The University of Newcastle Calendar consists of the following volumes:

Volume 1  Faculty of Architecture Handbook
Volume 2  Faculty of Art and Design Handbook
Volume 3  Faculty of Arts and Social Science Handbook
Volume 4  Faculty of Economics and Commerce Handbook
Volume 5  Faculty of Education Handbook
Volume 6  Faculty of Engineering Handbook
Volume 7  Faculty of Law Handbook
Volume 8  Faculty of Medicine and Health Sciences Handbook
Volume 9  Faculty of Music Handbook
Volume 10  Faculty of Nursing Handbook
Volume 11  Faculty of Science and Mathematics Handbook
Volume 12  Legislation
Volume 13  University Bodies and Staff

Also available are the Undergraduate Guides

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

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The colour band Lapis Lazuli BCC150 on the cover is the lining colour of the hood of Bachelors of Engineering of this University.

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**Section Ten**

**General Information**
Dean's Foreword

On behalf of the staff of the Faculty of Engineering, I wish to extend a 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.

Having chosen to study in one of the fields of Engineering, 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. While these problems will be many and varied, none will be 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 of 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 has broadened. 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 application of research to the solution of problems associated with industry and the community. For this reason, the role of a university engineering faculty in applied and industrially orientated research is an important one. In this respect it is noteworthy that this Faculty of Engineering, through its research and associated projects undertaken on behalf of Australian industry, is making a major contribution and has attained national and international prominence. The interaction between the research and teaching functions is invaluable to the maintenance of standards and the professional relevance of course curricula.

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-curricular 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. I would also encourage you to take part in the decision-making processes of the Faculty, either through membership of the Faculty and Departmental Boards, or by supporting the students elected to those positions.

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.

Graham C. Goodwin
Dean
section one
Faculty Staff

PRINCIPAL OFFICERS

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Professors
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Professor of Industrial Engineering - position vacant
Faculty Information

About This Section
This section contains general information about the Faculty of Engineering and the courses which are offered within that faculty. Relevant University Rules and Course Programs 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.

As course and University requirements do not remain static, students are advised to purchase a copy of the Faculty Handbook annually in order to become aware of changes and to retain those Handbooks so as to provide a record of the content studied.

COURSE AND ENROLMENT ENQUIRIES
Enquiries regarding course requirements and general matters such as University Rules and procedures, Faculty policies, admission, enrolment and re-enrolment, variations of program and course transfer may be directed to the Faculty Office - call at Room EA206 or telephone (049) 21 6065.

ACADEMIC ADVICE
Academic advice and general enquiries regarding the content of particular courses may be obtained from the relevant Head of Department or from the Course Coordinator of the relevant course.

PERSONAL COUNSELLING
Students may wish to discuss matters relating to course difficulties or options with the Faculty Secretary, other Faculty Office staff or the relevant Course Coordinator.

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.
STUDENTS WITH DISABILITIES

Students with disabilities may wish to consult the Faculty's Adviser to Students with Disabilities, Associate Professor D.H. Wood of the Department of Mechanical Engineering, top Floor, D.W. George Building. Telephone 21 6200 for an appointment.

The Faculty

The Faculty of Engineering is constituted by the Council of the University and consists of the Department of Chemical Engineering, the Department of Civil Engineering and Surveying, the Department of Computer Science, the Department of Electrical and Computer Engineering and the Department of Mechanical Engineering.

The Faculty Board, Faculty of Engineering, is charged with conducting the academic affairs of the Faculty. Membership of the Faculty Board includes the Vice-Chancellor (ex officio), the Dean of the Faculty, the members of the full-time academic staff of the departments comprising 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.

DEGREES AND DIPLOMAS

The awards which may currently be made by the Faculty are listed below.

Bachelor Degrees

Bachelor of Computer Science (BCompSc)
Bachelor of Chemical Science (Honours) (BCompSc(Hons))
Bachelor of Engineering (BE), which may be awarded as a Bachelor of Engineering (BE) degree courses are offered in the Faculty is provided below. The detailed Course Programs appear in Section 5 of the Handbook.

COMPUTER SCIENCE

The Bachelor of Computer Science (BCompSc) degree course has been designed to equip students with an excellent background for a professional career in the computer industry or as a programmer or systems analyst in industry or commerce.

The course program is accredited by the Australian Computer Society (ACS) and meets the highest academic requirements for membership of the Society.

The BCompSc program may be completed by three years of full-time study or part-time equivalent. Combined degree programs are also available (see below).

Honours in Computer Science

The Bachelor of Computer Science (Honours) degree is a separate degree program which may be taken full-time over one year or part-time over two years. Candidates for this degree must have normally completed the BCompSc program with a creditable performance, however, graduates in other disciplines with a substantial background and a creditable performance in computer science may be considered for admission.

ENGINEERING

Bachelor of Engineering (BE) degree courses are offered in the following specialisations:

- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Environmental Engineering

Industrial Engineering [no new enrolments]

Mechanical Engineering

Each engineering degree program 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 years of full-time study with years of part-time study as their commitments permit. It is also possible to follow a 'thick sandwich' pattern of attendance by which full-time study and full-time industrial experience are undertaken in alternate years. It is recommended that at least the final year of study be taken on a full-time basis.

Engineering courses are highly structured and, although each follows a similar pattern, the content of the courses naturally differs according to the needs of the speciality concerned.

In Year I students study mathematics and the basic sciences as well as commencing studies in the engineering sciences. Year II programs 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 program. In the final year these studies are extended by the inclusion of more highly specialised topics. The programs also make provision for non-engineering elective subjects to be included in the degree program. The final year project, in which students may undertake extensive studies in an area of special interest, is a particular feature of engineering programs at Newcastle.

Engineering programs are regularly reviewed in order to incorporate the latest technological and professional developments relevant to each specialisation. The current Course Programs are set out in Section 5 of this Handbook.

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

Honours

Awards of honours are made on the basis of performance during the entire course program (see Faculty Policies in Section 4). There is no separate 'honours year'.

Accreditation

Each engineering program (other than the new Environmental Engineering program) is accredited as meeting the full academic requirements for corporate membership of the Institutions of Engineers of Australia (IEAust) and recognised by a number of overseas professional bodies. The Environmental Engineering program has received provisional recognition and is confidently expected to be fully accredited in accordance with the normal accreditation process.

The Computer Engineering Program is also accredited by the Australian Computer Society (ACS) as satisfying that organisation's highest level of academic requirements.

The Chemical Engineering program 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.

SURVEYING

The Bachelor of Surveying (BSurv) program is offered as a four year full-time or equivalent study course on a similar basis to that of engineering programs. 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 include: cadastral surveying, engineering surveying, topographical surveying, geodetic surveying and hydrographic surveying.

The course meets the academic prerequisites for an application for registration under the Surveyors Act, 1929 (as amended). In order to become a Registered Surveyor in NSW it is necessary for a graduate to meet other requirements of the Board of Surveyors of NSW. Enquiries on this aspect should be directed to the Registrar of the Board of Surveyors of NSW. Registration is required only if practice as a land surveyor is intended; many surveying careers do not require registration.

