff leadership for a one-year intensive study of a specific example of technological decision making. The aim is to provide a comprehensive and accurate understanding of the interaction between technical and value factors in the decision. Each team will produce a report of a quality aimed at management/managerial discussion. Evaluation will be by the 'Team Report plus staff member's assessment of individual contributions. Example projects are Nuclear Electric Power for Australia, A Study of Technology Assessment. A wider variety of projects can be undertaken, selection by teams will occur during the first few weeks of term.

53003
1 unit
GE5325 MICROPROCESSOR SYSTEMS AND APPLICATIONS

Text
Moylan, P.J.
Assembly Language for Engineers (Ellis Horwood 1987)

53006
2 units
GEM4 AUTOMATIC CONTROL
Prerequisite Mathematics IIA or EM2COO
GENARAL ENGINEERING SUBJECT DESCRIPTIONS


Text
Doebelin, B.O.
Control System Principles and Design
(William Int. Ed. 1982)
or
Stephanopoulos, G.
Chemical Process Control (Prentice-Hall Int. Ed. 1984)

500102
1 unit
GES02 COAL ANALYSIS AND PROPERTIES
Coal formation and geology, classification, analysis and testing. The basis for presentation of analysis results. Analysis of coal minerals. Coal and mineral reactions at high temperature. The effect of coal properties on its utilisation.

500103
2 units
GES03 MINERAL MATTER IN COAL
Prerequisite: A first course in coal properties
Typical composition and origins of the mineral matter in coal. Analytical methods for the analysis and characterisation of the inorganic matter in coal.
Examination of a number of coal applications in which minerals and inorganics determine successful usage and aspects of coal preparation and clean-up. Depending on interest this may include: grindability, furnace fouling, fly ash collection, NOx and SOx emissions, material aspects (including refractory).

500104
2 units
GES04 COAL PREPARATION
Prerequisite: A first course in coal properties
The principles of particle sizing, crushing, washability and separation techniques. Analysis of the unit operations of coal preparation such as jig washing, dense medium, cyclones and flotation.
Flow sheeting of washers, plant control, optimisation and computer modelling.

500105
2 units
GES05 METALLURGICAL ASPECTS OF COAL UTILISATION
Content: To be advised.

MATERIALS ENGINEERING SUBJECT DESCRIPTIONS

Materials Engineering Subject Descriptions

**INDUSTRIAL EXPERIENCE**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>51003</td>
<td>Mat003</td>
<td>1 unit</td>
</tr>
<tr>
<td>51004</td>
<td>Mat004</td>
<td>1 unit</td>
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<td>51005</td>
<td>Mat005</td>
<td>1 unit</td>
</tr>
<tr>
<td>51006</td>
<td>Mat006</td>
<td>1 unit</td>
</tr>
</tbody>
</table>

These subjects are designed to formalise periods of Industrial Experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students will also be required to present a report giving a connected account and critical evaluation of their engineering activities and experience during the year. Such units may be counted by part-time students as electives (See Section 4 of this Handbook).

**PROPERTIES OF MATERIALS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>52002</td>
<td>Mat202</td>
<td>1 unit</td>
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</tbody>
</table>

Assumed Knowledge GE151


**STATE OF MATERIALS**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>52006</td>
<td>Mat203</td>
<td>1 unit</td>
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</tbody>
</table>

Assumed knowledge GE151

A description of the equilibrium state of materials and the consequences of finite temperatures and non-equilibrium states. Phase diagrams, the structures of phases and the generation of microstructure. Atomic transport in the solid state. Diffusive and non-diffusive solid state transformations.

**EXAMINATION OF MATERIALS**

<table>
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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>52004</td>
<td>Mat204</td>
<td>1 unit</td>
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</table>

Assumed knowledge GE151

An introduction to the techniques for the examination of materials, the physical basis of the techniques and the representation of results. The microscope, the electron microscope and elemental stereology. The production of x-rays, x-ray fluorescence and x-ray diffraction, the identification and measurement of elements and compounds present. Introductory crystallography and the representation of crystallographic information.

**MATERIALS ENGINEERING LABORATORY**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
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<tr>
<td>52005</td>
<td>Mat205</td>
<td>3 units</td>
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</table>

A laboratory course to complement the theory in Mat202, Mat203 and Mat204. Includes practical microscopy, electron microscopy, x-ray diffraction and experiments on the deformation and mechanical properties of materials.

Text To be advised

634112 1 unit

Mat412 FAILURE OF MATERIALS IN MECHANICAL DESIGN

Pre-requisites: GE151, Mat211


Text To be advised

634113 1 unit

Mat413 MECHANICAL AND PHYSICAL PROPERTIES OF METALS

Pre-requisites: GE151, Mat211

Mechanical properties of engineering alloys. Some topics from physical metallurgy. Phase transformations.

Text To be advised

634491 1 unit

Mat491 SEMINAR

Students will be expected to present seminars on topics in the area of Materials Engineering.

634496 4 units

Mat496 RESEARCH PROJECT

A theoretical and/or experimental investigation into some aspect of Materials Engineering. The results of the investigation are to be presented in a formal report.

634497 4 units

Mat497 DESIGN PROJECT

An in-depth study of the route to the manufacture of a specific product. The study will include an examination of alternative materials and alternative production methods.

Mechanical Engineering Subject Descriptions

INDUSTRIAL EXPERIENCE

541302 ME4092 1 unit
541303 ME4093 1 unit
541304 ME4094 1 unit

Prerequisite: Part-time Emulation

These subject units are designed to formalise periods of industrial experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students who wish to study any or all of the Industrial Experience units ME4092-94 will be required to attend nominated 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 their engineering activities and experience during the year. Such units may be used by students in lieu of electives.

541307 ME4097 2 units
544308 ME4098 2 units

Prerequisite: Permission of Head of Department

As above except that each of ME4097-8 is the equivalent of two units. These Industrial Experience units are available to sandwich course students only and are designed to cover Industrial Experience gained over two years.

541104 1 unit

ME411 GRAPHICS AND ENGINEERING DRAWING

A study in communication methods and visualisation by pictorial means. Review of drafting types. Method of projection including orthographic, axonometric and perspective in both structured and freehand modes. Sectioning, dimensioning and use of standards and symbolism in engineering pictorial communication. Developments, true shapes and intersection of entities.


542296 1 unit

ME301 EXPERIMENTAL METHODS I

Only available to students who completed ME203 prior to 1987 and is not expected to be available after 1989.

Assumed Knowledge: Mathematics I and Physics IA or IB

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.


542207 1 unit

ME203 EXPERIMENTAL METHODS II

Only available to students who completed ME203 prior to 1987 and is not expected to be available after 1989.

Assumed Knowledge: ME201

Selected engineering experiments designed to extend the concepts of experimental procedures and to complement formal subject matter in the course.

542211 2 units

ME204 EXPERIMENTAL METHODS III

Assumed Knowledge: Mathematics I, Physics IA or IB

A series of laboratory experiments designed to give the student familiarity with mechanical, optical and electrical systems used to measure basic physical quantities such as length, strain, pressure, temperature, force, torque and fluid flow. Problems of correct interpretation of experimental data and basic principles of error analysis are discussed. Proficiency in technical report writing is emphasized.

542208 1 unit

ME212 ENGINEERING DESIGN I

Only available to students who completed GE112 but not ME212 prior to 1987 and is not expected to be available after 1989.

Assumed Knowledge: ME111, ME214, CE111, Mathematics I and GE112

Design procedures for mechanical components. Loading analysis. 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 belt drives and girds. Horsepower calculations for straight and helical spur gear reductions.

80

ME2144 DYNAMICS OF MACHINES

Prerequisite CE111

Assumed Knowledge: Mathematics I (or I5).

The subject covers the analysis and design of mechanical systems, including the study of forces, motion, and energy principles. The course includes topics such as Newton's laws of motion, kinematics, dynamics, and energy concepts. It also covers the analysis of simple and complex systems, including the use of computer-aided design tools.

Text

Meriam, J. L., and Kraige, L. G.
Engineering Mechanics: Dynamics SI version
2nd edn. (Wiley 1987)

ME2145 DYNAMICS OF MACHINES

Prerequisite CE111, ME111

Corequisite ME214

Assumed Knowledge: Mathematics II (or II1).

The subject covers the analysis and design of mechanical systems, including the study of forces, motion, and energy principles. The course includes topics such as Newton's laws of motion, kinematics, dynamics, and energy concepts. It also covers the analysis of simple and complex systems, including the use of computer-aided design tools.

Text

Meriam, J. L., and Kraige, L. G.
Engineering Mechanics: Dynamics SI version
2nd edn. (Wiley 1987)

ME2146 DYNAMICS OF MACHINES

Prerequisite CE111, ME111

Corequisite ME214

Assumed Knowledge: Mathematics II (or II1).

The subject covers the analysis and design of mechanical systems, including the study of forces, motion, and energy principles. The course includes topics such as Newton's laws of motion, kinematics, dynamics, and energy concepts. It also covers the analysis of simple and complex systems, including the use of computer-aided design tools.

Text

Meriam, J. L., and Kraige, L. G.
Engineering Mechanics: Dynamics SI version
2nd edn. (Wiley 1987)

Text
White, F.M.
*Heat Transfer* (Addison-Wesley 1984)

54311

ME371 THERMODYNAMICS II
Prerequisite: ME271

Tests As for ME271

54350

ME381 METHODS ENGINEERING
Prerequisite: All Year II subjects

Text
Niebel, B.W.
*Motion and Time Study (Irwin)*
or
Stevenson, M.G.
*Methods Engineering (N.S.W. University Press)*

543502

ME383 QUALITY ENGINEERING
Prerequisite: EM23AS
Assumed Knowledge: EM230, ME215

543503

ME384 DESIGN FOR PRODUCTION
Prerequisite: ME215
The application of economics, methods engineering, ergonomics and mechanical engineering to the development and design of products. Production, distribution and marketing of engineering products. Production, assembly and inspection methods in relation to scale of output. Principles of technology and tool, jig and fixture design.

82

544484 1 unit
ME405 ADVANCED NUMERICAL PROGRAMMING
Prerequisite: GE205
Complex algebra, multiple entry and return points for segments, use of disc and magnetic tape files, use of library subroutines, etc. Some advanced computing techniques. For example: Solution of end value differential equations; Finite element techniques; Advanced finite difference techniques; Eigenvalue problems.

544453 1 unit
ME407 ENVIRONMENTAL ENGINEERING
Assumed Knowledge: All Year II subjects
Physical and chemical interaction of air pollutants on the local and global scale. Meteorology, atmospheric diffusion models and ambient measurements of air pollutants and the control of exhausts from mobile and stationary sources.

544424 1 unit
ME409 INTRODUCTION TO NOISE POLLUTION CONTROL
Assumed Knowledge: All Year II subjects

Text
Berenen, L.J.
*Noise and Vibration Control* (McGraw-Hill 1971)

544426 1 unit
ME410 ADVANCED DESIGN CONCEPTS I
Prerequisite: ME316
The application of system analysis principles to the solution of problems associated with the design of mechanisms. Formalization of the design process. Computer approach for mechanical design applications. The optimum design of typical mechanical components.

544452 1 unit
ME411 FINITE ELEMENT METHODS IN MECHANICAL ENGINEERING DESIGN
Prerequisite: ME316
Basic concepts of finite element techniques. Introduction to finite element computer packages and their use as tools in mechanical engineering design. Application to problems of stress analysis of complex shapes, thermal stresses and vibrations.

544409 1 unit
ME413 ENGINEERING DESIGN I
Prerequisite: ME215
More advanced design topics including the analysis of complete systems. Selected projects including the development of computer packages as an aid to component selection.

544407 1 unit
ME414A COMPUTER AIDED DESIGN AND MANUFACTURING
Prerequisite: Permission of the Head of Department, Department of Mechanical Engineering.

Text
This subject is offered in the First Semester. It is repeated in the Second Semester as ME414B. Students may not take both ME414A and ME414B.

The CAD/CAM environment. Representation of basic geometric entities: point, line, surfaces. Drafting; control of work views and levels, dimensioning, bills of materials, templates and patterns. 2-D geometry; projections, auxiliary views, coordinate transformations, sections and solid properties. Part representation and generation. NC machining path and part program generation. Interface to analysis packages.

544410 1 unit
ME414B COMPUTER AIDED DESIGN AND MANUFACTURING
Prerequisite: Permission of the Head of Department, Department of Mechanical Engineering.

Text
This subject is offered in the Second Semester as a repeat of ME414A.

Consent and enrolment restrictions as for ME414A.

544449 1 unit
ME419 BULK MATERIALS HANDLING SYSTEMS I
Prerequisite: All Year II subjects

Text
Arnold, P.C., McLean, A.G. and Roberts, A.W.

Selected research papers

544472 1 unit
ME420 BULK MATERIALS HANDLING SYSTEMS II
Prerequisite: ME419

544479 1 unit
ME433 ROBOTICS
Prerequisite: ME231
Basic concepts: Classification of robotic systems, control systems, kinematics analysis and co-ordinate transformations, trajectory
interpolators, programming, applications, sensors and intelligent
robots, computer integrated manufacturing systems.

Text

Koren, Y.
Robots for Engineers (McGraw Hill 1987)

54482

1 unit

ME444 INTRODUCTION TO MACHINERY

Prerequisites: All Year II subjects

Historical review; The significance of Machineries; Engineering Energy Balance approach; Modification of the Griffith Theory; Stress intensity approach; Fracture Toughness; Crack Tip Plasticity; Subcritical crack growth; The J-integral; The COD approach; Determination of K-Curves; Effects of Crack Tip geometry; Standard test methods. Problems associated with "break-before-break" theories. Dynamic crack growth; Environmental effects; Experimental problems and application.

Text

Ewoldt, H.L. and Wambill, R.J.
Fracture Mechanics 2nd edn (Edward Arnold 1985)

54475

1 unit

ME445 MECHANICS OF SOLIDS III

Prerequisite: ME342

An introduction to the theory of plates and shells with extensions to thick pressure vessels and creep effects. Application of numerical (approximate) methods.

54476

1 unit

ME453 FLUID MECHANICS III

Prerequisite: ME353

Lectures and laboratory work dealing with a selection from the following topics: Topics in turbomachinery; One-dimensional compressible flow; Fluid dynamic stability; Elements of turbulent flows. Turbulent flows in both the laboratory and atmosphere.

54477

1 unit

ME473 THERMODYNAMICS III

Prerequisite: ME373

Thermodynamic relations; the Maxwell relations; general equations for enthalpy, internal energy and entropy; compressibility factor; equations of state; generalised charts for enthalpy and entropy. Availability concepts and applications. Applications of irreversible processes. Mechanisms of statistical thermodynamics; Direct energy conversion.

Text

Holtman, J.P.
Thermodynamics (McGraw-Hill 1969)

54478

1 unit

ME474 HEAT TRANSFER II

Prerequisite: ME353

Development of the general forms of the continuity, momentum and energy equations. Application of these equations to a range of convection heat transfer problems. Advanced convection and radiation heat transfer. Heat transfer with change of phase.