The combined BE Civil Engineering/BSurv degree program, which is understood to be unique to the University of Newcastle, allows completion of the two professional qualifications by 5 years of full-time study.

COMBINED DEGREE PROGRAMS

A number of combined degree programs are available which lead to the award of two degrees by a total of five years of full-time study for programs which include BE and four years of full-time study for BCompSc/BMath and BCompSc/BSc programs. The programs listed below have either been approved or have been submitted for approval by the relevant Faculty Boards. Other combined programs may be approved to meet the needs of individual cases. Information on the availability of combined programs may be obtained from the Combined Degree Coordinator or from the Faculty Office.

BA/BCompSc
BCompSc/BMath
Scholarships are awarded on the basis of academic merit. No application is necessary.

Department of Mechanical Engineering Scholarships

Six scholarships are awarded annually to first year students enrolled in the Bachelor of Mechanical Engineering program. The value of each scholarship is $500 for one year only. Scholarships are based on academic merit. No application is necessary.

Shortland Electricity Scholarships in Electrical Engineering

Two scholarships are awarded annually to students enrolled in the Electrical Engineering or combined degree program. Selection is based on the value of the University of Newcastle entrance scholarship. Scholarships are awarded on the basis of merit.
MASTER OF SURVEYING

The Master of Surveying is a research degree by thesis. Coursework will not normally be included in the program. The quality and standard of work required in the thesis will be at a substantially higher level than that expected of a Bachelor of Surveying honours graduate. Candidates who enrol initially in the MSurv program may later transfer into the PhD program if their work is of an exceptional quality.

DOCTOR OF PHILOSOPHY

Doctoral research programs are available within each of the Departments of the Faculty. Initial enquiries regarding these programs 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:

Graduate Studies and Scholarships Office,
University of Newcastle,
Callaghan, NSW
AUSTRALIA 2308

Centre for Industrial Control Science

The Centre for Industrial Control Science (CiCS) was established in 1988 under the Special Research Centre scheme of the Australian Government and is closely linked to the Department of Electrical and Computer Engineering. 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 control and signal processing systems. The aim of the Centre is to establish a true synergism 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 and Computer Engineering 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,
Department of Electrical and Computer Engineering,
University of Newcastle,
Callaghan, NSW
AUSTRALIA 2308

section three
Award Rules

About This Section

This section contains the University Rules regarding the Bachelor Degrees, Graduate Diplomas and Coursework Masters Degree programs offered in the Faculty of Engineering. The approved Course Programs referred to in the Degree schedules appear in Sections 5 and 7 of this Handbook.

Rules Governing Academic Awards

Application of Rules

1. These Rules shall apply to all the academic awards of the University other than the degrees of Doctor and degrees classified as Master degrees by research.

Interpretation

2. (1) In these Rules, unless the context or subject matter otherwise indicates or requires:
   - “award” means the degree, diploma (including graduate diploma and associate diploma) or graduate certificate for which a candidate is enrolled;
   - “course” means the total requirements of the program of study approved by the Academic Senate to qualify a candidate for the award as set out in the schedule;
   - “Dean” means the Dean of a Faculty;
   - “Department” means the Department offering a particular subject and includes any other body so doing;
   - “Faculty” means the Faculty responsible for the course;
   - “Faculty Board” means the Faculty Board of the Faculty;
   - “schedule” means the schedule to these Rules relevant to the award listed under the name of the Faculty;
   - “subject” means any part of a course for which a result may be recorded.

   (2) A reference in these Rules to a Head of Department shall be read not only as a reference to the person appointed to that office but also, where a subject is not offered by a Department as such, to the person approved by the Academic Senate to undertake the responsibilities of a Head of Department for the purpose of these Rules.
Admission

3. An applicant for admission to candidature for an award shall satisfy the requirements of the University governing admission to and enrolment in a course and any other additional requirements as may be prescribed in the schedule for that award.

Subject

4. (1) For the purposes of a course, a subject may be classified at a level determined by the Faculty Board.

(2) Each subject shall be allotted a credit point value by the Academic Senate after considering the advice of the Faculty Board of the Faculty in which the Department is located.

(3) The Academic Senate, after considering a request from a Faculty Board, may determine that a subject be not offered during a particular academic year.

(4) The Faculty Board shall approve the subjects for the award. Any change in the list of approved subjects which will have effect in the following year shall be approved by a date determined by the Academic Senate.

(5) Where there is any change in the list of approved subjects, the Faculty Board shall make all reasonable provision to permit students already enrolled in the course to progress normally.

Enrolment

5. (1) A candidate may not enrol in any year in a combination of subjects which is incompatible with the requirements of the timetable for that year.

(2) Except with the permission of the Dean and subject to any contrary provision in the schedule:

(a) a candidate may not enrol in subjects totalling more than the equivalent of 40 credit points in any semester;

(b) a candidate shall not enrol in a subject which does not count towards the award; and

(c) a candidate shall not be permitted to enrol in any subject which is substantially equivalent to one which that candidate has previously counted towards a degree or diploma.

(3) A candidate for an award shall not enrol in a course or part of a course for another award in this University unless consent has first been obtained from the Dean and, if another Faculty is responsible for the course leading to that other award, the Dean of that Faculty, provided that a student may enrol in a combined course approved by the Academic Senate leading to two awards.

Pre-requisites and Co-requisites

6. (1) The Faculty Board on the recommendation of the Head of the Department may prescribe pre-requisites and/or co-requisites for any subject offered by that Department.

(2) Except with the permission 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 pre-requisites 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 co-requisites.

(3) Except with the permission of the Dean, a candidate will not have satisfied a pre-requisite if the pre-requisite subject has not been completed in the preceding eight calendar years.

(4) A candidate attaining a Terminating Pass in a subject shall be deemed not to have passed that subject for pre-requisite purposes.

Credit

7. (1) A Faculty Board may grant credit to a candidate in specified and unspecified subjects, on such conditions as it may determine, in recognition of work completed in the University or another institution approved by the Faculty Board for this purpose or additionally as may be provided in the schedule.

(2) Except as may be otherwise provided in the schedule, a candidate shall not be given credit for more than sixty-five percent of the total number of credit points required to complete the course.

Subject Requirements

8. (1) The subjects which may be completed in the course for the Award shall be those approved by the Faculty Board and published annually as the Approved Subjects section of the schedule.

(2) A candidate enrolled in a subject shall comply with such academic and practical requirements and submit such written or other work as the Department shall specify.

(3) Except as otherwise permitted by the Head of Department, any material presented by a candidate for assessment must be the work of the candidate and not have been previously submitted for assessment.

(4) To complete a subject a candidate shall satisfy published Departmental requirements and gain a satisfactory result in such assessments and examinations as the Faculty Board shall require.