Text

Kalekar, B.V. and Desmond, R.M.
Engineering Heat Transfer
(West Publishing Company 1977)

54493

1 unit

ME481 ENGINEERING ADMINISTRATION

Prerequisite: All Year II subjects

The nature and function of an industrial enterprise. Theories of organisation; Behavioural aspects of work; Production management.

54494

1 unit

ME482 ENGINEERING ECONOMICS I

Prerequisite: All Year II subjects

Elementary accounting concepts; Time value of money, interest formula; Comparison of alternatives, annual and present equivalent, rate of return; Depreciation and income tax effects. Projects financed from public funds; Replacement and retirement economics; Capital budgeting.

Text

Smith, G.W.
Engineering Economy: Analysis of Capital Expenditures
(4th edn Iowa State U.P. 1987)

54495

1 unit

ME483 PRODUCTION SCHEDULING

Prerequisite: ME482


54496

1 unit

ME484 ENGINEERING ECONOMICS II

Prerequisite: ME482


Text

Smith, G.W.
Engineering Economy: Analysis of Capital Expenditures
(4th edn Iowa State U.P. 1987)

54497

2 units

ME497 PROJECT / DIRECTED READING

Prerequisite: Permission of the Head of the Department of Mechanical Engineering.

Private work of laboratory, literature search or theoretical nature requiring preparation of a report. Work will be undertaken at the discretion of a supervisor with whom the topic should be negotiated. The work undertaken in this subject may form part of an extended ME496 Project or an independent topic.

54498

1 unit

ME498 PROJECT / DIRECTED READING

Prerequisite: Permission of the Head of the Department of Mechanical Engineering.

Private work of laboratory, literature search or theoretical nature requiring preparation of a report. Work will be undertaken at the discretion of a supervisor with whom the topic should be negotiated. The work undertaken in this subject may form part of an extended ME496 Project or an independent topic.

54500

1 unit

ME500 ADVANCED NUMERICAL PROGRAMMING

Prerequisite: ME405 with additional material

54501

1 unit

ME507 ENVIRONMENTAL ENGINEERING

Prerequisite: ME407 with additional material

54502

1 unit

ME4465 NUMERICAL CONTROL AND COMPUTER AIDED MANUFACTURING


Text

Yam, K.
Computer Control of Manufacturing Systems
(McGraw-Hill 1983)

54504

1 unit

ME4467 OPERATIONS RESEARCH - FUNDAMENTAL TECHNIQUES

Prerequisite: All Year II subjects

Concept of optimisation; Optimisation approaches; Formulation of Models; Linear Programming; Allocation and assignment; Simplex Method; Duality; Theory of Games, Parametric Programming; Decomposition principle. Network theory; Dynamic Programming, Geometric Programming. Applications.

Texts

Hiller, F.S. and Lieberman, G.J.
Introduction to Operations Research (Holt, Rinehart and
Winston of Canada Ltd 1984)

Recognition Research (Prentice-Hall)

Text

Smith, G.W.
Principles of Operations Research (Prentice-Hall)

54507

4 units

ME496 PROJECT / DIREC TED READING

Prerequisite: ME495 with additional material

54508

1 unit

ME507 ENVIRONMENTAL ENGINEERING

Prerequisite: ME407 with additional material

54509

1 unit
MECHANICAL ENGINEERING SUBJECT DESCRIPTIONS

540145  1 unit
ME509  INTRODUCTION TO NOISE POLLUTION CONTROL
Content as for ME409 with additional material.

540146  1 unit
ME510  ADVANCED DESIGN CONCEPTS I
Content as for ME410 with additional material.

540147  1 unit
ME514  COMPUTER AIDED DESIGN AND MANUFACTURING
Content as for ME414A with additional material.

540148  1 unit
ME519  BULK MATERIALS HANDLING SYSTEMS I
Content as for ME419 with additional material.

540149  1 unit
ME520  BULK MATERIALS HANDLING SYSTEMS II
Assumed Knowledge ME519
Content as for ME520 with additional material.

540154  1 unit
ME521  CONVEYING OF BULK SOLIDS
Assumed Knowledge ME519
Content as for ME421 with additional material.

540190  1 unit
ME522  MAINTENANCE ENGINEERING
Content as for ME422 with additional material.

540156  1 unit
ME545  MECHANICS OF SOLIDS III
Content as for ME445 with additional material.

540157  1 unit
ME553  FLUID MECHANICS III
Content as for ME453 with additional material.

540131  1 unit
ME554  COMPUTATION OF FLUID FLOWS AND HEAT TRANSFER
Assumed Knowledge GE204, ME353 (or ME352 and ME372)

540158  1 unit
ME573  THERMODYNAMICS III
Content as for ME473 with additional material.

540159  1 unit
ME547  HEAT TRANSFER II
Content as for ME474 with additional material.

540132  1 unit
ME581  MATHEMATICAL PROGRAMMING II
Assumed Knowledge ME487 or ME587
An introduction to non-linear optimization problems. Dynamic programming and its application to a range of resource allocation, production planning and inventory control problems. Linear programming problems in integers; introduction branch-and-bound methods and implicit enumeration algorithms for problems in binary variables.

540161  1 unit
ME582  INDUSTRIAL COMPUTATIONS
Review and revision of probability theory, random variable and distribution. Regression analysis and statistical tests applied to applications in industry, in quality control and sampling inspection schemes; in design of industrial experiments and analysing variability in production systems.
Text

540163  1 unit
ME583  PRODUCTION SCHEDULING
Content as for ME483 with additional material.

540164  1 unit
ME584  ENGINEERING ECONOMICS II
Content as for ME484 with additional material.

540165  1 unit
ME585  NUMERICAL CONTROL AND COMPUTER AIDED MANUFACTURING
Content as for ME485 with additional material.

540166  1 unit
ME587  OPERATIONS RESEARCH - FUNDAMENTAL TECHNIQUES
Content as for ME487 with additional material.

540167  1 unit
ME588  OPERATIONS RESEARCH - PLANNING, INVENTORY CONTROL AND MANAGEMENT
Content as for ME488 with additional material.

MECHANICAL ENGINEERING SUBJECT DESCRIPTIONS

540168  1 unit
ME589  SIMULATION
Assumed Knowledge ME587, ME588
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 simulations of a queue to illustrate the problems and methods involved in the construction of different models to answer different questions; general solutions to the modelling of such networks; the classic 3-phase model; programming languages for simulation; design of simulation experiments; simulation project.

540169  1 unit
ME589  VIBRATION AND NOISE PROBLEMS IN INDUSTRY
Assumed Knowledge ME589
A systematic study of both noise and vibration problems which are of common occurrence in industrial plants and structures. Fundamentals underlying noise control. Criteria for noise and vibration control. Practical noise control. (This section continues from ME589). Vibration measurement and analysis. Vibration control: shock and vibration isolation in machines and vehicles. Effects of shock and vibration on structures.
Text
Anderson, R.A. Fundamentals of Vibrations (Macmillan)

540177  1 unit
ME560  ADVANCED DESIGN CONCEPTS II
Assumed Knowledge ME510
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. (This subject continues on from ME510).

540178  1 unit
ME561  MATERIALS HANDLING AND TRANSPORTATION SYSTEMS
Advanced study in the area of bulk solids handling and transportation. Topics for study will be chosen from the areas of powder mechanics, bulk solids storage and flow and conveying of bulk solids.
Text
Selected research papers

540179  1 unit
ME553  TURBULENT FLOWS
Assumed Knowledge ME352 or ME353
Text
Tennekes, H. and Lumley, J.L. A First Course in Turbulence (M.I.T. Press 1972)

540183  1 unit
ME565  COMPUTATION OF FLUID FLOW AND HEAT TRANSFER
Assumed Knowledge GE204, ME353 (or ME352 and ME372)

540189  2 units
ME564  PROJECT
For consent see Head of Department of Mechanical Engineering.

540176  1 unit
ME565  ADVANCED OPERATIONS RESEARCH
Assumed Knowledge ME587, ME588, ME589
The application of the Operational Research Method and techniques to tactical and strategic industrial problems. Analysis and simulation of production - inventory control systems. Queuing systems, investment and replacement, quality control and reliability.

540184  1 unit
ME587  MODELLING OF MANAGEMENT PROBLEMS
Assumed Knowledge ME587, ME588
Principles of model building, classification of models; cause-effect structures; organisational objectives; problem formulation; management problems in industry and government; models for marketing, manpower, production, inventory, distribution, and investment; case studies of management problems.

540185  1 unit
ME588  PROBABILISTIC MODELS IN OPERATIONS RESEARCH
Assumed Knowledge ME588
Review of relevant, probability and statistics theory; Bayes' theorem; decision trees; decision models under risk and uncertainty; queuing theory; Markov models, renewal theory;
MECHANICAL ENGINEERING SUBJECT DESCRIPTIONS

SECTION SIX

variable inventory models; forecasting; time series analysis; production-inventory models; quality assurance models; reliability.

540186
ME697 PROJECT/SEMINAR
2 units

540187
ME698 PROJECT/SEMINAR
3 units

540188
ME699 PROJECT/SEMINAR
4 units

540191
ME682 INDUSTRIAL LAW
3 units

A series of lectures and case studies given by the Department of Law on the application of legal principles to industrial situations.

Surveying Subject Descriptions

INDUSTRIAL EXPERIENCE

521870 SV991 1 unit
521871 SV992 1 unit
521872 SV993 1 unit

Prerequisite Part-time enrolment

These subject units are designed to formalise periods of Industrial Experience gained by part-time students only. Each of the Industrial Experience units is equivalent to one unit of 42 hours. Students will also be required to present a report giving a connected account and critical evaluation of their engineering activities and experience during the year. Such units may be counted by part-time students as electives. (See Section 4 of this Handbook).

551110
SV111 SURVEYING I
4 units

Elementary surveying principles - nature, causes and classes of errors - elementary error propagation - linear measurement with tapes, ordinary differential levelling, the theodolite, angle measurement, plane table, magnetic compass, detailed surveys, field notes, chain surveys, traversing and traverse calculations, contour surveys by stadia, route surveys, areas and volumes, horizontal curves, transition curves, vertical curves. A brief history of surveying and surveying instruments. A five-day series of fieldwork exercises will form a compulsory component of this subject.

Text
Fryer, J.G. and Ellis, M.H.
Elementary Surveying I (Harper and Row 1986)

521811
SV121 SURVEY CAMP I

This subject is only available to students who passed SV111 prior to 1988 but did not complete SV121.

Duration 5 days

Extensive contour and detail survey, including horizontal and vertical control by traverse and differential levelling - plane tabling - stadia. A small engineering survey. Associated calculations and plans.

522411
SV13 SURVEYING II

3 units

Prerequisite SV111

Corequisite SV233

Part A (Surveying)


Part B (Opics)


This subject includes a 5-day survey camp.

522407
SV222 SURVEY CAMP II

This subject is only available to students who passed SV233 prior to 1988 but did not complete SV222.

Prerequisite SV121 Survey Camp I

Duration 5 days

Extensive engineering survey - control by plane triangulation and traversing - setting out road centreline, including transition and circular curves - calculation of grades and earthworks quantities, and associated drawings.

522409
SV232 SURVEY COMPUTATIONS I

1 unit

Prerequisite Mathematics I (or IS)

This course is concerned with computer programming, with particular emphasis on programming style. The use of terminals, files and editing techniques will be covered. Also some aspects of computer hardware and data handling will be considered. Some numerical analysis techniques will be discussed to provide examples for programming. These will include solutions of single non-linear equations, interpolation and integration.

Texts
Brown, L.W.B.
A Fortran Primer (Prentice-Hall 1982)

Balfour, A. and Marwick, D.H.
Programming in Standard Fortran 77 (Heinemann 1979)

Handbook for VAX/VMS
(The University of Newcastle Computing Centre)

522409
SV233 SURVEY COMPUTATIONS II

1 unit

Prerequisite Knowledge SV111

Plane trigonometrical formulae - calculation of triangles, areas, etc.

452109

SV291 INTRODUCTION TO LEGAL STUDIES
The Australian constitution and legal system - legal research and writing - areas of law - legal concepts and terminology - statute law - case law.

452110

SV292 PROPERTY AND SURVEY LAW
Prerequisite SV291

The notion of property - classifications of property - estates in land - interests in land - systems of title to land - dealing with land - statutory control of land use, with particular reference to the Local Government Act 1919 (N.S.W.). The regulation and legal liability of surveyors - survey investigation and searches.

Texts
Hallinan, F. Legal Aspects of Boundary Surveying as apply in New South Wales (Inst. of Surveyors Aust. 1973)

Willis Notes on Survey Investigations (NSW Govt. Printer)

523305

SV313 SURVEYING III
Prerequisite SV213

Corequisite SV351


Text
Burmsida, C.D. Electromagnetic Distance Measurement 2nd edn (Granada 1982)

523315

SV334 SURVEY COMPUTATIONS III
Prerequisite SV233

Revision and extension of error theory - adjustment by least squares - error ellipse calculations.

Text
Mikhail, E.M. and Gracie, G. Analysis and Adjustment of Survey Measurements (Van Nostrand 1963)

523328

SV351 GEODESY I
Prerequisites SV213, SV222 and SV233

Corequisites SV313, SV354

Historical development of geodesy - ellipsoid and geoid, geodetic reference systems - outline of physical geodesy - differential geometry - geometry of the ellipsoid, normal sections and the geodetic - spherical excess, Legendre's Theorem - polars and geocentric ellipsoid - Map projection theory, Transverse-Mercator projection, Australian Map Grid, NSW Integrated Surveys Grid - geodesy surveys (horizontal control), Doppler satellite position fixing, adjustment of figures and networks by Condition Equations.

523329

SV361 PHOTOGRAPHY I

Stereoscopic vision - geometry of single aerial photograph - stereoscopic pairs - fundamental mathematical relationships - radial triangulation, inner, oblique and absolute orientation with respect to direct topological projection. Cameras, physical properties of photographs.

Texts

523334

SV371 PRINCIPLES OF ECONOMICS
An introduction to the fundamental theorems and principles of modern economic thought and their application to the real world problems arising in the context of regional and urban planning. Micro- and macro-economic principles will be introduced as required. Major problems to be examined: backward and underdeveloped regions, unemployment, labour migration policies for balanced regional growth, urban growth, sprawl, urban development, poverty and crime, traffic congestion, pollution, and declining quality of life.

523331

SV393 LAND BOUNDARY DEFINITION
Prerequisites SV291, SV292


Texts
Hallinan, F.M. Legal Aspects of Boundary Surveying as apply in New South Wales (Inst. of Surveyors N.S.W. 1973)

524124

SV416 SURVEYING IV
Prerequisites SV313, SV334


Texts
Richardus, P. Project Surveying (North Holland) Manual of the NSW Integrated Survey Grid (NSW, Department of Lands 1976)

524143

SV441 ASTRONOMY
Prerequisites SV213 and SV223

The celestial sphere and astronomical tables - definitions, conventions and time. Latitude by circum-meridian methods. Longitude by ex-meridian methods. Azimuth by circumpolar and sun observations. Position line methods.