Withdrawal

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

(2) A candidate shall be deemed not to have enrolled in a subject if that student withdraws from the subject:

(a) in the case of a semester length subject, before the Higher Education Contribution Scheme census date for that semester; or

(b) in the case of a full year subject, before the first Higher Education Contribution Scheme census date for that academic year.

(3) Except with the permission of the Dean:

(a) a candidate shall not be permitted to withdraw from a subject after the relevant date which shall be:

(i) in the case of a semester length subject, the last day of that semester; or

(ii) in the case of a full year subject, the last day of second semester; and/or

(iii) subject to any provision within the schedules; and

(b) a candidate shall not be permitted to withdraw from a subject on more than two occasions.

Leave of Absence

10. (1) Subject to any provision in the schedule, a candidate may be granted leave of absence for the following reasons only:

(a) may take leave of absence of one year from the course; or

(b) with the permission of the Dean, may take leave of absence of two consecutive years from the course without prejudice to any right of the candidate to re-enrol in the course following such absence and, with full credit in all subjects successfully completed prior to the period of leave.

(2) For the purposes of sub-rule (1), unless otherwise specified in the schedule, a candidate eligible to re-enrol shall be deemed to be in good academic standing.

(3) A person who has been enrolled in a course but is absent without leave or has been excluded from the course may apply for re-admission to that course and may be re-admitted to candidature under such conditions and at such time as the Faculty Board may determine, unless otherwise specified in the schedule.

Qualification for the Award

11. (1) To qualify for the award a candidate shall satisfy all the requirements governing the course prescribed in the schedule.

(2) A subject which has been counted towards a completed award may not be counted towards another award, except to such extent as the Faculty Board may approve.

Combined Degree Programs

12. (1) Where so prescribed for a particular course, a candidate may complete the requirements for one Bachelor degree in conjunction with another Bachelor degree by completing a combined degree program approved by the Academic Senate on the advice of the Faculty Board and, where the other Bachelor degree is offered in another Faculty, the Faculty Board of that Faculty.

(2) Admission to a combined degree program shall be restricted to candidates who have achieved a standard of performance deemed satisfactory for the purposes of admission to the specific combined degree course by the Faculty Board(a).

(3) The work undertaken by a candidate in a combined degree program shall be no less in quantity and quality than if the two courses were taken separately.

(4) To qualify for admission to the two degrees a candidate shall satisfy the requirements for both degrees, except as may be otherwise provided.

Relaxing Provision

13. In order to provide for exceptional circumstances arising in a particular case, the Academic Senate on the recommendation of the Faculty Board may relax any provision of these Rules.
SCHEDULE — BACHELOR OF ENGINEERING

Specialisations

1. The degree may be offered in one of the following specialisations:
   - Chemical Engineering;
   - Civil Engineering;
   - Computer Engineering;
   - Electrical Engineering;
   - Environmental Engineering;
   - Industrial Engineering;
   - Mechanical Engineering.

2. For the purposes of this Schedule, the designated Department with respect to each specialisation shall be:
   - Department of Chemical Engineering:
     - Chemical Engineering;
   - Department of Civil Engineering and Surveying:
     - Civil Engineering and Surveying;
   - Environmental Engineering:
   - Department of Electrical and Computer Engineering:
     - Computer Engineering and Electrical Engineering;
   - Department of Mechanical Engineering:
     - Industrial Engineering and Mechanical Engineering.

Qualification for the Award

3. To qualify for admission to the degree a candidate shall:
   (a) complete the requirements of the course program for that specialisation; and
   (b) complete the industrial experience requirements as determined by the Faculty Board;
   to the satisfaction of the Faculty Board.

   (2) The course program for each specialisation shall consist of subjects totalling not less than 320 credit points approved by the Faculty Board on the recommendation of the Head of the designated department and include:
   (a) at least 80 credit points from 100 level subjects;
   (b) at least 60 credit points from 200 level subjects; and
   (c) at least 100 credit points from 300 or 400 level subjects of which at least 40 credit points must be from 400 level subjects.

Grading of the Degree

4. (1) The degree shall be conferred as an Ordinary Degree except that, where the performance of a candidate has reached a standard determined by the Faculty Board to be of sufficient merit, the degree shall be conferred with Honours.

   (2) There shall be two classes of Honours, namely Class I and Class II. Class II shall have two divisions, namely Division 1 and Division 2.

Enrolment

5. A candidate may not enrol in any year in a combination of subjects which is incompatible with the requirements of the Faculty Board for the particular specialisation.

Pre-requisites and Co-requisites

6. Where the result for a subject is expressed as a mark, a candidate shall have met the requirements of Rule 6(2) of the Rules Governing Academic Awards by achieving a mark of 45 or more in all subjects specified as pre-requisites or co-requisites.

Credit

7. Credit may be granted for up to 160 credit points except that a candidate may be granted such credit as the Faculty Board determines for subjects completed in the University which have not already been counted towards an award.

Transfer Between Specialisations

8. The Faculty Board may make conditions with respect to the transfer of candidate from one specialisation in the degree to another.

Additional Specialisations

9. A person who has satisfied the requirements for admission to the degree in one specialisation may be admitted to candidacy in any other specialisation on such conditions as the Faculty Board may prescribe. Upon completing the requirements for admission to the degree in that other specialisation the candidate shall be issued with a statement to that effect by the Academic Registrar.

Leave of Absence

10. (1) For the purposes of Rule 10 of the Rules Governing Academic Awards, candidates shall be deemed to be in good academic standing if at the conclusion of the year of last enrolment in the course they:
   (a) had achieved a passing grade or a result of 45 or more in at least one subject; and
   (b) were eligible to re-enrol.

   (2) Leave of Absence of one year from the course may be taken on more than one occasion but not in consecutive years.

SCHEDULE — BACHELOR OF SURVEYING

Qualification for the Award

1. To qualify for admission for the degree a candidate shall complete, to the satisfaction of the Faculty Board, a course program consisting of subjects totalling not less than 320 credit points approved by the Faculty Board on the recommendation of the Head of the Department of Civil Engineering and Surveying, including:
   (a) at least 80 credit points from 100 level subjects;
   (b) at least 60 credit points from 200 level subjects; and
   (c) at least 100 credit points from 300 or 400 level subjects of which at least 40 credit points must be from 400 level subjects.

Grading of the Degree

2. (1) The degree shall be conferred as an Ordinary Degree except that, where the performance of a candidate has reached a standard determined by the Faculty Board to be of sufficient merit, the degree may be conferred with Honours.

   (2) There shall be two classes of Honours, namely Class I and Class II. Class II shall have two divisions, namely Division 1 and Division 2.

Enrolment

3. A candidate may not enrol in any year in a combination of subjects which is incompatible with the requirements of the Faculty Board.

Pre-requisites and Co-requisites

4. Where the result for a subject is expressed as a mark, a candidate shall have met the requirements of Rule 6(2) of the Rules Governing Academic Awards by achieving a mark of 45 or more in all subjects specified as pre-requisites or co-requisites.