Texts

Mackie, J.B. Astronomy for Surveyors 5th edn (Griffin 1978)

524128

SV452 GEODESY II
Prerequisite SV351

Least squares adjustment of control surveys: variance/covariance matrix, variance factor and weighted coefficient matrix, elementary statistical testing of observations and adjusted values. Relationship between geoid and ellipsoid, astro-geodetic levelling, ellipsoidal elevations, mean sea level and the geoid-gravity and its use in geodesy, methods for establishing a world geodetic system. Precise levelling.

Texts
Torge, W. Geodesy (de Gruyter)

Mikhail, E.M. Observations and Least Squares (IEP)

524130

SV462 PHOTOGRAMMETRY II
Prerequisite SV361

Photogrammetric orientation. Design principles and practical application of exact and approximate restitution instruments. Flight and project planning, aerial mapping - aerial triangulation of strips.

Text
Wolf, P.R. Elements of Photogrammetry (McGraw-Hill 1974)

524140

SV465 ADVANCED CARTOGRAPHY
Prerequisite SV361


524135

SV472 LAND VALUATION
General principles of urban and rural land valuation - unimproved and improved capital values - valuation of leasehold and freehold land - subdivisional value of land - valuation of buildings - relevant Acts and Regulations - N.S.W. Land and Valuation Court proceedings and decisions.

Texts
Hornby, D. Appraisal One (University 1976)

Murray, J.P. Principles and Practice of Land Valuation (Commonwealth Inst. of Valuers 1974)

524136

SV473 TOWN PLANNING
Review of historical planning concepts. Modern approaches to town planning including legal aspects. Practical consideration in subdivision design. Environmental impact considerations.

524144

SV475 SURVEY MANAGEMENT AND PLANNING

524133

SV481 PROJECT
Prerequisite All Year III subjects
Core Subjects Offered Outside the Faculty of Engineering

**Department of Chemistry**

**CHEMISTRY I**

**Prerequisites** Nil

**Advisory Prerequisites** At least Mathematics (2-unit course), physics (2-unit course) and Chemistry (2-unit course) with ranking in the top 50% in each case.

**Hours** About 3 lecture hours and 3 hours of tutorial and laboratory classes per week.

**Content**

**Semester 1**

General / Inorganic Chemistry (16 lectures)
Revision of basic concepts

Organic Chemistry (23 lectures)
Historical development. The shapes, structures and names of organic compounds; reactions of common functional groups; synthesis, differentiation and structural elucidation of organic compounds.

**Examination** One 3 hour examination held in mid-year examination period.

**Texts**

Ayward, G.H. & Findlay, T.J.V.
*S.I. Chemical Data 2nd edn (Wiley 1974)*

Brown, W.H.
*Introduction to Organic Chemistry* 3rd edn
(Wadsworth student edn)

Brown, T.L. & LeMay, H.E.
*Chemistry - The Central Science* 3rd edn
(Prentice-Hall 1985)

**Semester II**

Inorganic Chemistry (14 lectures)
Revision of basic concepts; periodic properties of the elements and their compounds; bonding and structure; co-ordination compounds.

Physical Chemistry (25 lectures)
Chemical equilibria; thermodynamics; electrochemistry; chemical kinetics.

**Examination** One 3 hour examination held in November examination period.

The final result in Chemistry I will be determined by performance in Semesters 1 and II.

The laboratory mark counts 10% towards the final grade. A pass in the laboratory course is required in order to pass the subject.

**Texts** As for Semester I.

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**CHEMISTRY IIA**

As for Chemistry IIC (below) with additional 3 hour of laboratory classes per week. The laboratory mark counts 20% towards the final grade. A pass in the laboratory course is required in order to pass the subject.

**CHEMISTRY IIC**

**Prerequisite** Chemistry I

**Preparatory Subjects** Mathematics I and either Physics IA or IB.

**Hours** About 3 lecture hours and 3 hours tutorial and laboratory classes per week.

**Content**

**Semester I**

Inorganic Chemistry (11 lectures) Main group chemistry, transition metal chemistry and coordination complexes.

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SECTION SIX

CORE SUBJECTS OFFERED OUTSIDE THE FACULTY OF ENGINEERING

Organic Chemistry (11 lectures) Aliphatic Chemistry.
Physical Chemistry (11 lectures) Thermodynamics - basic laws and applications to ideal and non-ideal systems.
Analytical Chemistry (6 lectures) General concepts, separation methods.
Laboratory Programme - Analytical Chemistry.

Examination Two (2 hour) examinations held in the mid-year examination period.

Text

Atkins, P.W.
Physical Chemistry 3rd edn (Oxford 1982)
Pine, S.H. Hendrickson, J.B. et al
Also adequate, particularly if proceeding to Chemistry IIIA:
Shoemaker, D.P. Gutlund, C.W., et al
Stoog, D.A. & West, D.M.
Principles of Instrumental Analysis 2nd edn (Saunders College, Philadelphia 1980)

Model Kit

Starkey, R.
The Model Set (Wiley)

OR

Leman, J.W.
Molecular Model Set for Organic Chemistry (Allyn & Bacon)

Semester II

Inorganic Chemistry (11 lectures) Symmetry, structure and bonding, structure elucidation; it acceptor complexes and organometallic compounds.
Organic Chemistry (11 lectures) Aromatic Chemistry.
Physical Chemistry (11 lectures) Dynamics - Kinetics; chemical affinity; electrochemical cells.
Analytical Chemistry (6 lectures) selected instrumental methods.
Laboratory Programme - Physical Chemistry.

Examination Two (2 hour) examinations held in the mid year examination period.

The final result for the subject Chemistry IIIC will be determined by performance in Semesters I and II.
The laboratory mark counts 10% towards the final result. A pass in the laboratory course is required in order to pass the subject.

Text As for Semester I

DEPARTMENT OF MATHEMATICS

661100 4 units weighting:1

MATHEMATICS I

Advisor/Prerequisite Students intending to study Mathematics I are advised that since the minimum assumed knowledge for Mathematics I is 3 units of Mathematics as the Higher School Certificate, students who have less than 3 units of preparation will usually find themselves seriously disadvantaged.

It is recommended that students who have only 2 units Mathematics or 3 units with a mark of less than 110 (out of 150) at the HSC should enrol in Mathematics IS and not in Mathematics I.

Examination Two (2 hour) examinations held in the mid-year examination period.

Texts

University of Newcastle
Mathematics I Tutorial Notes (1989)
Anon, H.
Elementary Linear Algebra 5th edn (Wiley, 1987)
Parrard, S. & Paxon, N.J.
Calculus
(Thurston, F. Javornick, 1984)
Students will be advised on any further texts.

References
See individual topics

MATHEMATICS I TOPIC DESCRIPTIONS

Algebra

References
Bretscher, W.
A Basis for Linear Algebra (Wiley, 1973)
Johnson, R.S. & Vinson, T.D.
Elementary Linear Algebra
(Kendall/Hunt Bruce Javornick, 1987)
Kolman, B.
Elementary Linear Algebra (Macmillan, 1977)
Lieberk, H.
Algebra for Scientists and Engineers (Wiley, 1971)
Lipschutz, S.
Linear Algebra (Schaum, 1974)

Statistics & Computing

An introduction to elementary numerical analysis and computing, including finding roots and estimating integrals. Programming in Pascal starts early in the course, and students are required to compose and use effective programs and carry out laboratory work.

An introduction to statistics: exploratory data analysis, uncertainty and random variation, probability, use of MINITAB.

References
Freedman, D., Pisani, R. & Purves, R.
Statistics (W.W.Norton & Co., 1978)
Cooper, D. & Clancy, M.
Old Pascal 2nd edn (W.W. Norton & Co., 1982)
Koffman, F.B.
Problem Solving and Structured Programming in Pascal 2nd edn (Addison-Wesley, 1985)

Savitch, W.J.
Pascal. An Introduction to the Art and Science of Programming (Benjamin/Cummings)

Other References
Cormen, S.D. & de Boor, C.
Elementary Numerical Analysis 3rd edn
(McGraw-Hill, 1980)
Ryan, B.P., Joiner, B.L. & Ryan, T.A.
Minitab Handbook 2nd edition
(Duxbury Press, Boston, 1985)

661200 MATHEMATICS IS

Mathematics IS is unsuitable for students who have achieved better than 110 out of 150 in 3-Unit Mathematics at the HSC.

This subject is designed to help the students who are likely to find great difficulty in passing Mathematics I. The Mathematics Department strongly recommends that students who have done only 2 units Mathematics, or 3 units Mathematics with a mark of less than 110 in the Higher School Certificate, should enrol in Mathematics IS rather than Mathematics I. This is recommended because of the very high failure rate for such students in Mathematics I.

Mathematics IS consists of one half of Mathematics I, namely the calculus, statistics and computing sections, some revision work in basic school mathematics, and some work introductory to the remaining algebra and analysis sections of Mathematics I. It has 6 hours of lectures and tutorials a week for the full year, the same as Mathematics I. It is taught as small groups, where the students have more supervised practice in solving problems than is possible in Mathematics I.

Students wishing to proceed to a second year mathematics subject after they have passed Mathematics IS, must then pass Mathematics 102, which consists of the remaining algebra and analysis sections of Mathematics I. These students may count Mathematics IS and Mathematics 102, as the equivalent of the full subject Mathematics I, in their degree.

It is possible for students enrolled in a B. A. or B. Sc. to count Mathematics IS as a full subject in their degree, though it does not qualify these students to enter a second year mathematics subject.

Examination
One paper after first semester and two papers after second semester.

Core


Referenced

Hausdorff, F.
Elementary Mathematical Analysis
(Wadsworth-Brookes, 1982)
Giles, J.R.
Real Analysis: An Introductory Course
(Wiley, 1972)
Spivak, M.
Calculus (Benjamin, 1967)

Calculus

Revision of differentiation and integration of polynomials and trigonometric functions. Differentiation of rational functions and of implicit and parametrically defined functions. Definition and properties of logarithmic, exponential and hyperbolic functions.

Complex numbers. Integration by parts and by substitution techniques. Integration of rational functions. First order separable and linear differential equations. Second order linear differential equations with constant coefficients. Sample three-dimensional geometry of curves and surfaces.

References
Ayers, F.
Calculus (Schaum, 1974)
Calculus and Analytical Geometry
(Prentice-Hall, 1982)
Stein, S.K.
Calculus and Analytical Geometry 3rd edn
(McGraw-Hill, 1982)

Qualitative and Computational

An introduction to elementary numerical analysis and computing, including finding roots and estimating integrals. Programming in Pascal starts early in the course, and students are required to compose and use effective programs and carry out laboratory work.

An introduction to statistics: exploratory data analysis, uncertainty and random variation, probability. Use of MINITAB.

References
Freedman, D., Pisani, R. & Purves, R.
Statistics (W.W.Norton & Co., 1978)
Cooper, D. & Clancy, M.
Old Pascal 2nd edn (W.W. Norton & Co., 1982)
Koffman, F.B.
Problem Solving and Structured Programming in Pascal 2nd edn (Addison-Wesley, 1985)
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REFERENCES

Ayres, F. Calculus (Schaum, 1974)


Cooper, D. & Cheney, M. Old Pascal 2nd edn (W.W. Norton & Co., 1982)

Koffman, E.B. Problem Solving and Structured Programming in Pascal 2nd edn (Addison-Wesley, 1985)

Savitch, W.J. Pascal, An Introduction to the Art and Science of Programming (Benjamin/Cummins, 1980)


MATH 102

This is a half subject, which is an upgrade for students who have passed Mathematics 15.

Hours: 2 lecture hours and 1 tutorial hour per week for both semesters

Examination: One paper after first semester and one 3-hour paper after the second semester.

Content

As for the topics "Algebra" and "Real Analysis" in Mathematics I.

Notes

Mathematics 15 is not a sufficient prerequisite for any further Mathematics subjects, except Mathematics 102. However, Mathematics 15 is followed by Mathematics 102 as an acceptable substitute in all cases where Mathematics 15 is acceptable as a prerequisite.

MATH 104

Units: weighting 2

MATH 105

Prerequisite: Mathematics 1

Hours: 4 lecture hours and 2 tutorial hours per week for both semesters.

Examination: Each topic is examined separately.

Content: Topics B, C, D - see below.

MATH 106

Top B - Complex Analysis

Corequisite: Topic CO

96

HOURS 1 lecture hour per week and 1 tutorial hour per fortnight.

Examination: One 2-hour paper.

Content


Text

Nil

References


Kreyszig, E. Advanced Engineering Mathematics 6th edn (Wiley, 1988; earlier editions are acceptable)

Greenberg, M.D. Foundations of Applied Mathematics (Prentice-Hall, 1978)


Spigel, M.R. Theory and Problems of Vector Analysis (Schaum, 1959)

Spigel, M.R. Theory and Problems of Advanced Calculus (Schaum, 1974)

62104 TOPIC D - LINEAR ALGEBRA

Prerequisite: Nil

Hours: 1 lecture hour per week and 1 tutorial hour per fortnight.

Examination: One 2-hour paper.

Content


Text


References

Atkinson, K.E. An Introduction to Numerical Analysis (John Wiley, 1984)


Cooper, D. & Clancy, M. Old Pascal (Wiley, 1985)

Crawley, J.W. & Miller, C.E. A Structured Approach to Fortran (Prentice-Hall, 1983)

Elter, D.M. Problem Solving with Structured Fortran 77 (Benjamin, 1984)

Roman, S. An Introduction to Linear Algebra (Saunders, 1985)


62104 MATHEMATICS HCS

Hours: 4 lecture hours and 2 tutorial hours per week for both semesters.

Examination: Each topic is examined separately.

Content: Topics D, F, G and Random Processes and Simulation (offered by the Department of Statistics - see below).

62104 TOPIC D - LINEAR ALGEBRA

See description above

62102 TOPIC F - NUMERICAL ANALYSIS AND COMPUTING

Hours: 3 hours per week for first semester.

Examination: One 2-hour paper.

Text


References

Atkinson, K.E. An Introduction to Numerical Analysis (John Wiley, 1984)


Cooper, D. & Clancy, M. Old Pascal (Wiley, 1985)

Crawley, J.W. & Miller, C.E. A Structured Approach to Fortran (Prentice-Hall, 1983)

Elter, D.M. Problem Solving with Structured Fortran 77 (Benjamin, 1984)

Roman, S. An Introduction to Linear Algebra (Saunders, 1985)

SECTION SIX

CORE SUBJECTS OFFERED OUTSIDE THE FACULTY OF ENGINEERING

Elter, D.M.
Structured Fortran 77 for Engineers and Scientists
(Benjamin, 1983)

Gend, C.P. & Wheady, P.O.
Applied Numerical Analysis (Addison-Wesley, 1984)

Murasek, S.L.
Fortran 77 (Academic, 1983)

McCaffrey, D.D.
Computing for Engineers and Scientists with Fortran 77
(Wiley, 1984)

McKerrow, P.G.
Structured Programming Using Fortran 77 (Harcourt, 1983)

Handbook for VAX/VMS (University of Newcastle Computing Centre, 1983)

VAX II Fortran (University of Newcastle Computing Centre, 1983)

662203  TOPIC G - DISCRETE MATHEMATICS

Hours: 3 hours per week for second semester.

Examination: One 2-hour paper.

Content


Text

Ross, K.A. & Wright, C.R.
Discrete Mathematics 2nd edn (Prentice Hall, 1988)

References

Grimaldi, R.P.
Discrete and Combinatorial Mathematics (Addison-Wesley, 1985)

Kalman, E.
An Introduction to Discrete Mathematics and its Applications (Addison-Wesley, 1986)

Dierker, P.F. & Vroman, W.L.
Discrete Mathematics (Harcourt Brace Jovanovich, 1986)

662103  RANDOM PROCESSES AND SIMULATION

Lecturer: B.G. Quinn

Hours: Two lecture hours and one tutorial hour per week for Semester 2 only.

Examination: Assignments, tests and one 2-hour examination.

Content

This course is about the mathematical modelling and simulation of random, or stochastic, processes.

Topics covered include: random walks, Markov chains, Markov processes, birth-death processes and queues, random number generation, and simulation using computer packages.

Text

Taylor, H.M. and Karlin, S.
An Introduction to Stochastic Modelling (Academic Press, 1984)

References

Morgan B.J.T.
Elements of Simulation (Chapman and Hall, 1984)

Ross, S.
Stochastic Processes (Wiley, 1985)

CORE ENGINEERING MATHEMATICS SUBJECTS

Note: Mathematics I is a prerequisite for all EM2 subjects.

692201 1 unit, weighting = 2

EM2AS  APPLIED STATISTICS

Pre-requisite: Mathematics 1

Hours: Two lecture hours per week and practical work for Semester 1 only.

Examination: Assignments, tests and one 2-hour examination.

Content

Topics covered include: exploratory data analysis, probability theory, sampling, quality control, error propagation, confidence intervals and hypothesis tests, e.g. for means and proportions, simple linear regression and contingency tables.

Emphasis is placed on data analysis using the statistical computer program MINITAB.

Text

Chatfield, C.

References

Ryan B.F., Joiner B.L. & Ryan T.A.

Freund J.E. & Walpole R.E.

662111 1 unit, weighting = 2

EM2RD COMPLEX ANALYSIS AND LINEAR ALGEBRA

Pre- or Corequisite: EM2CO.

Content

Consists of first half year’s work in Topic B Complex Analysis and Topic D Linear Algebra. See topic descriptions under Mathematics IIA.

662110 2 units, weighting = 2

EM2CO VECTOR CALCULUS AND DIFFERENTIAL EQUATIONS

Content

See Topic CO description under Mathematics IIA.

Department of Physics

744100 4 units, weighting = 1

PHYSICS I

Pre-requisite: Nil, however refer to the Advisory Prerequisite for entry to the Faculty.

Hours: 3 lecture hours and an average of 3 hours of laboratory and tutorial work per week.

Examination: 3 hours.

Content

This subject is intended for students enrolled in the Electrical Engineering and Computer Engineering programmes. The content covers topics in Electromagnetism 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: Texts will be listed on the Physics Department noticeboard.

7441100 4 units, weighting = 1

PHYSICS II

Pre-requisite: Nil, however refer to the Advisory Prerequisite for entry to the Faculty.

Hours: 3 lecture hours and an average of 3 hours of laboratory and tutorial work per week.

Examination: 3 hours.

Content

This subject is intended for students enrolled in the Electrical Engineering and Computer Engineering programmes. The content covers topics in Electromagnetism 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.
### Approved Elective Subjects

All undergraduate engineering programmes include Elective units which may be selected in accordance with specific requirements. The elective requirements of each programme are set out following the Approved Programme and students should consult these requirements before selecting their elective subjects (see relevant course entry in Section 3).

Subject to the Elective Requirements of the relevant course, Elective units may be selected from:
- Subjects offered by Departments of the Faculty of Engineering (except EE(00));
- Subjects offered by Departments outside the Faculty which are core subjects in an Engineering course (except Computer Science I) and are therefore listed in the previous part of this Section;
- Subjects included in the lists below; and
- Subjects which may be specially approved by Faculty Board on the recommendation of the Head of the responsible Department.

The unit value and weighting of any subject so approved will also be determined by Faculty Board.

Full descriptions of the subjects listed below, including any prerequisite or corequisite requirements, may be found in the relevant Faculty Handbook.

The unit value and weighting of the subjects listed below have been approved by Faculty Board for use in the event that such subjects are approved as Elective subjects in accordance with course Elective Requirements.

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SECTION SEVEN

COMBINED DEGREE PROGRAMMES

About This Section

This section sets out the detailed programmes of combined degree courses which may be taken by students enrolled in the various BE programmes. Admission to these programmes must be approved by the Dean of the Faculty of Engineering and the Dean of the other faculty concerned. Entry to the course is normally made after completion of the first year of the Approved Programme of their BE course. Applications are made by submitting an Application for Course Transfer form attached to the Application for Re-enrolment form. The forms must be lodged at the Student Administration Office in the McManus Building by the due date for return of the latter form.

ENTRY TO COMBINED DEGREE PROGRAMMES

Students wishing to enter a combined degree programme must apply for entry after completion of the first year of the Approved Programme of their BE course. Applications are made by submitting an Application for Course Transfer form attached to the Application for Re-enrolment form. The forms must be lodged at the Student Administration Office in the McManus Building by the due date for return of the latter form.

Bachelor of Engineering in Chemical Engineering

The following combined courses leading to the degrees of Bachelor of Engineering (BE) in the specialty of Chemical Engineering, and the degree of Bachelor of Arts (BA), Bachelor of Commerce (BCom), Bachelor of Economics (BEC), Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) are to be submitted to the relevant Faculty Boards.

Year I

Identical to Year I of the Approved Programme for the B.E. in Chemical Engineering, except that students contemplating enrolment in the BMath/BE and BSc/BE combined degree programmes should include Physics IA in their first year programme rather than taking Physics IB.

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### Bachelor of Engineering in Civil Engineering

The following combined courses leading to the degrees of Bachelor of Engineering (BE) in the specialty of Civil Engineering, and the degree of Bachelor of Arts (BA), Bachelor of Mathematics (BMath), Bachelor of Science (BSc) or Bachelor of Surveying (BSurv) are to be submitted to the relevant Faculty Boards.

Combined courses leading to the degrees of Bachelor of Engineering (BE) in the specialty of Civil Engineering, and the degree of Bachelor of Commerce (BCom) or Bachelor of Economics (BEC) may be submitted to the relevant Faculty Boards for approval but will require 6 years full-time study for completion. Prospective students may prefer to consider a first degree in the specialty of Civil Engineering followed by later enrolment in the Master of Business Administration (MBA) programme.

**Year I**

Identical to Year I of the Approved Programme for the BE in Civil Engineering, except that Physics IA is recommended in place of Physics IB for the BMath/BE and BSc/BE combined degrees.

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* An additional essay is required to complete BCompSc requirements - see section 4(7)(b) of the BCompSc Degree Regulations.
**Bachelor of Engineering in Electrical Engineering**

The Bachelor of Engineering programme in Electrical Engineering may be combined with studies leading to the award of the degrees of Bachelor of Arts (BA), Bachelor of Commerce (BCom), Bachelor of Economics (BSc), Bachelor of Mathematics (BMath) or Bachelor of Science (BSc). These courses are to be submitted to the relevant Faculty Boards.

Two of these combined programmes may be taken over 5 years full-time. They are a combined BE/BMath and BE/BSc programme majoring in Physics. These programmes are listed below. Enquiries regarding other combined degree programmes may, in the first instance, be directed to the Faculty Secretary.

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- The Year II Electrical Engineering Programme
- The Year II Electrical Engineering Programme
- The Year II Electrical Engineering Programme

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**Bachelor of Engineering in Industrial Engineering**

The following combined courses leading to the degrees of Bachelor of Engineering (BE) in the specialty of Industrial Engineering, and the degree of Bachelor of Arts (BA), Bachelor of Commerce (BCom), Bachelor of Economics (BSc), Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) are to be submitted to the relevant Faculty Boards.

**Year I**

Identical to Year I of the Approved Programme for the B.E. in Civil Engineering, except that Physics I is recommended in place of Physics II for the BMath/BE and BSc/BE combined degrees.

**Bachelor of Arts**

- Bachelor of Commerce
- Bachelor of Economics
- Bachelor of Mathematics
- Bachelor of Science

**Year II**

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Bachelor of Engineering in Mechanical Engineering

The following combined courses leading to the degree of Bachelor of Engineering (BE) in the speciality of Mechanical Engineering, and the degree of Bachelor of Arts (BA), Bachelor of Commerce (BCom), Bachelor of Economics (BEC), Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) are to be submitted to the relevant Faculty Boards.

Year I

Identical to Year I of the Approved Programme for the BEng in Industrial Engineering, except that Physics IA is recommended in place of Physics IB for the BMath/BE and BSc/BE combined degrees.

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Bachelor of Surveying

The following combined courses leading to the degrees of Bachelor of Surveying (BSurv) and the degree of Bachelor of Engineering (BE) in the Specialisation of Civil Engineering or Bachelor Mathematics (BMath) are to be submitted to the relevant Faculty Boards.

Year I

Identical to Year I of the Approved Programme for the BSurv.

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REGULATIONS

Section Eight

Postgraduate Degree Regulations

About This Section

This section contains the University Regulations regarding the Postgraduate Degrees and Diplomas to be offered in the Faculty of Engineering in 1989 with the exception of Doctoral Degree Regulations which are published in Volume 1 of the Calendar.

Regulations Governing the Honours Degree of Bachelor of Computer Science

1. These regulations prescribe the requirements for the honours degree of Bachelor of Computer Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.2.1.

2. Definitions

In these “Definitions,” unless the context or subject matter otherwise indicates or requires:

“course” means the programme of studies prescribed from time to time to qualify a candidate for the degree;

“Dean” means the Dean of the Faculty;

“degree” means the degree of Bachelor of Computer Science (Honours);

“Department” means the Department offering the honours subject and includes any other body so doing;

“Faculty” means the Faculty of Engineering;

“Faculty Board” means the Faculty Board of the Faculty;

3. Admission to Candidature

In order to be admitted to candidature for the degree, an applicant shall

(a) have completed the requirements for admission to the ordinary degree of Bachelor of Computer Science or to any other degree approved by the Faculty Board, or have already been admitted to that degree;

(b) have satisfactorily completed any additional work prescribed by the Head of the Department; and

(c) have obtained approval to enrol given by the Dean on the recommendation of the Head of the Department.

4. Qualification for Admission to the Degree

To qualify for admission to the degree a candidate shall in one year of full-time study or two years of part-time study pass the following honours subject:

Computer Science IV

5. Subject

(1) To complete the honours subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require.

Regulations Governing Diplomas in Industrial Engineering and Surveying

1. General

1. These Regulations are made in accordance with the powers vested in the Council under By-Law 5.2.1 and prescribe the conditions and requirements relating to the Diploma in Industrial Engineering and the Diploma in Surveying.

2. Definitions

(1) In these Regulations and the Schedules thereto, unless the context or subject matter otherwise indicates or requires:

“course” means the total requirements as prescribed in the schedule to qualify a candidate for the award of the Diploma;

“Dean” means the Dean of the Faculty of Engineering;

“Department” means the department or departments offering a particular subject and includes any other body doing so;

“Diploma” means the Diploma in Industrial Engineering or the Diploma in Surveying as the case may be;

“Faculty Board” means the Faculty Board, Faculty of Engineering;

“responsible department” means the department designated as such in the schedule;

“Schedule” means the Schedule to these Regulations relevant to the diploma in which a person is enrolled or proposing to enrol;

“subject” means any part of the course for which a result may be recorded.

(2) The unit value of a subject for the purposes of these Regulations shall be determined by the Faculty Board.

Admission and Enrolment

3.1 To be eligible for admission to candidature an applicant shall have satisfied the requirements for admission specified in the Schedule.

3.2 Application for admission to candidature shall be considered by the Faculty Board which may approve or reject any application.

4.1 In any year a candidate shall enrol only in those subjects approved by the Dean or the Dean’s nominee.

4.2 A candidate will not be permitted to enrol in any subject which is deemed by the Faculty Board to be substantially equivalent to one which he has previously counted towards a degree or diploma.

5. Standing

(1) The Faculty Board, on the recommendation of the Head of the responsible department, may grant a candidate standing in the course in recognition of work completed in this University or elsewhere on such conditions as the Faculty Board may determine.

(2) The standing granted under this regulation shall not exceed the unit value specified in the schedule.
6. Prerequisites and Corequisites

(1) The Faculty Board, on the recommendation of the Head of Department, may prescribe prerequisites and/or corequisites for a subject.

(2) Except with the approval of the Dean, a candidate may not enrol in a subject unless he or she has passed any subject prescribed as its prerequisite, and has already passed or concurrently enrols in or is already enrolled in any subject prescribed as its corequisite.

7. Withdrawal

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

(2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty. The relevant date shall be:

(a) in the case of any subject offered only in the first half of the academic year, the last Monday of that term;
(b) in the case of any subject offered only in the second half of the academic year, the fourth Monday of that term;
(c) in the case of any other subject the last Monday of that term.

8. Subject Requirements

(1) To complete a subject, a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or oral work as the Department shall require.

(2) To pass a subject, a candidate shall complete it and pass such examinations as the Faculty Board shall require.

9. Grading of Diploma

The Diploma shall be awarded in one grade only.

10. Award of Diploma

To qualify for the award of the Diploma, a candidate shall enrol and satisfy the requirements prescribed in the Schedule.

11. Exceptional Circumstances

In order to provide for exceptional circumstances arising in a particular case, the Senate on the recommendation of the Faculty Board may relax any provision of these Regulations.

SCHEDULE 1 — DIPLOMA IN INDUSTRIAL ENGINEERING

1. For the purposes of these Regulations the responsible department for the Diploma shall be the Department of Mechanical Engineering.

2. To be eligible for admission to candidature as an applicant shall:

(a) have satisfied the requirements for admission to a degree in the University of Newcastle; or
(b) have satisfied the requirements for admission to a degree in another university recognised for this purpose by the Faculty Board.

2.1 To be eligible for admission to candidature as an applicant shall:

(a) have satisfied the requirements for admission to a degree in another university recognised for this purpose by the Faculty Board; or
(b) hold such other qualifications approved by the Faculty Board for the purpose of admission to candidature.

Rules Governing the Diploma in Computer Science

1. These Regulations prescribe the requirements for the Diploma in Computer Science of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.2.1.