Credit

5. Credit may be granted for up to 160 credit points except that a candidate may be granted such credit as the Faculty Board determines for subjects completed in the University which have not already been counted towards an award.

SCHEDULE — BACHELOR OF COMPUTER SCIENCE

Qualification for the Award

1. To qualify for admission for the degree a candidate shall complete, to the satisfaction of the Faculty Board, a course program consisting of subjects totalling not less than 240 credit points approved by the Faculty Board on the recommendation of the Head of the Department of Computer Science, including:
   (a) at least 80 credit points from 100 level subjects;
   (b) at least 60 credit points from 200 level subjects; and
   (c) at least 40 credit points from 300 level subjects.

Enrolment

2. A candidate may not enrol in any year in a combination of subjects which is incompatible with the requirements of the Faculty Board.

Pre-requisites and Co-requisites

3. Where the result for a subject is expressed as a mark, a candidate shall have met the requirements of Rule 6(2) of the Rules Governing Academic Awards by achieving a mark of 45 or more in all subjects specified as pre-requisites or co-requisites.

Credit

4. Credit may be granted for up to 160 credit points except that a candidate may be granted such credit as the Faculty Board determines for subjects completed in the University which have not already been counted towards an award.

SCHEDULE — BACHELOR OF COMPUTER SCIENCE

Qualification for the Award

1. To qualify for admission for the degree a candidate shall complete, to the satisfaction of the Faculty Board, a course program consisting of subjects totalling not less than 240 credit points approved by the Faculty Board on the recommendation of the Head of the Department of Computer Science, including:
   (a) at least 80 credit points from 100 level subjects;
   (b) at least 60 credit points from 200 level subjects; and
   (c) at least 40 credit points from 300 level subjects.

Enrolment

2. A candidate may not enrol in any year in a combination of subjects which is incompatible with the requirements of the Faculty Board.

Pre-requisites and Co-requisites

3. Where the result for a subject is expressed as a mark, a candidate shall have met the requirements of Rule 6(2) of the Rules Governing Academic Awards by achieving a mark of 45 or more in all subjects specified as pre-requisites or co-requisites.

Credit

4. Credit may be granted for up to 160 credit points except that a candidate may be granted such credit as the Faculty Board determines for subjects completed in the University which have not already been counted towards an award.
be in good academic standing if at the conclusion of the year of last enrolment in the course they:
(a) had achieved a passing grade or a result of 45 or more in at least one subject; and
(b) were eligible to re-enrol.
Leave of Absence may be taken on more than one occasion but not in consecutive years.

SCHEDULE — BACHELOR OF COMPUTER SCIENCE (HONOURS)

Admission to Candidature
1. (1) An applicant for admission to candidature shall have satisfied the requirements for admission to:
(a) the degree of Bachelor of Computer Science; or
(b) a degree in the University, or another university approved for this purpose by the Faculty Board.
(2) The Head of the Department of Computer Science shall, after considering an applicant’s previous academic performance in relevant studies, make recommendations to the Faculty Board as to the applicant’s suitability for admission to candidature.
(3) The Faculty Board after taking into account the recommendation of the Head of the Department of Computer Science shall either:
(a) approve admission to candidature; or
(b) approve admission to candidature subject to the applicant completing, to the satisfaction of the Faculty Board, such prerequisites and/ or corequisite studies as it may prescribe; or
(c) reject the application.

Grading of the Degree
2. (1) The Faculty Board shall, on the recommendation of the Head of the Department of Computer Science, determine the grade of Honours to be awarded to a candidate upon qualifying for admission to the degree.
(2) There shall be three classes of Honours, namely Class I, Class II and Class III. Class II shall have two divisions, namely Division 1 and Division 2.

Qualification for the Award
3. To qualify for admission to the degree a candidate shall pass the program of subjects approved by the Faculty Board on the recommendation of the Head of the Department of Computer Science totalling not less than 80 credit points and including at least 60 credit points from 400 level subjects.

Credit
4. Credit for previous studies shall not be granted.

Leave of Absence
5. Candidates shall not be entitled to take Leave of Absence from the course.

SCHEDULE — GRADUATE DIPLOMA IN COMPUTER SCIENCE

Admission to Candidature
1. In order to be admitted to candidature for the award, the applicant shall:
(a) have completed the requirements for admission to a degree in the University; or
(b) have completed the requirements for admission to a degree at any other institution recognised by the Faculty Board; and
hold such other qualifications approved by the Faculty Board for the purpose of admission to candidature.

Qualification for the Diploma
2. To qualify for admission to the Diploma a candidate shall pass the program of subjects approved by the Faculty Board on the recommendation of the Head of the Department of Computer Science totalling not less than 80 credit points.

Grading of the Diploma
3. The Diploma shall be awarded as an Ordinary Diploma except that, where the performance of a candidate has reached a standard determined by the Faculty Board to be sufficient, the Diploma may be conferred with Merit.

Credit
4. (1) Credit shall not be granted for studies which have been counted towards a completed award.
(2) Credit granted for studies completed at another institution which did not qualify a candidate for an award shall be limited to 40 credit points.
(3) Credit may be granted for all subjects completed in this University which have not already been counted towards a completed award.

Leave of Absence
5. Candidates shall not be entitled to take Leave of Absence from the course.

Time Requirement
6. Except with the permission of the Faculty Board, a candidate shall complete the requirements for the award of the Diploma in not less than one and not more than five calendar years from the date of first enrolment in the course.

SCHEDULE — GRADUATE DIPLOMA IN SURVEYING

Admission to Candidature
1. In order to be admitted to candidature for the award, the applicant shall:
(a) have completed the requirements for admission to a degree at the University of Newcastle; or
(b) have completed the requirements for admission to a degree at any other institution recognised by the Faculty Board; or
(c) have registration as a Land Surveyor or hold a Certificate of Competency issued by any of the Boards of Surveyors of Australia or New Zealand; or
(d) hold such other qualifications approved by the Faculty Board for the purpose of admission to candidature.

Course Program
2. The course program for the Diploma shall comprise subjects totalling not less than 80 credit points approved by the Faculty Board on the recommendation of the Head of the Department of Civil Engineering and Surveying.

Qualification for the Diploma
3. To qualify for admission to the Diploma a candidate shall complete the requirements of the course program to the satisfaction of the Faculty Board.

Grading of the Diploma
4. The Diploma shall be awarded as an Ordinary Diploma except that, where the performance of a candidate has reached a standard determined by the Faculty Board to be sufficient, the Diploma may be conferred with Merit.

Credit
5. (1) Credit shall not be granted for studies completed which qualified the candidate for an award.
(2) Credit granted for studies completed at another institution which did not qualify a candidate for an award shall be limited to 40 credit points.
(3) Credit may be granted for all subjects completed in this University which have not already been counted towards a completed award.

Leave of Absence
5. Candidates shall not be entitled to take Leave of Absence from the course.
5. Except with the permission of the Faculty Board a candidate shall not be entitled to take Leave of Absence from the course.