2. Definitions

In these Regulations, unless the context or subject matter otherwise indicates or requires:

"course" means the programme of studies prescribed from time to time to qualify a candidate for the Diploma;
"Dean" means the Dean of the Faculty;
"Department" means the Department offering a particular subject and includes any other body so doing;
"Diploma" means the Diploma in Computer Science;
"Faculty" means the Faculty of Engineering;
"Faculty Board" means the Faculty Board of the Faculty;
"Schedule" means the Schedule of Subjects to these Regulations;
"subject" means any part of the course for which a result may be recorded.

Admission to Candidature

3. (1) To be eligible for admission to candidature for the Diploma, an applicant shall:

(a) have satisfied the requirements for admission to a degree of the University of Newcastle or to a degree of another University approved for this purpose by the Faculty Board; or
(b) have such other qualifications approved by the Faculty Board for the purpose of admission to candidature.

(2) An application for admission to candidature shall be considered by the Faculty Board, which may approve or reject any applications.

4. The Faculty Board may require a candidate to complete work and/or examinations additional to the programme referred to in Regulations 6 if in its opinion the candidate has not reached the assumed standard of attainment on which the content of any of the subjects for the Diploma is based.

5. Enrolment

(1) In any year a candidate shall enrol only in those subjects approved on the recommendation of the Head of the Department of Electrical Engineering and Computer Science by the Dean or the Dean's nominee.

(2) 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.

(3) A candidate will not be permitted to enrol in a subject the content of which in the opinion of the Faculty Board is substantially equivalent to work previously counted towards the requirements of a subject.
another degree or diploma, except to such extent as the Faculty Board may permit.

6. Qualification for Admission to the Diploma
   (1) To qualify for the award of the Diploma a candidate shall:
       (a) pass the Preliminary Subject referred to in the Schedule;
       (b) pass subjects from those listed in the Schedule, or subjects deemed by the Faculty Board to be their equivalent, with an aggregate unit value of at least twenty-two; and
       (c) complete a project prescribed by the Head of the Department of Electrical Engineering and Computer Science to the satisfaction of that Head.
   (2) The subjects presented for the Diploma shall include not fewer than four subjects selected from those listed in the Schedule with a unit value of three.

7. Subject
   (1) To complete a subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department may require.
   (2) To pass a subject a candidate shall complete it and pass such examinations as the Faculty Board may require.

8. Standing
   (1) The Faculty Board may grant standing in the course to a candidate, on such conditions as it may determine, in recognition of work completed in this University or another institution.
   (2) Except for the Preliminary Subject, a candidate may not be granted standing for work which has already counted towards a degree to which that candidate has been admitted or is eligible for admission.
   (3) Standing granted to a candidate shall not exceed an aggregate unit value of twelve.
   (4) The Dean shall determine the unit value of the work for which standing is granted.

9. Prerequisites and Corequisites
   (1) The Faculty Board, on the recommendation of the Head of the Department, may prescribe prerequisites and/or corequisites for any subject comprising the course.
   (2) Except with the approval of the Dean granted after considering any recommendation made by the Head of the Department, no candidate may enrol in a subject unless that candidate has passed all subjects prescribed as its prerequisites at any grade which may be specified and has already passed or concurrently enrols in or is already enrolled in any subjects prescribed as its corequisites.
   (3) A candidate obtaining a Terminating Pass in a subject shall be deemed not to have passed that subject for prerequisite purposes.

10. Withdrawal
    (1) A candidate may withdraw from a subject or the 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.
    (2) A candidate who withdraws from a subject after the relevant date shall be deemed to have failed the subject save that, after consulting with the Head of the Department, the Dean may grant permission for withdrawal without penalty. The relevant date shall be:
        (a) in the case of a subject offered only in the first semester, the Monday of the 9th week of the first semester;
        (b) in the case of a subject offered only in the second semester, the Monday of the 9th week of the second semester;
        (c) in the case of any other subject, the Monday of the 3rd week of the second semester.

11. Results
    The result obtained by a successful candidate in a subject shall be:
        Terminating Pass, Ungraded Pass, Pass, Credit, Distinction, or High Distinction.

12. Award of the Diploma
    The Diploma shall be awarded in two grades, namely: Diploma in Computer Science with Merit and Diploma in Computer Science.

13. Time Requirements
    (1) Except with the special permission of the Faculty Board:
        (a) a full-time candidate shall complete the requirements for the Diploma in not less than one and not more than three calendar years from the commencement of the course;
        (b) a part-time candidate shall complete the requirements for the Diploma in not less than two and not more than five calendar years from the commencement of the course.
    (2) A candidate who has been granted standing in accordance with Regulation 8 of these Regulations shall be deemed to have commenced the course from a date to be determined by the Dean.

14. Relating Provision
    In order to provide for exceptional circumstances arising in a particular case the Senate on the recommendation of the Faculty Board may relax any provision of these Regulations.

SCHEDULE OF SUBJECTS

<table>
<thead>
<tr>
<th>Diploma in Computer Science</th>
<th>Prerequisites</th>
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</thead>
<tbody>
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<td>Subjects with a Unit Value of Two</td>
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<tr>
<td>Data Structures and Algorithms (DS&amp;A)</td>
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</tr>
<tr>
<td>Commercial Programming (CP)</td>
<td>IP</td>
</tr>
<tr>
<td>Assembly Language (AL)</td>
<td>IP</td>
</tr>
<tr>
<td>Comparative Programming Languages (CPL)</td>
<td>IP</td>
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<tr>
<td>Systems Analysis (SA)</td>
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<td>Systems Design (SD)</td>
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<td>Microcomputers in Business (MB)</td>
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</tr>
<tr>
<td>Numerical Analysis (NA)</td>
<td>Mathematics I</td>
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<tr>
<td>Linear Algebra (LA)</td>
<td>Mathematics I</td>
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<tr>
<td>Discrete Mathematics (DM)</td>
<td>Mathematics I</td>
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<tr>
<td>Random Processes and Simulation (RP)</td>
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</tr>
<tr>
<td>Switching Theory and Logical Design (ST&amp;LD)</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>Microprocessor Systems and Applications (MSPA)</td>
<td>IP,AL&amp;OS</td>
</tr>
</tbody>
</table>

Subjects with a Unit Value of Three

| Software Engineering (SE) | IP,DS&A,AL&OS |
| Operating Systems (OS) | IP,DS&A,AL&OS |
| Database Design (DD) | IP,DS&A,AL&OS,CP |
| Compiler Design (CD) | IP,DS&A,AL&OS,CPL |
| Artificial Intelligence Programming Techniques (AIP) | IP |
| Computer Networks (CN) | IP,DS&A,AL&OS |
| Theory of Computation (TC) | IP,DM |

Regulations Governing the Diploma in Computing

1. These Regulations prescribe the requirements for the Diploma in Computing of the University of Newcastle and are made in accordance with the powers vested in the Council under By-Law 5.3.1.

2. Definitions
   In these Regulations, unless the context or subject matter otherwise indicates or requires:
   "course" means the programme of studies prescribed from time to time to qualify a candidate for the Diploma;
   "Dean" means the Dean of the Faculty;
   "Department" means the Department offering a particular subject and includes any other body so doing;
   "Diploma" means the Diploma in Computing;
   "Faculty" means the Faculty of Engineering;
   "Faculty Board" means the Faculty Board of the Faculty;
   "Schedule" means the Schedule of Subjects to these Regulations;
   "subject" means any part of the course for which a result may be recorded.

Admission to Candidature

3. To be eligible for admission to candidature for the Diploma, an applicant shall:
   (a) have satisfied the requirements for admission to a degree of the University of Newcastle or to a degree of another University approved for this purpose by the Faculty Board;
   (b) have such other qualifications approved by the Faculty Board for the purpose of admission to candidature.

4. The Faculty Board may require a candidate to complete work and/or examinations additional to the programme referred to in Regulation 6 if in its opinion the candidate has not reached the assumed standard of attainment on which the content of any of the subjects for the Diploma is based.

5. Enrolment
   (1) In any year a candidate shall enrol only in those subjects approved on the recommendation of the Head of the Department of Electrical Engineering and Computer Science by the Dean or the Dean's nominee.
   (2) 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.
   (3) A candidate will not be permitted to enrol in a subject the content of which in the opinion of the Faculty Board is substantially equivalent to work previously counted towards another degree or diploma, except to such extent as the Faculty Board may permit.

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6. Qualification for Admission to the Diploma

(1) To qualify for the award of the Diploma a candidate shall
(a) pass the Preliminary Subject referred to in the Schedule;
(b) pass ten other subjects from those listed in the Schedule, or subjects deemed by the Faculty Board to be their equivalent.

(2) The Head of the Department of Electrical Engineering and Computer Science may approve a project for inclusion in the candidate's programme. Such a project shall take the place of one of the ten other subjects.

7. Subject

(1) To complete a subject a candidate shall attend such lectures, tutorials, seminars, laboratory classes and field work and submit such written or other work as the Department shall require.

(2) To pass a subject a candidate shall complete it and pass such examinations as the Faculty Board shall require.

8. Standing

(1) The Faculty Board may grant standing in the course to a candidate, on such conditions as it may determine, in recognition of work completed in this University or another institution.

(2) Except for the Preliminary Subject, a candidate may not be granted standing for work which has already counted towards a degree to which that candidate has been admitted or is eligible for admission.

(3) A candidate shall not be granted standing in more than five subjects from the Preliminary Subject.

9. Prerequisites and Corequisites

(1) The Faculty Board, on the recommendation of the Head of the Department, may prescribe prerequisites and/or corequisites for any subject comprising the course.

(2) Except with the approval of the Dean granted after considering any recommendation made by the Head of the Department, no candidate may enrol in a subject unless that candidate has passed any subjects prescribed as its prerequisites at any grade which may be specified and has already passed or concurrently enrolled in or is already enrolled in any subjects prescribed as its corequisites.

(3) A candidate obtaining a Terminating Pass in a subject shall be deemed not to have passed that subject for prerequisite purposes.

10. Withdrawal

(1) A candidate may withdraw from a subject or the 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.

(2) A candidate who withdraws from a subject after the relevant date shall be deemed to have failed the subject save that, after consulting with the Head of the Department, the Dean may grant permission for withdrawal without penalty. The relevant date shall be:
   (a) in the case of a subject offered only in the first semester, the Monday of the 9th week of first semester;
   (b) in the case of a subject offered only in the second semester, the Monday of the 9th week of second semester;
   (c) in the case of any other subject, the Monday of the 3rd week of second semester.

11. Results

The result obtained by a successful candidate in a subject shall be:
Terminating Pass, Ungraded Pass, Pass, Credit, Distinction, or High Distinction.

12. Time Requirements

(1) Except with the special permission of the Faculty Board:
   (a) a full-time candidate shall complete the requirements for the Diploma in not less than one and not more than three calendar years from the commencement of the course;
   (b) a part-time candidate shall complete the requirements for the Diploma in not less than two and not more than five calendar years from the commencement of the course.

(2) A candidate who has been granted standing in accordance with Regulation 8 of these Regulations shall be deemed to have commenced the course from a date to be determined by the Dean.

13. Relocating Provision

In order to provide for exceptional circumstances arising in a particular case the Senate on the recommendation of the Faculty Board may relax any provision of these Regulations.

SCHEDULE OF SUBJECTS

Diploma in Computing

<table>
<thead>
<tr>
<th>Preliminary Subject</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to Programming (IP)</td>
<td></td>
</tr>
</tbody>
</table>

Other Subjects

| Data Structures and Algorithms (DS&A) | IP |
| Commercial Programming (CP) | IP |
| Assembly Language (AL) | IP |
| Comparative Programming Languages (CPL) | IP |
| Systems Analysis (SA) | IP |
| Systems Design (SD) | IP,SA |
| Microcomputers in Business (MB) | |
| Numerical Analysis (NA) | Mathematics I |
| Linear Algebra (LA) | Mathematics I |
| Discrete Mathematics (DM) | Mathematics I |

Regulations Governing Masters Degrees

Part I — General

1.0 These Regulations prescribe the conditions and requirements relating to the degrees of Master of Architecture, Master of Arts, Master of Commerce, Master of Computer Science, Master of Computing, Master of Education, Master of Educational Studies, Master of Engineering, Master of Engineering Science, Master of Letters, Master of Mathematics, Master of Medical Science, Master of Psychology (Clinical), Master of Psychology (Educational), Master of Science, Master of Scientific Studies, Master of Special Education and Master of Surveying.

2. In these Regulations and the Schedules thereto, unless the context or subject matter otherwise indicates or requires:
   "Faculty Board" means the Faculty Board of the Faculty responsible for the course in which a person is enrolled or is proposing to enrol;
   "programme" means the programme of research and study prescribed in the Schedule;
   "Schedule" means the Schedule of these Regulations pertaining to the course in which a person is enrolled or is proposing to enrol; and
   "thesis" means any thesis or dissertation submitted by a candidate.

3. These Regulations shall not apply to degrees conferred honoris causa.

4. A degree of Master shall be conferred in one grade only.

2. An application for admission to candidature for a degree of Master shall be made on the prescribed form and lodged with the Secretary to the University by the prescribed date.

3.1 To be eligible for admission to candidature an applicant shall:
   (a) have satisfied the requirements for admission to a degree of Bachelor in the University of Newcastle as specified in the Schedule; or
   (b) have satisfied the requirements for admission to a degree or equivalent qualification, approved for the purpose by the Faculty Board, in another tertiary institution; or
   (c) have such other qualifications and experience as may be approved by the Senate on the recommendation of the Faculty Board or otherwise as may be specified in the Schedule; and
   (b) have satisfied such other requirements as may be specified in the Schedule.

2. Unless otherwise specified in the Schedule, applications for admission to candidature shall be considered by the Faculty Board which may approve or reject any application.

3. An applicant shall not be admitted to candidature unless adequate supervision and facilities are available. Whether these are available shall be determined by the Faculty Board unless the Schedule otherwise provides.

4. To qualify for admission to a degree of Master a candidate shall enrol and satisfy the requirements of these regulations including the Schedule.
5. The programme shall be carried out:
(a) under the guidance of a supervisor or supervisors either appointed by the Faculty Board or as otherwise prescribed in the Schedule; or
(b) as the Faculty Board may otherwise determine.

6. Upon request by a candidate the Faculty Board may grant leave of absence from the course. Such leave shall not be taken into account in calculating the period for the programme prescribed in the Schedule.

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

(2) A candidate who withdraws from any subject after the relevant date shall be deemed to have failed in that subject unless granted permission by the Dean to withdraw without penalty.

The relevant date shall be:
(a) in the case of a subject offered only in the first semester, the Monday of the 9th week of the first semester;
(b) in the case of a subject offered only in the second semester, the Monday of the 9th week of the second semester;
(c) in the case of any other subject, the Monday of the 3rd week of the second semester.

(8.(1) If the Faculty Board is of the opinion that the candidate is not making satisfactory progress towards the degree then it may terminate the candidate's place based on such conditions as it deems fit.