SCHEDULE — MASTER OF COMPUTING

Classification
1. The degree of Master of Computing shall be a degree by coursework offered in the Faculty of Engineering.

Admission to Candidature
2. To be eligible for admission to candidacy an applicant shall:
   (a) have satisfied all the requirements for admission to the degree of Bachelor of Engineering of the University or hold an equivalent qualification requiring at least four years of full-time study; or
   (b) have satisfied the requirements for admission to any other Bachelor degree of the University or any other approved university and have had at least two years of relevant industrial experience and/or have completed to the satisfaction of the Faculty Board such work and examinations as determined by the Faculty Board; or
   (c) in exceptional cases produce evidence of such academic and professional attainments as may be approved by the Faculty Board.

Qualification for the Degree
3. (1) To qualify for admission to the degree a candidate shall pass a program of subjects approved by the Faculty Board on the recommendation of the Head of the Department of Computer Science totalling not less than 160 credit points.
   (2) The program referred to in sub-Clauses (1) shall contain 60 credit points comprising 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-Clauses (2) shall be appointed by the Head of the Department of Computer Science.

Credit
4. A candidate may be granted credit by the Faculty Board on such conditions as the Faculty Board may determine for up to 40 credit points in recognition of subjects completed in this University or elsewhere which have not already been counted towards an award.

Time Requirements
5. Except with the permission of the Faculty Board a candidate shall complete the program in not less than two and not more than five years from its commencement.

section four
Faculty Policies

About This Section
This section contains Faculty Policies which are relevant to all students enrolled in coursework programs within the Faculty and are to be read in conjunction with the relevant Course Programs and Award Rules.

Students should 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 Office.

General Course Policies and Information
The information given below should be read in conjunction with the Rules Governing Academic Awards and the relevant Schedule to those Rules together with other University requirements and Faculty policies.

It is the responsibility of students to ensure that they enrol in a program which meets currently applicable course requirements. Where approval of a Head of Department or Course Coordinator is required, this should be gained prior to submitting a Variation of Program Form and be attached to that form.

Advice on course requirements and procedures is available from the staff of the Faculty Office - Enquiries to Room EA29C, or from the relevant Course Coordinator.

Credit Points
1. The credit point value of a subject is intended to give a general indication of the total time required of a student undertaking that subject. The normal annual workload of 80 credit points may be taken to indicate that the total workload of an average student working at pass level is approximately 48 hours per week. Thus a 5 credit point subject offered over one semester may be taken to indicate a minimum average workload requirement of 6 hours per week which includes course contact hours plus time spent by the student on assignments and other set work as well as general study of subject content. The ratio between contact hours and private study will vary between subjects according to the nature of the content studied.

2. The number of hours per week required by individual students will vary according to many factors including: academic background, personal ability, work/study techniques and the
Section Four

Faculty Policies

Level of performance the student wishes to attain in a particular subject. The general indication of 6 hours per week for each 5 credit points in a semester subject is a guide to the minimum expectations of the Faculty - students will need to monitor and evaluate their own performance in the light of this expectation and the results they obtain in particular subjects.

Enrolment in Second Semester Subjects which require Adjusting

5. Every effort will be made to provide for single day release attendance patterns in the first two part-time stages of each course. Timetable requirements may restrict selection of subjects in non-standard programs.

6. Students are not to enrol in subjects which clash in the timetable.

Prerequisites and Corequisites

In addition to the subject prerequisite and corequisite requirements of individual subjects, a general understanding of the material in previous years of the course is assumed.

Students must satisfy the relevant prerequisites and corequisites requirements of each subject unless granted a written waiver of these requirements by the Head of the Department responsible for offering the subject. Students wishing to obtain such a waiver should make application at the scheduled Re-enrolment Approval Sessions in February. If requesting a variation of enrolment in courses offered in the first semester of a non-standard program, applications must be submitted with the written permission of the Head of Department.

Note that dates are prescribed after which total semester workload may not be increased. This requirement prevents approval of the addition of a subject after those dates where total semester workload would be increased, even if the permission of the Head of Department is obtained. Students in doubt as to the requirements should consult the Faculty Office before making an appointment to see the Head of Department to discuss the proposed waiver.

Only in exceptional circumstances will prerequisite and corequisite requirements be waived. Students must have a WAM of 54 or less.

Adjusting Second Semester Enrolment

9. Enrolment in second semester subjects which require completion of first semester subjects to meet prerequisite, corequisite or assumed knowledge requirements is contingent upon successful completion of the relevant first semester subjects.

It is the responsibility of students to apply to withdraw from any second semester subject for which they do not meet prerequisite or corequisite requirements unless a formal waiver of such requirements is received from the Head of Department offering the subject concerned within the first 2 weeks of second semester.

11. A student who remains officially enrolled in a subject will receive a result in that subject. If a student ceases to attend classes but does not officially withdraw, the result will be Fail (EF).

12. Students wishing to add a second semester subject in place of a withdrawn subject should do so by 5 p.m. on Monday of the third week of second semester otherwise the Head of Department may refuse to permit the addition.

Late Addition or Substitution of Subjects

13. Applications to add subjects after 5 p.m. on Monday of the third week of the semester in which the subject commenced will be approved by the Dean only when submitted with the written permission of the Head of the Department offering the subject. When considering a request for late addition of a subject, the Head of Department will take into account of:

- the ability of the student to catch up with work already completed in the subject;
- the effect that a late addition to the class may have on the work of students already enrolled in the subject;
- where a student has been attending the subject without being enrolled, the reason why the student did not enrol in the subject within the first two weeks of the semester.

14. Note that dates are prescribed after which total semester workload may not be increased. This requirement prevents approval of the addition of a subject after those dates where total semester workload would be increased, even if the permission of the Head of Department is obtained. Students in doubt as to the requirements should consult the Faculty Office before approaching the Head of Department.

15. Addition or substitution of first semester and full year subjects after 31 March and second semester subjects after 31 August will only be permitted by the Dean in exceptional circumstances and where the total semester workload of the student is not increased.

Non-Standard Programs

16. A non-standard program is one which includes subjects from more than one Year of the course program. While progression in each course offered in the Faculty of Engineering is by subject, the following rules apply to students wishing to enrol in a non-standard program.

Students are expected to complete subjects in the order given in the course program. A student undertaking a non-standard program should then choose to include all subjects yet to be completed from the lower year of the course. If a student withdraws from a subject, that subject is expected to be chosen from the higher year. The approval of the Course Coordinator is required for any departure from these expectations.

Applications for enrolment in the following non-standard programs will be approved without special permission being required.

- An annual program of subjects prescribed for a combined degree program in which a student is enrolled.
- Inclusion of Industrial Experience subjects by part-time students.
- An annual program which follows prescribed Year by Year transition arrangements.
- An annual program of subjects for which all of the following apply:
  - all prerequisite and corequisite requirements are met or written relaxation of the relevant requirements is submitted;
  - subjects extend over only two Years of the course;
  - all subjects yet to be completed in the lower Year of the course program are included;
  - when undertaken by a student with a WAM of 55 or more, has a total credit point value not exceeding 85 with no more than 50 credit points in a semester; and
  - when undertaken by a student with a WAM of 54 or less, has a total credit point value not exceeding 60 with no more than 40 credit points in a semester.