(2) For the purpose of assessing a candidate's progress, the Faculty Board may require candidates to submit a report or reports on their progress.

(3) A candidate against whom a decision of the Faculty Board has been made under Regulation 8(3) of these Regulations may request that the Faculty Board cause the case to be reviewed. Such request shall be made to the Dean of the Faculty within seven days from the date of posting to the candidate the advice of the Faculty Board's decision or such further period as the Dean may accept.

(4) A candidate may appeal to the Vice-Chancellor against any decision made following the review under Regulation 8(3) of these Regulations.

In exceptional circumstances arising in particular cases, the Senate, on the recommendation of the Faculty Board, may relax any provision of these Regulations.

Part II — Examination and Results

10. The Examination Regulations approved from time to time by the Council shall apply to all examinations with respect to a degree of Master with the exception of the examination of a thesis which shall be conducted in accordance with the provisions of Regulations 12 to 16 inclusive of these Regulations.

11. The Faculty Board shall consider the results in subjects, the reports of examiners and any other recommendations prescribed in the Schedule and shall decide:
(a) to recommend to the Council that the candidate be admitted to the degree;
(b) in a case where a thesis has been submitted, to permit the candidate to resubmit an amended thesis within twelve months of the date on which the candidate is advised of the result of the first examination or within such longer period of time as the Faculty Board may prescribe;
(c) to require the candidate to undertake such further research, written or practical examinations as the Faculty Board may prescribe;
(d) not to recommend that the candidate be admitted to the degree, in which case the candidate shall be terminated.

Part III — Provisions Relating to Theses

12.(1) The subject of a thesis shall be approved by the Faculty Board on recommendation of the Head of the Department in which the candidate is carrying out the research for the thesis.

(2) The thesis shall not contain as its main content any work or material which has previously been submitted by the candidate for the purpose of any other secondary institution unless the Faculty Board otherwise permits.

13. The candidate shall give to the Secretary to the University three months written notice of intention to submit a thesis and the notice shall be accompanied by a synopsis of the thesis.

14.(1) The candidate shall comply with the following provisions concerning the presentation of a thesis:
(a) the thesis shall contain an abstract of approximately 200 words describing its content;
(b) the thesis shall be typed and bound in a manner prescribed by the University;
(c) three copies of the thesis shall be submitted together with:
(i) a certificate signed by the candidate that the main content of the thesis has not been submitted by the candidate for the degree of any other tertiary institution;
(ii) a certificate signed by the supervisor indicating whether the candidate has completed the programme and whether the thesis is of sufficient academic merit to warrant examination; and
(iii) if the candidate so desires, any documents or published work of the candidate whether bearing on the subject of the thesis or not.

(2) The Faculty Board shall determine the course of action to be taken should the certificate of the supervisor indicate that in the opinion of the supervisor the thesis is not of sufficient academic merit to warrant examination.

15. The University shall be entitled to retain the submitted copies of the thesis, accompanying documents and published work. The University shall be free to allow the thesis to be consulted or borrowed and, subject to the provisions of the Copyright Act, 1968 (Com), may issue it in whole or any part in photocopy or microfilm or other copying medium.

16.(1) For each candidate two examiners, at least one of whom shall be an external examiner (being a person who is not a member of the staff of the University) shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.

(2) If the examiners' reports are such that the Faculty Board is unable to make any decision pursuant to regulation 11 of these Regulations, a third examiner shall be appointed either by the Faculty Board or otherwise as prescribed in the Schedule.

SCHEDULE 6 — MASTER OF ENGINEERING

1. The Faculty of Engineering shall be responsible for the course leading to the degree of Master of Engineering.

2. To be eligible for admission to candidature an applicant shall:
(a) have satisfied the requirements for admission to a four year full-time or equivalent part-time Bachelor's degree in Engineering or Metallurgy from the University of Newcastle or any other approved university;
(b) have satisfied the requirements for admission to a three year full-time or equivalent part-time Bachelor's degree of the University of Newcastle or any other approved university and had completed to the satisfaction of the Faculty Board such work and examinations as determined by the Faculty Board;
(c) in exceptional cases produce evidence of such academic and professional attainments as may be approved by the Faculty Board on the recommendation of the Head of Department in which the applicant proposes to carry out the programme.

3.(1) An applicant shall nominate the Department in which it is proposed to carry out the programme.

(2) In the case of each applicant the Head of the nominated Department shall:
(a) make recommendations to the Faculty Board on the applicant's suitability for admission to candidature; and
(b) advise Faculty Board as to the adequacy or otherwise of supervision and the Department.

4. (1) To qualify for admission to the degree a candidate shall pass a programme of subjects approved by the Faculty Board on the recommendation of the Head of the nominated Department totalling not less than twelve units.

(2) The programme prescribed in sub-section (1) shall contain at least two but not more than four units consisting of the investigation of and report on a project specified by the candidate's supervisor or supervisors.

(3) The candidate's supervisor or supervisors referred to in sub-section (2) shall be appointed by the Faculty Board on the recommendation of the Head of the nominated Department.

5. A candidate may be granted standing by the Faculty Board on such conditions as the Faculty Board may think fit in recognition of work completed in this University or elsewhere.

6.(1) The programme shall be completed in not less than one academic year in the case of a full-time candidate or not less than two academic years in the case of a part-time candidate.

(2) Except with the permission of the Faculty Board, the programme shall be completed in not more than two years in the case of a full-time candidate and not more than three years in the case of a part-time candidate.

* For list of approved M.Eng. subjects see page 123 of this Handbook.
SCHEDULE 11 — MASTER OF SCIENCE

1. A candidate for the degree of Master of Science may be enrolled in either the Faculty of Engineering or the Faculty of Science. The Faculty in which the candidate is enrolled shall be responsible for the programme.

2. (1) To be eligible for admission to candidature in the Faculty of Science an applicant shall:

   (a) have satisfied all the requirements for admission to the degree of Bachelor of Science with honours Class I or Class II of the University of Newcastle or a degree, approved for this purpose by the Faculty Board, of this or any other university;

   (b) except with the permission of the Faculty Board, have not less than two academic years of full-time study (or part-time study equivalent) in an appropriate subject.

   (2) To be eligible for admission to candidature in the Faculty of Engineering an applicant shall:

   (a) have satisfied the requirements for admission to a degree in Engineering approved for this purpose by the Faculty Board, of this or any other university;

   (b) have satisfied all the requirements for admission to the degree of Bachelor of Science of the University of Newcastle or other approved university and have completed such work and passed such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of bachelor with second class honours in an appropriate subject;

   (c) in exceptional cases produce evidence of possessing such other qualifications as may be approved by the Faculty Board on the recommendation of the Head of the Department in which the applicant proposes to carry out the programme.

SCHEDULE 15 — MASTER OF SURVEYING

1. The Faculty of Engineering shall be responsible for the course leading to the degree of Master of Surveying.

2. To be eligible for admission to candidature an applicant shall:

   (a) have satisfied all the requirements for admission to the degree of Master of Surveying with honours Class I or Class II of the University of Newcastle or other approved university approved for this purpose by the Faculty Board;

   (b) have satisfied all the requirements for admission to the degree of Bachelor of Science of the University of Newcastle or other approved university and have completed such work and passed such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of bachelor with second class honours in an appropriate subject;

   (c) in exceptional cases produce evidence of possessing such other qualifications as may be approved by the Faculty Board on the recommendation of the Head of the Department in which the applicant proposes to carry out the programme.

3. To qualify for admission to the degree a candidate shall complete the satisfactory completion of the Faculty Board a programme consisting of:

   (a) the work and examinations as may be prescribed by the Faculty Board;

   (b) a thesis embodying the results of an original investigation or design.

4. The programme shall be completed:

   (a) in not less than one academic year except that, in the case of a candidate who has completed the requirements for a degree of Bachelor of Science with honours or a qualification deemed by the Faculty Board to be equivalent or who has had previous research experience, the Faculty Board may reduce this period to not less than one academic year; and

   (b) except with the permission of the Faculty Board, at not less than two academic years.

SCHEDULE 17 — MASTER OF COMPUTER SCIENCE

1. The Faculty of Engineering shall be responsible for the course leading to the degree of Master of Computer Science.

2. To be eligible for admission to candidature an applicant shall:

   (a) have satisfied all the requirements for admission to the degree of Bachelor of Computer Science with honours class I or class II of the University of Newcastle or an equivalent degree, approved for this purpose by the Faculty Board, of the University of Newcastle or any other university;

   (b) have satisfied all the requirements for admission to the degree of Bachelor of Computer Science with an equivalent degree, approved for this purpose by the Faculty Board, of another approved university and have completed such work and passed such examinations as the Faculty Board may have determined and have achieved a standard at least equivalent to that required for admission to a degree of bachelor with second class honours;

   (c) in exceptional cases produce evidence of possessing such academic or professional qualifications as may be approved by the Faculty Board on the recommendation of the Head of the Department of Electrical Engineering and Computer Science.

3. To qualify for admission to the degree a candidate shall complete the satisfactory completion of the Faculty Board a programme consisting of:

   (a) the subject Computer Science IV, and

   (b) a project prescribed by, and carried out under the direction of, the Head of the Department of Electrical Engineering and Computer Science.

4. The Faculty Board may grant standing to a candidate on such conditions as it may determine in respect of work undertaken by the candidate for an incomplete qualification. Standing shall not be granted for more than half the programme.

5. Except with the permission of the Faculty Board:

   (a) a full time candidate shall complete the programme in not less than two and not more than three calendar years from its commencement;

   (b) a part time candidate shall complete the programme in not less than three and not more than five calendar years from its commencement.

Approved Master of Engineering Science Subjects

The following subjects have been approved for inclusion in the Master of Engineering Science course programme. Not all subjects will be offered in any one year. For details of which subjects will be offered in 1988 consult the Department concerned.

Electrical and Computer Engineering

- EE511 Advanced Power Systems
- EE512 Variable Speed Drive Systems
- EE521 VLSI and Design Automation
- EE541 Control Computer Theory
- EE542 Control System Design
- EE543 Optimization Techniques
- EE544 Linear Systems Theory
- EE545 Nonlinear Systems Analysis
- EE546 Topics in System Design
- EE547 Topics in System Design
- EE551 Digital Communications
- EE552 Advanced Digital Signal Processing
- EE560 Computer Software
- EE570 Computer Systems
- EE580 Project
- EE589 Project
- EE590 Seminar
ME503 Design of Experiments for Engineering Research
ME505 Advanced Numerical Programming
ME507 Environmental Engineering
ME509 Introduction to Noise Pollution Control
ME510 Advanced Design Concepts
ME514 Computer Aided Design and Manufacturing
ME520 Bulk Materials Handling Systems I
ME520 Bulk Materials Handling Systems II
ME521 Conveying of Bulk Solids
ME522 Maintenance Engineering
ME545 Mechanics of Solids III
ME554 Fluid Mechanics III
ME554 Computation of Fluid Flows and Heat Transfer
ME573 Thermodynamics III
ME574 Heat Transfer II
ME581 Mathematical Programming II
ME582 Industrial Computations
ME583 Production Scheduling
ME584 Engineering Economics II
ME585 Numerical Control and Computer Aided Manufacturing
ME587 Operations Research — Fundamental Techniques
ME588 Operations Research — Planning, Inventory Control and Management
ME589 Simulation
ME599 Vibration and Noise Problems in Industry
ME600 Advanced Design Concepts II
ME621 Materials Handling and Transportation Systems
ME653 Turbulent Flows
ME654 Computation of Fluid Flow and Heat Transfer
ME681 Industrial Law
ME684 Project
ME685 Advanced Operations Research
ME687 Modelling of Management Problems
ME688 Probabilistic Models in Operations Research
ME697 Project/Seminar

ME698 Project/Seminar
ME699 Project/Seminar

ME701 Coal Combustion
ME712 Coal Technology
ME713 Furnace Engineering
GE908 Air Pollution Studies
GE909 Coal Analysis and Properties
GE910 Coal Matters in Coal
GE911 Coal Preparation
GE912 Metallurgical Aspects of Coal Utilisation
GE913 Mining Geology

Candidates may, if they wish, select subjects offered in other Faculties subject to the approval of the Faculty Board, Faculty of Engineering.

COMPUTER SCIENCE INFORMATION AND SUBJECT DESCRIPTIONS

About this Section
This section contains information for students enrolled in Deegrees and Diploma in Computer Science and the subjects of which these programs are composed.

Computer Science courses and subjects will be offered in the Faculty of Engineering from 1 January 1989 following the merger of the Department of Electrical and Computer Engineering and the Department of Computer Science to form the new Department of Electrical Engineering and Computer Science.

At the time of publication of this Handbook, a number of matters regarding the merger of the Departments remained to be resolved. However, in anticipation of the Computer Science programmes and subjects being offered in the Faculty of Engineering, the Faculty Board has indicated that it will continue, for the 1989 academic year, those policies and practices of the Faculty of Mathematics which operated in 1988 regarding grading of subjects and the progress requirements of Computer Science degree programs. The Computer Science degree subjects offered in the Faculty of Engineering in 1989 will be therefore essentially unchanged from those offered in the Faculty of Mathematics in 1988. Any student encountering difficulties as a result of the transfer of the Computer Science degree programs to the Faculty of Engineering should consult the Heads of the Departments of Electrical Engineering and Computer Science or the Faculty Secretary (room EA209) at the earliest opportunity.

Bachelor of Computer Science
The Regulations Governing the Ordinary Degree in Computer Science are published in Section 3 of this Handbook.

In order to qualify for a BCompSc degree, students must pass nine subjects. At least seven of these subjects must be from the Schedule, including three Part I subjects, the Part II subject Computer Science IIIA and one other Part III subject. In practice this means that a full-time student will typically take the following subjects:

First year: Computer Science I, Computer Engineering I, Mathematics I, X

Second year: Computer Science II, Mathematics BCS, Y

Third year: Computer Science IIIA, Computer Science IIIB.

X will normally be Part I subject and Y a Part II subject. Students may take any Part I subject from the list at the end of this section in the slot X. Slot Y will usually be a Part II subject and can include other Part II subjects from the Schedule. At present the only such subjects are Computer Engineering II and Data Processing II. Alternatively a student can choose a Part II subject from the list below.

Students who wish to transfer from some other degree and who have already taken Computer Science I and Mathematics I, together with two other Part I subjects, may in suitable cases be
Combined Degree Courses

The decision to take a combined degree course is usually taken at the end of a student’s first year of study in consultation with the Deans of the Faculties responsible for the two degrees. Permission to embark on a combined degree course will normally require an average of credit levels in first year subjects.

Combined degree regulations for BCompSc students have been approved for combined degrees with Computer Science and Arts, and Computer Engineering and Mathematics. Students interested in a combined degree course should discuss their plans with the appropriate Dean(s).

Faculty Policy on Computer Science Degrees and Diplomas

The following policies which operated in the Faculty of Mathematics in 1988 will be continued in the Faculty of Engineering for the 1989 academic year.

Review of Academic Progress

Acting under the Regulations Governing Unsatisfactory Progress, as set out in Volume 1 of the Calendar, the Faculty Board will review:

1. all full-time students who have failed to pass at least four subjects at the end of the second year of attendance;
2. all part-time students who have failed to pass at least four subjects at the end of the fourth year of attendance;
3. all students who have failed to pass at least four subjects after one full-time and two part-time years;
4. all students, whether part-time or full-time, who in their first year of attendance have a record of complete failure; and
5. all students who fail a compulsory subject twice, and may take action under the Regulations.

Unless there are mitigating circumstances, a student who fails any elective subject twice may not be permitted to enrol again in that subject.

Time Limits

The various degree and diploma regulations require that students complete the relevant course within specified time limits. Only in the most extenuating circumstances will the Faculty Board give permission for these to be exceeded. Students should consult the appropriate regulations for details of the limits applying to the course in which they are enrolled.

Other Faculty Policies

The policies of Faculty Board, Faculty of Engineering, are set out in Section 4 of this Handbook. These policies, with the exception of the Faculty Policies on Undergraduate Performance and Progress, will apply, where appropriate, to students enrolled in Computer Science degree and diploma programmes in 1989.
SECTION NINE

COMPUTER SCIENCE SUBJECT DESCRIPTIONS

Science IV and IVM students, and students who as part of any other Computer Science subject wish to take topics other than exactly as described in the relevant subject description, must first obtain permission from the Head of the Department of Electrical Engineering and Computer Science.

68110  COMPUTER SCIENCE I

Entry to this subject by students other than those enrolled in the BCompSc and BE (Computer Engineering) degree programmes is limited by quota. See the information above for details.

Hours 3 lecture hours and 2 laboratory hours per week.

Examinations Two 2-hour papers and one 3-hour mid-year paper.

Content

Introduction to the following aspects of computer science: The design of algorithms. The theory of algorithms. How algorithms are executed as programs by a computer. The functions of system software (computer and operating systems). Applications of computers. Social issues raised by computers. An extensive introduction to programming in Pascal and a shorter introduction to programming in FORTRAN 77.

Texts


and other

Koffman, E.D., Problem Solving and Structured Programming in Pascal 2nd ed. (addition Wesley 1985)

or

Cooper, D., Condensed Pascal (Norton 1987)

68210  COMPUTER SCIENCE II

Prerequisite Computer Science I

Hours 4 lecture hours and approx. 4 hours of tutorials and practical work per week.

Examinations By topic

Content

This subject comprises the four topics:

- Assembly Language
- Commercial Programming
- Comparative Programming Languages
- Data Structures & Algorithms

Descriptions of these topics appear as the subject descriptions for the Diploma in Computer Science subjects of the same names in Section Six.

68210  DATA PROCESSING II

Prerequisite Computer Science I

Hours 4 lecture hours and approx 4 hours of tutorials and practical work per week

Examinations By topic

Content

This subject comprises the four topics:

- Microcomputers in Business
- Systems Analysis
- Systems Design
- Software Methods and Techniques

Descriptions of these topics appear as the subject descriptions for the Diploma in Computer Science subjects of the same names in Section Six.

683200  COMPUTER SCIENCE IIIA

Prerequisite Computer Science II passed in or since 1987

Hours 4 lecture hours per week, with tutorials as required, plus a 100-hour project

Examination By topic, plus a report on the project undertaken

Content

This subject comprises a project, and the four topics:

- Software Engineering Principles
- Compiler Design
- Operating Systems
- Database Design

Descriptions of these topics appear as the subject descriptions for the Diploma in Computer Science subjects of the same names in Section Six.

683300  COMPUTER SCIENCE IIIB

Prerequisite Computer Science II passed in or since 1987 and Mathematics II CS

Hours 4 lecture hours per week, with tutorials as required, plus a 100-hour project

Examination By topic, plus a report on the project undertaken

Content

This subject comprises a project, and the four topics:

- Assembly Language
- Commercial Programming
- Comparative Programming Languages
- Data Structures & Algorithms

Descriptions of these topics appear as the subject descriptions for the Diploma in Computer Science subjects of the same names in Section Six.

682000  COMPUTER SCIENCE IIIII

This subject is available only to students who were enrolled prior to 1986 and require it for transition purposes.

Prerequisite Mathematics I

682900  COMPUTER SCIENCE IIIIII

This subject is available only to students who were enrolled prior to 1986 and require it for transition purposes.

Prerequisite Mathematics I

683000  COMPUTER SCIENCE IIIIII

This subject is available only to students who were enrolled in the Bachelor of Computer Science degree programme.

Prerequisite Mathematics I

Hours To be advised

Examination To be advised

Content

Electrical and Computer Engineering I is an introductory course to electrical circuits and digital systems. The lectures are supported by tutorials and extensive laboratory work. The laboratory component includes an introduction to oscilloscopes, function generators, electronic power supplies and other laboratory instruments.

Part 1


Part 2


532600  COMPUTER ENGINEERING II

Prerequisites Computer Engineering I, Mathematics I

Hours To be advised

Examination To be advised

Content

A course of lectures and practical exercises on the hardware and software aspects of computer systems design, with particular emphasis on microprocessor systems.

For the 1987 course will be taught in four sections:

(a) Logic design & computer architecture (BE36G2)
(b) Multiprogramming and operating systems (BE46G3)
(c) Digital design (EE326)
(d) Microprocessor interfacing & assembly language (EE325)

Texts

Moylan, P.J., Assembly Language for Engineers (Ellis Horwood 1987)


533600  COMPUTER ENGINEERING III

Students who have completed Computer Engineering II may not enrol in this subject.

Prerequisites Computer Engineering I, Mathematics I

Hours To be advised
EXAMINATION To be advised
Content To be determined by the Head of Department.

684100 COMPUTER SCIENCE IV

This subject is the one-year full-time or two-year part-time honours subject in the BComSp(Hons) and BMath(Hons) degrees. A student desiring admission to this subject should apply in writing to the Head of Department before 20 December of the preceding year.

Prerequisites Computer Science III

Hours Approx 162 lecture hours plus a 400 hour project.
Examination Six 2-hour papers or equivalent assessment. A thesis relating to the project undertaken.

Content
d A selection of six Part IV topics, chosen from the Part IV Computer Science Topics. (In exceptional circumstances the Head of Department may approve other topics). Each topic is worth 10% of the final assessment.

Students are also required to complete a substantial practical project (involving approximately 400 hours of work) prescribed by the Head of Department. The results of the project, worth 40% of the final assessment, must be embodied in a thesis. Work on the project normally starts early in February.

Students must advise the Head of the Department of Electrical Engineering and Computer Science at the beginning of the year which six topics have been selected. Information about projects and a list of Part IV topics can be obtained from the Departmental Office at the beginning of the academic year.

684101 COMPUTER SCIENCE IV M

This subject is available only to students enrolled in the coursework Master of Computing degree. A student desiring admission to this subject should apply in writing to the Head of Department before 20 December of the preceding year.

Prerequisite Computer Science III

Hours Approx 270 lecture hours plus a 1000 hour project.
Examination Ten 2-hour papers or equivalent assessment. A thesis relating to the project undertaken.

Content

d A selection of ten topics, normally consisting of at least six topics chosen from the list of Part IV computer science topics together with additional topics chosen from Part III computer science topics. (In exceptional circumstances the Head of Department may approve other topics.) Each topic is worth 5% of the final assessment.

Students are also required to complete a major research project (involving approximately 1000 hours of work) prescribed by the Head of Department. The results of the project, worth 50% of the final assessment, must be embodied in a thesis. Work on the project normally starts early in February.

Students should advise the Head of the Department of Computer Science at the beginning of each year which topics have been selected. Information about projects can be obtained from the

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DIPLOMA IN COMPUTER SCIENCE SUBJECTS (REVISED REGULATIONS)

Summary

The following are subjects in the (revised) postgraduate Diploma in Computer Science. Some of them may also be available as subjects, topics or units in other subjects. The specification of unit value refers to their value in the Diploma in Computer Science.

Subjects taught by the Department of Electrical Engineering and Computer Science and Management are described in this section. Subjects taught by the Department of Mathematics and Statistics are described in the relevant Handbooks:

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<thead>
<tr>
<th>Subject</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Preliminary Subject</td>
<td></td>
</tr>
<tr>
<td>Introduction to Programming</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Subjects with a Unit Value of Two</td>
<td></td>
</tr>
<tr>
<td>Assembly Language</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Cognitive Science I</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Cognitive Science II</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Comparative Programming Languages</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Commercial Programming</td>
<td>Management</td>
</tr>
<tr>
<td>Data Structures and Algorithms</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Discrete Mathematics</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Microprocessors and Applications</td>
<td>Management</td>
</tr>
<tr>
<td>Numerical Analysis</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Random Processes and Simulation</td>
<td>Mathematics</td>
</tr>
<tr>
<td>Software Methods and Techniques</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>System Analysis</td>
<td>Management</td>
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<tr>
<td>System Design</td>
<td>Management</td>
</tr>
<tr>
<td>Switching Theory and Logical Design</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Subjects with a Unit Value of Three</td>
<td></td>
</tr>
<tr>
<td>Artificial Intelligence Programming Techniques</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Compiler Design</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Computer Graphics</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Computer Networks</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Database Design</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Operating Systems</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Software Engineering</td>
<td>EE &amp; Comp Sc.</td>
</tr>
<tr>
<td>Theory of Computation</td>
<td>EE &amp; Comp Sc.</td>
</tr>
</tbody>
</table>

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680116 PROJECT

Projects are allocated from a list available from the Departmental Office.

680114 INTRODUCTION TO PROGRAMMING

Hours 2 lecture hours per week for first semester, plus tutorials and practical work.

Examination Assignments and a 2-hour paper

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680104 ARTIFICIAL INTELLIGENCE PROGRAMMING TECHNIQUES

Prerequisite Introduction to Programming

Hours 2 lecture hours per week for first semester, plus tutorials and practical work.

Examination One 2-hour paper and assignments

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680106 COMMERCIAL PROGRAMMING

Prerequisites Introduction to Programming or equivalent

Hours 2 lecture hours per week for first semester.

Examination One 2-hour paper plus progressive assessment

---

680124 COGNITIVE SCIENCE I

Prerequisite Nil

Hours 2 lecture hours per week for one semester.

Examination Assignments and final examination

---

680119 ASSEMBLER LANGUAGE

Prerequisite Introduction to Programming

Hours 2 lecture hours per week for one semester, plus tutorials and practical work.

Examination Assignments and a 2-hour paper

---

680125 COGNITIVE SCIENCE II

Prerequisite Cognitive Science I

Hours 2 lecture hours per week for one semester

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SECTION NINE

COMPUTER SCIENCE SUBJECT DESCRIPTIONS

Aho, A.V. & Ullman, J.D.
The Theory of Parsing, Translation and Compiling (Prentice-Hall 1972)

Donovan, J.J.
System Programming (McGraw-Hill 1972)

Introduction to Computer Construction with UNIX (Prentice-Hall 1985)

Wale, W.M. & Goos, G.
Compiler Construction (Springer-Verlag 1984)

680106 COMPUTER GRAPHICS

Prerequisite: Introduction to Programming

Hours: 2 lecture hours per week for one semester; plus tutorials and practical work

Examination: Assignments and a 2-hour paper

Content

This course will examine the principles underlying the comparative study of programming languages. It will consider the essential control and data structure components of a programming language, and identify instances of those components in various languages. There will also be a brief introduction to the notions and techniques of program translation via compilers and interpreters. The programming languages SNOBOL and C will be introduced during this course, to broaden the range of languages available for comparison.

Text

Pratt, T.W.
Programming Languages - Design and Implementation (Prentice Hall, 2nd ed. 1984)

680107 COMPILER DESIGN

Prerequisite: Assembly Language and Operating Systems

Hours: 2 lecture hours per week for one semester plus tutorials and practical work

Examination: One 2-hour paper plus assignments

Content

Introduction to the theory of grammar; lexical analyzers, parsing techniques, object code generation, design of interpreters, global and peephole optimization. Runtime support, error management, translator writing systems.

The course consists of lectures and a project assignment.

Text

Aho, A.V., Sethi, R., & Ullman, J.D.
Compilers: Principles, Techniques and Tools (Addison-Wesley 1986)

References

Aho, A.V. & Ullman, J.D.
Principles of Compiler Construction (Addison-Wesley 1977)

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680110 COMPUTER NETWORKS

Prerequisite: Introduction to Programming, Data Structures & Algorithms, Assembly Language

Hours: 2 lecture hours per week for one semester

Examination: One 2-hour paper and assignments

Content

Introduction to data communication networks. Topics include network protocols, transmission media, network protocols, ISO/OSI, public data networks, local area networks and distributed systems.

Text

Halston, P.
Data Communications, Computer Networks and OSI 2nd edn (Addison-Wesley 1988)

680112 DATA STRUCTURES AND ALGORITHMS

Prerequisite: Introduction to Programming

Hours: 2 lecture hours per week for one semester, plus tutorials and practical work

Examination: One 2-hour paper and assignments

Content

Basic data structures and the design and analysis of algorithms which use these data structures are investigated. Topics covered will include: basic concepts and terminology, types of systems (hierarchical, relational, network, inverted list), physical/logical system design, data design, relational theory, relational algebra, relational calculus, data integrity/recovery, security, concurrency, distributed systems. A number of relational database systems will be studied in detail during the course.

Text

Nil

References

Dutt, C.J.
An Introduction to Database Systems Vol 1, 4th edn (Addison-Wesley 1990)

440131 MICROCOMPUTERS IN BUSINESS

Hours: 2 lecture hours per week for first term plus workshops

Examination: One 2-hour paper plus progressive assessment

Content

The course provides a practical introduction to microcomputers and their application in the business environment. During the workshop sessions students will gain "hands on" experience using software packages such as the electronic spreadsheets, database management systems and word processors.
503003 MICROPROCESSOR SYSTEMS AND APPLICATIONS
Prerequisite Assembly Language & Operating Systems
Hours 3 hours per week for second half of year
Fourteen hours of laboratory exercises dealing with hardware and microprocessor hardware and software.
Reference Cantoni, A.
A//Introduction to Microprocessor Systems: Course Notes, Department of Electrical and Computer Engineering

680120 OPERATING SYSTEMS
Prerequisite Introduction to Programming
Hours 2 lecture hours per week for one semester, plus tutorials and practical work
Examination Assignments and a 2-hour paper
Content This course provides an introduction to operating system structure and design. The course begins with a review of process management and inter-process synchronisation, covered as part of the Assembly Language course. New topics covered include: advanced synchronisation techniques, deadlock detection, memory management including virtual storage techniques, multiprocessing and file systems.

The emphasis will be on practical operating systems, and where possible reference will be made to existing systems currently in use.