21. The Head of Department responsible for the course program or the Course Coordinator may approve limited substitution of another subject for a subject listed in the course program where such a substitution is considered to be to the academic benefit of the student concerned. Approval will only be given where:

- the replacement subject is of the same credit point value as the subject(s) it replaces;
- the requirements of the Regulations governing the degree program continue to be met; and
- the overall program of study to be taken by the student is equal to the award of the degree involved.

Enrolment in Extraneous Subjects

22. Enrolment in subjects extraneous to the requirements of the course in which the student is enrolled will normally only be approved where the student is otherwise enrolled in all subjects required to complete degree requirements and has a WAM of at least 55. The total annual program attempted by such a student, including extraneous subjects, shall not exceed 80 credit points. The approval of the Dean is required for any application to undertake extraneous subjects while a student is enrolled in any course offered in the Faculty of Engineering. The Dean may decline to approve any such application.

23. Note that the University charges a fee for enrolment in subjects which do not count towards degree requirements.

Appeals

24. A written appeal regarding any decision made under these rules may be made to the Dean who shall decide the matter.

Course Coordinators

Undergraduate Programs

Chemical Engineering - Professor T.F. Wall
Civil Engineering - Dr W.G. Field
Combined Degree Programs - Dr W.G. Field
Computer Engineering - Associate Professor P.J. Moylan
Computer Science - Dr M. Houle
Electrical Engineering - Dr I. Webster
Environmental Engineering - Dr B.J. Williams
Industrial Engineering - Dr B.J. Hill
Mechanical Engineering - Dr B.J. Hill
Surveying - Professor J.G. Fryer
Postgraduate Coursework Programs

BCompSc(Hons) - Dr H. Rigney
GradDipCompSc - Dr H. Rigney
GradDipSurv - Professor J.G. Fryer
MComp - Dr H. Rigney
MEngSc - Professor A.J. Chambers
Undergraduate Performance and Progress

These policies apply to students enrolled in the Bachelor of Computer Science, Bachelor of Engineering and Bachelor of Surveying programs.

1. General

(1) The following policies are made under the powers vested in the Faculty Board, Faculty of Engineering, by the Rules of the University.

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

   • "annual WAM" means the weighted average mark of the results of subjects taken in a particular calendar year.
   • "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 degree of Bachelor of Computer Science, Bachelor of Engineering or Bachelor of Surveying.
   • "Course Coordinator" means the Head of the designated Department or the Head of Department's nominee.
   • "Dean" means the Dean of the Faculty of Engineering.
   • "Degree Regulations" means the Regulations Governing Bachelor Degrees in the Faculty of Engineering.
   • "Department" means a department of the Faculty of Engineering.
   • "Faculty Board" means the Faculty Board, Faculty of Engineering.
   • "designated department" means the department identified 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.
   • "Assistant Dean" means an Assistant Dean of the Faculty of Engineering.
   • "WAM" means the cumulative Weighted Average Mark calculated in accordance with these policies.

2. Reservation

Faculty Board reserves its right 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 end of the second week of lectures in that subject. This information will include an indication of the type of tasks comprising the assessment and the proportion each task will contribute to the final result in the subject concerned.

(3) 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 weighting of each task and class ranking will be maintained except where an application for special consideration is granted.

(4) Each subject shall have a weighting of 1, 2, 3 or 4 as set out below.

4. Academic Performance

(1) The academic performance of each student enrolled in an undergraduate course offered in the Faculty shall be measured by a cumulative Weighted Average Mark (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:

\[ \text{WAM} = \frac{\sum (m \times w)}{\sum (w)} \]

Where:

- \( m \) is the Mark as defined in Policy 4(3) below.
- \( v \) is the credit point value of the subject concerned.
- \( w \) is the Weighting of the subject concerned as determined under Policy 4(4) below.

(3) The Mark \( (m') \) will be calculated as follows:

- If the result in a subject is given in the range of 45 to 50 inclusive, the result will be rounded to the nearest whole number.
- Where the result in a subject is a failing grade, the result will be rounded to the nearest whole number.

Students should note that while results of 45 to 49 are (barely) acceptable in the context of the full requirements of a particular course in the Faculty of Engineering, they are unlikely to be considered adequate for full standing outside the Faculty of Engineering. For example: a result of 48 awarded to a student enrolled in an engineering course in a first year physics subject may be considered for standing in the Faculty of Science and Mathematics at a Terminating Pass level but would not be acceptable for full standing.

(4) Each subject shall have a weighting of 1, 2, 3 or 4 as set out below.

Level at which the subject is offered: Weighting

<table>
<thead>
<tr>
<th>Level</th>
<th>Weighting</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 - 199</td>
<td>1</td>
</tr>
<tr>
<td>200 - 299</td>
<td>2</td>
</tr>
<tr>
<td>300 - 399</td>
<td>3</td>
</tr>
<tr>
<td>400 and over</td>
<td>4</td>
</tr>
</tbody>
</table>

Note: The level at which a subject is offered is indicated by the first number in the subject code, for example, MECH101 is offered at 100 level and MECH342 is offered at 300 level.

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

- Subjects taken in satisfaction of course elective requirements will be considered to satisfy those requirements in the order in which they are taken during the course.
- Subjects taken extraneous to degree requirements will not be included in the calculation of the student's WAM.
- Students re-admitted to a course after an absence for the previous academic year, will 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 the credit point value of the credit granted in the new course equals the credit point value of all subjects previously completed in the original course, retain the WAM achieved in the original course as the basis for future WAM calculations in the new course.
- In all other cases, students admitted to a course shall commence calculation of their WAM from the year of their admission or re-admission, whether they be granted credit or not.
Section Four

5. Academic

A student who achieves a WAM of 55 or more is considered to be clearly progressing at a satisfactory level in the course as a whole.

5.1. Students subject to review shall be advised of any representations made by any student subject to the Review Committee in connection with the decision of the Review Committee.]

5.2. Students subject to review shall be advised of any representations made by any student subject to the Review Committee in connection with the decision of the Review Committee.

5.3. The Dean or Assistant Dean shall determine the time and place at which students may make representations in person.

6. Unsatisfactory Progress

(1) Students on probation who fail to attain a WAM of 55 or more, or who fail to achieve an Annual W of 55 or more in that year shall be deemed not to have maintained a rate of progress considered satisfactory to the Faculty Board unless performance is improved sufficiently (see 'Unsatisfactory Progress' below).

(2) Students subject to review shall be advised of any representations made by any student subject to the Review Committee in connection with the decision of the Review Committee.

(3) The Dean or Assistant Dean shall determine the time and place at which students may make representations in person.