Texts Deitel, H.M.
A//Introduction to Operating Systems (Addison-Wesley 1986)

680117 SOFTWARE ENGINEERING
Prerequisite Introduction to Programming, Data Structures & Algorithms, Assembly Language & Operating Systems
Hours 2 lecture hours per week (first semester), plus a major assignment (second semester)
Examination One 2-hour paper plus assignment
Content After a brief explanation of the nature and life-cycle of large software systems, the software crisis which they have created, and the desirable properties of well-designed systems, the lecture explores the nature of stable systems in the natural world and in engineering and consider how humans think about, remember and create complex systems. This leads to a re-evaluation of the principles and techniques used in the construction of major software systems, offering new insights into the concepts of modularity and hierarchical structure.

Texts
Kendzy, J.L.
Software Engineering Principles
Notes available from Computer Science Office

533902 SWITCHING THEORY AND LOGICAL DESIGN
Hours 3 hours of lectures, tutorials and practical work per week for the First Semester
Examination Progressive assessment and final examination
Content Boolean algebra, combinatorial logic, logic circuits, minimisation 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.
Lectures will be supplemented by practical assignments on logic trainers and some tutorial sessions.

Texts
Mano, M.M.
Digital Design (Prentice Hall)

441213 SYSTEMS ANALYSIS
Prerequisite Experience of at least one programming language
Hours 2 lecture hours per week for first semester
Examination One 2-hour paper plus progressive assessment
Content Structured Analysis and Design Methodology will be introduced. Specific topics include: characteristics of a system, information systems, the role of the systems analyst, the system life-cycle, interview techniques, report writing, documentation techniques, data flow diagrams, data dictionary, flowcharts, etc, control analysis, implementation techniques.

Texts To be advised

440124 SYSTEMS DESIGN
Prerequisite Systems Analysis
Hours 2 lecture hours per week for second semester
Examination One 2-hour paper plus progressive assessment
Content Using techniques introduced in the Systems Analysis course students will work in small groups to design and implement small-scale computer-based information processing systems. Specific topics include: file design techniques, form design, security controls and backup, system testing and implementation, the ongoing maintenance of systems.

Text To be advised

680121 THEORY OF COMPUTATION
Prerequisite Introduction to Programming, Discrete Mathematics
Hours 2 lecture hours per week for one semester
Examination One 2-hour paper and assignments
Content This course gives an introduction to theoretical computer science, covering material in the areas of automata theory, computability and formal languages. Topics covered will be selected from the following: various types of automata including deterministic, non-deterministic, probabilistic, pushdown, finite, stack, linear and timed-tape bounded; Turing machines including computability, uncomputability, universality; formal languages and grammars; complexity theory.

Texts To be advised

References Lewis, H.R. and Papadimitriou, C.H.
Elements of the Theory of Computation (Prentice Hall 1981)

Aho, A.V., Hopcroft, J.E. and Ullman, J.D.
The Design and Analysis of Computer Algorithms (Addison-Wesley 1974)

Cohen, D.A.
Introduction to Computer Theory (John Wiley 1986)

Caryle, M.R. and Johnson, D.S.
Computers and Intractability (Freeman 1979)

Hopcroft, J.E., Ullman, J.D.
Introduction to Automata Theory, Languages and Computation (Addison-Wesley 1979)

DIPLOMA IN COMPUTER SCIENCE (OLD REGULATIONS)
The diploma is offered for the first time in the 1979-80 academic year. The diploma is offered only for the first time as the Diploma in Computer Science. Some of the requirements for the diploma may be available as subject credits in the degree programs in other faculties.

DIPLOMA IN COMPUTER SCIENCE (NEW REGULATIONS)
The diploma is offered for the first time in the 1979-80 academic year. The diploma is offered only for the first time as the Diploma in Computer Science. Some of the requirements for the diploma may be available as subject credits in the degree programs in other faculties.
them, denotational semantics, in detail.

Text
Gordon, M.J.C.
The Denotational Description of Programming Languages (Springer Verlag 1979)

References
Milner & Strachey

Stoy
Denotational Semantics: The Scott-Strachey Approach to Programming Language Theory (MIT Press 1977)

680103 ARTIFICIAL INTELLIGENCE
Prerequisite Programming Languages & Systems or Artificial Intelligence Programming Techniques
Hours 2 lecture hours per week (one semester)
Examination One 2-hour paper

Content
This course will provide an overview of Artificial Intelligence, covering some or all of the following topics: introduction and history; game playing; representation of knowledge; natural language processing; expert systems; automatic deduction; search techniques; computer vision; computer learning; philosophical, psychological and social issues.

References
Barr & Feigenbaum
The Handbook of Artificial Intelligence (Pitman 1981)

Boden
Artificial Intelligence and Natural Man (Harvester Press 1977)

Charniak & McDermott
Introduction to Artificial Intelligence (Addison-Wesley 1985)

Nilsson
Problem Solving Methods in Artificial Intelligence (McGraw-Hill 1971)

Winston
Artificial Intelligence, 2nd edn (Addison-Wesley 1984)

680110 CONCURRENCY, COMPLEXITY AND VLSI
Prerequisite Computer Science III or equivalent
Hours 2 lecture hours per week (one semester)
Examination One 2-hour paper and assignments

Content
This course provides an introduction to various aspects of VLSI systems. The fundamental ideas of VLSI design are introduced together with a description of the types of software design tools used. The opportunities which VLSI offers for the development of non-conventional computational structures and algorithms appropriate for machines with very many parallel processing elements and a high level of concurrency are discussed.

References
Evans, D.J. (ed.)
Parallel Processing Systems (Cambridge University Press 1983)

Hopcroft, J.E. & Ullman, J.D.
Introduction to Automata Theory, Languages and Computation (Addison-Wesley 1979)

Kuck, D.J., Lawrie, D.H. & Samb, A.H. (eds)

Mead, C.A. & Conway, L.A.
Introduction to VLSI Systems (Addison-Wesley 1980)

Savage, J.E.
The Complexity of Computing (Wiley 1976)

Tratt, J.F. (ed)

Ullman, J.D.
Computational Aspects of VLSI (Computer Science Press 1984)

SUBJECT COMPUTER NUMBERS

The following subject computer numbers are presented as an aid in the completion of enrollment and variation of programme forms. They are set out in the following course order:

1. Chemical Engineering — BE Programme
2. Civil Engineering — BE Programme
3. Electrical and Computer Engineering — BE Programme
4. Materials Engineering — BE Programme
5. Mechanical and Industrial Engineering — BE Programme
6. Surveying — BSurv Programme
7. MEngSc Subjects

Note:
1. The computer numbers of Approved Elective Subjects available in other faculties are given in the list of those subjects at the end of Section 6 of this Handbook.
2. Transition Subjects are marked *.

Bachelor of Engineering Computer Numbers

<table>
<thead>
<tr>
<th>Subject Name</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE141</td>
<td>511108</td>
</tr>
<tr>
<td>CHE151</td>
<td>511109</td>
</tr>
</tbody>
</table>
| CHE152       | 511110 *
| CHE153       | 511111 |
| GE151        | 501102 |
| Mathematics  | 661100 |
| 1            | 721100 |
| Physics IA   | 741200 |
| Physics IB   | 741300 |
| Process Analysis I | 512224 *
| Process Analysis I | 512231 |
| Structures and Process Vessel Design | 512225 *
| Chemistry Laboratory | 512230 |
| Separation Processes I | 512226 * |
## Bachelor of Engineering Subject Computer Engineering

### Third Year Subjects

<table>
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<tr>
<th>Code</th>
<th>Subject</th>
<th>UE/BE Subjects</th>
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<tbody>
<tr>
<td>512232</td>
<td>ChE262 Transfer Processes I</td>
<td>Engineering</td>
</tr>
<tr>
<td>512228</td>
<td>ChE272 Fluid Mechanics</td>
<td>Engineering</td>
</tr>
<tr>
<td>512229</td>
<td>ChE291 Laboratory</td>
<td>Engineering</td>
</tr>
<tr>
<td>722000</td>
<td>Chemistry IA</td>
<td>Engineering</td>
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<tr>
<td>722400</td>
<td>Chemistry IIC</td>
<td>Engineering</td>
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<tr>
<td>663110</td>
<td>EM2CO Vector Calculus and Differential Equations</td>
<td>Engineering</td>
</tr>
<tr>
<td>662111</td>
<td>EM2BD Complex Analysis and Linear Algebra</td>
<td>Engineering</td>
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</tbody>
</table>

### Industrial Experience Units

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject</th>
<th>UE/BE Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>513244</td>
<td>*ChE300 Selected Topics in Chemical Engineering</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513109</td>
<td>ChE342 Process Analyisis II</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513238</td>
<td>ChE343 Process Analyisis II</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513226</td>
<td>*ChE351 Equipment Design</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513227</td>
<td>ChE352 Process Engineering</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513228</td>
<td>*ChE353 Process Economics</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513229</td>
<td>*ChE354 Electrochemistry and Corrosion</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513239</td>
<td>ChE355 Transfer Processes II</td>
<td>Industrial Experience</td>
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<tr>
<td>513251</td>
<td>*ChE362 Solids Handling and Minerals Processing</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513240</td>
<td>ChE363 Separation Processes</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513232</td>
<td>ChE371 Kinetics and Thermodynamics</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513233</td>
<td>ChE372 Fuel Technology I</td>
<td>Industrial Experience</td>
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<tr>
<td>513234</td>
<td>ChE373 Furnace Heat Transfer</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513241</td>
<td>ChE374 Theory of Metallurgical Processes</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513242</td>
<td>ChE383 Modelling of Processes</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513236</td>
<td>ChE391 Laboratory</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>513243</td>
<td>ChE392 Extractive Metallurgy Laboratory</td>
<td>Industrial Experience</td>
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### Fourth Year Subjects

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### CIVIL ENGINEERING — BE SUBJECTS

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### Fourth Year Subjects

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### ELECTRICAL, AND COMPUTER ENGINEERING — BE SUBJECTS

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**MATERIALS ENGINEERING — BE SUBJECTS**

**First Year Subjects**
- 661100 Mathematics I
- 721100 Chemistry I
- 741200 Physics IA
- 741300 Physics IB
- 531105 CE111 Mechanics and Structures
- 501100 GE101 Introduction to Engineering
- 501100 GE151 Introduction to Materials Science
- 541104 ME111 Graphics and Engineering Drawing

**Second Year Subjects**
- 662110 EM220 Complex Analysis and Linear Algebra
- 662111 EM2BD Computer Aided Design and Manufacturing
- 500001 GE205 Engineering Computations I
- 500002 GE205 Engineering Computations II
- 632002 Mat201 Properties of Materials
- 632005 Mat203 Suite of Materials
- 632004 Mat204 Examination of Materials
- 632005 Mat205 Materials Engineering Laboratory

**MECHANICAL AND INDUSTRIAL ENGINEERING — BE SUBJECTS**

**First Year Subjects**
- 661100 Mathematics I
- 741200 Physics IA
- 741300 Physics IB
- 521105 CE111 Mechanics and Structures
- 531206 EI100 Electrical and Computer Engineering I
- 501103 GE101 Introduction to Engineering
- 501102 GE151 Introduction to Materials Science
- 541104 ME111 Graphics and Engineering Drawing

**Second Year Subjects**
- 692201 EM2AS Applied Statistics
- 662310 EM2CO Vector Calculus and Differential Equations
- 500002 GE204 Engineering Computations I
- 500002 GE205 Engineering Computations II
- 531206 EI100 Electrical and Computer Engineering I
- 501103 GE101 Introduction to Engineering
- 541104 ME111 Graphics and Engineering Drawing

**Third Year Subjects**
- 633005 MA205 Materials Engineering Laboratory
- 633100 MA311 Selection and Use of Materials
- 633312 MA312 Ceramic Science and Technology
- 633313 MA313 Polymer Science and Technology
- 633314 MA314 Composites in Engineering
- 633315 MA315 Fabrication of Metals
- 633316 MA316 Ferrous Alloys in Mechanical Design
- 633355 MA355 Electrochemistry and Corrosion

**Fourth Year Subjects**
- 644102 MA412 Failure of Materials in Mechanical Design
- 634113 MA413 Mechanical and Physical Properties of Metals

**Industrial Experience Units**
- 531302 EE201 Industrial Experience
- 531303 EE203 Industrial Experience
- 531304 EE204 Industrial Experience
- 531305 EE205 Industrial Experience

**SURVEYING — BSurr SUBJECTS**

**First Year Subjects**
- 661100 Mathematics I
- 741200 Physics IA
- 741300 Physics IB
- 521105 CE111 Mechanics and Structures
- 501103 GE101 Introduction to Engineering
- 501102 GE151 Introduction to Materials Science
- 541104 ME111 Graphics and Engineering Drawing

**Second Year Subjects**
- 692201 EM2AS Applied Statistics
- 662310 EM2CO Vector Calculus and Differential Equations
- 500002 GE204 Engineering Computations I
- 500002 GE205 Engineering Computations II
- 531206 EI100 Electrical and Computer Engineering I
- 501103 GE101 Introduction to Engineering
- 541104 ME111 Graphics and Engineering Drawing
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<td>532333 *C3E302</td>
<td>530164 EE512 Variable Speed Drive Systems</td>
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<td>530165 EE521 VLSI and Design Automation</td>
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**Master of Engineering Science Computer Numbers**

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**Mechanical and Industrial Engineering SUBJECTS**

- 540137 ME503 Design of Experiments for Engineering Research
- 540143 ME505 Advanced Numerical Programming
- 540144 ME507 Environmental Engineering
- 540145 ME509 Introduction to Noise Pollution Control
- 540146 ME510 Advanced Design Concepts I
- 540147 ME514 Computer Aided Design and Manufacturing
- 540148 ME519 Bulk Materials Handling Systems I
- 540149 ME520 Bulk Materials Handling Systems II
- 540154 ME521 Conveying of Bulk Solids
- 540158 ME537 Thermodynamics III
- 540159 ME534 Heat Transfer II
- 540161 ME582 Industrial Computations
- 540163 ME583 Production Scheduling
- 540164 ME584 Engineering Economics II
- 540165 ME585 Numerical Control and Computer Aided Manufacturing
- 540166 ME587 Operations Research — Fundamental Techniques
- 540167 ME588 Operations Research — Planning, Inventory Control and Management
- 540168 ME589 Simulation
- 540170 ME590 Vibration and Noise Problems in Industry
- 540177 ME590 Advanced Design Concepts II
- 540178 ME592 Materials Handling and Transportation Systems
- 540179 ME593 Turbulent Flows
- 540183 ME595 Computation of Fluid Flow and Heat Transfer
- 540189 ME594 Project — 2 units
- 540176 ME595 Advanced Operations Research
- 540184 ME596 Modelling of Management Problems
- 540185 ME598 Probabilistic Models in Operations Research
- 540186 ME599 Project/Seminar — 2 units
- 540187 ME598 Project/Seminar — 3 units
- 540188 ME599 Project/Seminar — 4 units
- 540191 ME599 Industrial Law