(4) The Dean or Assistant Dean shall, after considering any representations made by any student subject to review and the recommendation of the Head of the designated Department, determine the action to be taken under Rule 4 of the Rules Governing Unsatisfactory Progress which include:

- Exclusion for a period of at least 1 year;
- Permission to continue enrolment on specified conditions; or
- Permission to continue.

5.5. A student subject to review who is permitted to continue studies within the Faculty is considered to remain on probation and continues to be subject to the provisions of the Policies of Faculty Board as a student placed on probation under the provisions of Policy 5.2.

7. Satisfaction of Degree Requirements

(1) Students are considered to have passed the program 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 both:

- attained a result of 45 or more (or a passing grade) in each of the subjects comprising the relevant program of subjects approved by Faculty Board; and
- attained a WAM of 55 or more at the completion of that program.

(2) If a student completes the relevant program of subjects but has not achieved a WAM of 55 or more, the student is not regarded as having passed the program of subjects to the satisfaction of Faculty Board and is therefore ineligible for the award of the degree.

(3) A student who is ineligible for the award of a bachelor's degree under the terms of Policy 7.2 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 7.2 apply) or enrol in such other subjects not previously attempted as the Dean, on the recommendation of the Head of the designated 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.

8. Awards of Honours - Engineering and Surveying

(1) Honours grades in the Bachelor of Engineering and Bachelor of Surveying programs will normally be awarded by Faculty Board on the basis of a graduating student's performance in the course as a whole 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>77</td>
<td>Class I</td>
</tr>
<tr>
<td>72</td>
<td>Class II Division 1</td>
</tr>
<tr>
<td>67</td>
<td>Class II Division 2</td>
</tr>
</tbody>
</table>

(2) If a student was granted credit 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 credit was based may be considered by Faculty Board in connection with the determination of the award of honours.

(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 either 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 8.1.

(4) Faculty Board will normally recommend BE and BSurv graduates who achieve a WAM in the order of 85 or more for the award of a University Medal.

OTHER FACULTY POLICIES

Honours in Computer Science

The level of honours to be awarded to candidates completing the requirements of the Bachelor of Computer Science (Honours) degree shall be determined by Faculty Board on the recommendation of the Head of the Department of Computer Science.

Awards of Honours - Engineering and Surveying

(1) Honours grades in the Bachelor of Engineering and Bachelor of Surveying programs will normally be awarded by Faculty Board on the basis of a graduating student's performance in the course as a whole 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>77</td>
<td>Class I</td>
</tr>
<tr>
<td>72</td>
<td>Class II Division 1</td>
</tr>
<tr>
<td>67</td>
<td>Class II Division 2</td>
</tr>
</tbody>
</table>

(2) If a student was granted credit 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 credit was based may be considered by Faculty Board in connection with the determination of the award of honours.

(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 either 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 8.1.

(4) Faculty Board will normally recommend BE and BSurv graduates who achieve a WAM in the order of 85 or more for the award of a University Medal.

Applications for Special Consideration MUST be made on the prescribed form and should be lodged at the Faculty Office. Forms are available from the Faculty Office - Room EA206 (telephone 0494 21 6005).

As decisions can only be made on the basis of the information presented by the student, all available evidence should accompany each application. The medical certificate given on the prescribed form must be completed where an
application is made on medical grounds unless a more extensive medical report is presented which includes the information required on the form. Where a request for Special Consideration is made on the grounds of misadventure, all available supporting evidence should be attached to the application. In some cases, particularly where no written evidence is available, the submission of a statutory declaration will be appropriate. Statutory declaration forms are available from most newspapers or the Faculty Office.

Applications for Special Consideration should be made as soon as possible after the occurrence of the circumstances leading to the request but not more than 3 days after the final examination in a subject. 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 disadvantage other students.

Enquiries regarding Special Consideration may be directed to the Faculty Office.

Further Assessment

A department may grant further assessment where it considers it appropriate to do so after considering a request for Special Consideration or to resolve a doubt as to the appropriate result in a subject. Further assessment will normally occur shortly after the final examination in the subject concerned:

- in the case of first semester subjects, before the end of the fifth week of the mid-year recess; and
- in the case of full-year and second semester subjects, before the end of the first week in December.

Students who have requested Special Consideration which may lead to further assessment should ensure that they are available to attend any further assessment required during these periods. If unable to do so because of serious circumstances beyond their control, they should advise the relevant Head of Department as soon as possible.

In view of the provision for further assessment by departments, the Faculty Board does not normally award results of Incomplete (I) however, it may do so if it deems it appropriate to allow a further short period for further assessment. A student in receipt of a result of Incomplete should immediately contact the Head of the Department offering the subject concerned to arrange a time to undertake further assessment. All further assessment for full-year or second semester subjects should be completed by the second week of January.

Failure by a Potential Graduate

Where a student fails a single subject other than the final year project and is thereby prevented from qualifying to graduate, the Faculty Board may award a result of Incomplete (I) in that subject. Such a decision will not be taken until all results of other subjects required to meet degree requirements are known. Thus a failure in a single first semester subject will be recorded as an FF unless the student has been enrolled in a program which was potentially sufficient to complete degree requirements in first semester. A result of FF given in a first semester subject may be reviewed at the conclusion of second semester in the light of results obtained in the other subjects in that year and may be amended to ‘T’ if it is then the only subject required to meet degree requirements. All such further assessments should be completed by the second week of January.

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.

A review of a result includes a check:

- that all required parts of the assessment have been included in the final result;
- that the content of examination scripts has been fairly considered, including, where possible, a review of marks awarded by the examiners; and
- that all marks contributing to the final result have been correctly weighted and their total accurately obtained but shall not include any review of earlier assessments which have been made available to the candidate on a continuing basis throughout the subject.

If considered necessary, students may attach a statement to the official request for a review detailing any facts believed to point to an error or omission having been made. Students may also discuss aspects of performance in examinations with the lecturer concerned within a short period after final results have been published in order to gain feedback for educational purposes.

Submission of Final Year Project Reports

Meeting the deadline for submission of final year project reports is considered to be an important element of the subjects concerned. Departments within the Faculty have been requested by Faculty Board to adopt the following policies 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) before or 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 time 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 temporary grade of Special Consideration (SC) being awarded in December, may only be granted in response to a formal request for Special Consideration made through the Faculty Office (see Special Consideration policy above). As students are expected to anticipate some delay or difficulties during the course of their project, Special Consideration will not normally be granted for circumstances involving less than 4 weeks loss of working time for the student. In such cases, it is expected that final result recommendations will be submitted by departments before the end of the second week in January for consideration at the next meeting of the Faculty Board.

Year/Stage Classification

Full-time students are classified by year. Part-time students are classified by stage. Classification is determined by the number of credit points passed in accordance with the following table.

<table>
<thead>
<tr>
<th>Full-time Credit Points</th>
<th>Part-time Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-80</td>
<td>0-40</td>
</tr>
<tr>
<td>81-160</td>
<td>41-80</td>
</tr>
<tr>
<td>161-240</td>
<td>81-120</td>
</tr>
<tr>
<td>240-320</td>
<td>121-160</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year/Stage Classification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time Points</td>
</tr>
<tr>
<td>1-4</td>
</tr>
<tr>
<td>5-8</td>
</tr>
<tr>
<td>9</td>
</tr>
<tr>
<td>10</td>
</tr>
</tbody>
</table>

Students enrolled for the final year of any combined course will be classified as Year 5.

INDUSTRIAL EXPERIENCE - ENGINEERING

General

Students enrolled in Bachelor of Engineering programs 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.

To verify that they have completed this requirement, students will be required to provide a statement of their experience signed by the employer, and submit a report to the relevant Industrial Experience Coordinator for each block of practical work undertaken. The Industrial Experience Coordinator will advise the Faculty Office whether or not the practical work is satisfactory.

The report covering work undertaken for practical experience for the previous year must be prepared and submitted to the Departmental Office not later than 1 April or for potential mid-year graduates should contact the relevant Industrial Experience Coordinator regarding submission requirements.

Industrial Experience Coordinators

Chemical Engineering Dr Nafis Ahmed
Civil Engineering Mr Brian Heaton
Computer Engineering Dr Ian Hiskens
Electrical Engineering Mr Ian Hiskens
Environmental Engineering Mr Brian Heaton
Industrial Engineering Prof John Chambers
Mechanical Engineering Prof John Chambers

Students should contact their Industrial Experience Coordinator for information regarding the minimum acceptable duration of a block of industrial experience and the guidelines for the preparation of reports.

The University can accept no responsibility for finding employment for students wishing to enrol for Industrial Experience subjects or 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.

Part-Time and Sandwich Pattern Students

Students enrolled in the degree of Bachelor of Engineering on a part-time basis may choose to take Industrial Experience elective subjects as provided in the relevant course program. To be eligible for enrolment in an Industrial Experience
subject, the student must be in approved employment on the 1 November preceding the year in which the subject 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 subject is taken. Students enrolled in Industrial Experience subjects must attend such lectures and seminars, and submit such reports, as the relevant Head of Department may require. Normally enrolment in an Industrial Experience subject will not be allowed in the first year of enrolment. Students attending on a 'thick' sandwich pattern should consult with the Course Coordinator before enrolling in an Industrial Experience subject. The successful completion of one Industrial Experience subject satisfies the requirement that students complete 12 weeks practical experience.

Credit for Previous Studies
Students entering courses who believe that they may be eligible for credit on the basis of previous tertiary study should consult the Faculty Secretary. Evidence in the form of original academic transcripts and handbook descriptions of the content of the subjects studied should be provided.

Credit for TAFE Associate Diplomas
Faculty Board has approved the granting of credit to students enrolling in courses who hold certain TAFE Associate Diplomas (and TAFE Certificates obtained before the introduction of Associate Diploma programs). The credit to be granted will vary according to the TAFE qualification obtained, the course program in which the candidate is enrolled and the current requirements of that program. Further information may be obtained from the Faculty Secretary.

Leave of Absence
The formal requirements regarding leave of absence are included in the relevant schedules to the Award Rules. The provisions are summarised below. Enquiries regarding leave of absence in undergraduate courses and graduate coursework programs should be directed to the Faculty Office. Enquiries regarding leave from research degrees should be directed to the Graduate Studies Office.

Leave from Bachelor Degree Courses
Students enrolled in bachelor degree programs are entitled to take leave of absence for one academic year, provided they successfully completed at least one subject in the previous academic year and are entitled to re-enrol (ie. not excluded) in the year in which they take leave. Leave may not be taken in consecutive years. This provision thus allows students to follow a 'thick sandwich' attendance pattern of alternate years in industry and full-time study while maintaining their right to return to the course. As the requirements are specified in the Award Rules there is no need to apply for leave of absence.

It is important to note that students taking leave MUST re-apply to return to the course through UAC including a preference for the course from which leave was taken. If the student qualified for leave of absence and the course is the highest available preference, an offer will be made to return to the course via normal UAC procedures. UAC application materials are available from the Faculty Office in late August and should be lodged at UAC before the end of September. Students holding scholarships should ensure that they consult the Scholarship Officer regarding any intention to apply for leave of absence.

Further information may be obtained from the Faculty Office prior to discontinuing studies. Students discontinuing studies but intending to complete the requirements of the course provided they can meet any time requirements on completion. Students discontinuing studies but intending to apply for readmission at a later date should consult the Faculty Office prior to discontinuing studies.

STUVAC
The Faculty of Engineering has designated the week prior to the commencement of the official mid-year and end-of-year examination periods as STUVAC. This time is intended to allow for examination preparation and revision. For subjects offered by Departments of the Faculty of Engineering, all progressive assessment tasks will be due prior to the relevant STUVAC week and no new examinable material will be introduced during STUVAC. Revision lectures and tutorials may be held during STUVAC at the discretion of the lecturer.

About This Section
This section contains the detailed bachelor degree course programs approved by the Faculty Board which incorporate the list of Approved Subjects of the relevant Schedules of the Rules Governing Academic Awards. A guide is also provided to the various patterns of attendance by which courses may be completed.

Students are expected to be aware of all aspects of the Course Program and associated requirements of the course in which they are enrolled. Attention is particularly drawn to the General Course Policies and other policies of the Faculty Board set out in the previous section of this Handbook.

Guide to Course Attendance Patterns
Course Programs are given in this Section for all bachelor degree courses. All students must complete the requirements of the relevant Course Program 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. Each student may choose a pattern of attendance each year which suits them provided that academic progress is satisfactory and other course rules and requirements are met. The attendance patterns available are summarised below. Further queries may be directed to the Faculty Office.

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 engineering course may be completed in a minimum of 4 years of full-time study. The Computer Science program may be completed in 3 years full-time study.
Part-time Attendance

All or part of each Course Program 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 program.

As far as resources allow, 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 less than 60 credit points is regarded as a part-time student, there is no minimum number of subjects in which part-time students must enrol in each year. 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 Programs

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 contact the Faculty Office in August of each year of full-time employment for information on the appropriate procedure to apply for re-enrolment in their course in the following year.

The Traineeship Pattern

Some traineeships may continue to be offered on the basis of a part-time attendance pattern, however the following program 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
- Year IV
- Full-time work experience - 15 months (approx.)

A further 15 month period of work experience could be included between Years II and III resulting in a 7 year minimum program.

This attendance pattern allows both the employer and employee a period of assessment in Stages 1 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 gain 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 of his or her employer’s organisation and to give full attention to participating in the work of that organisation. The length of the major period(s) of work experience also 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.

Bachelor Degree Course Programs

Section Five

Bachelor Degree Course Programs

Chemical Engineering

Degree Bachelor of Engineering (BE) awarded in the specialisation of Chemical Engineering

Designated Department Department of Chemical Engineering

Course Coordinator Professor T.F. Wall

Course Code 10063

COURSE PROGRAM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR I</td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CHEE113 Chemical and Manufacturing Processes</td>
<td>10</td>
</tr>
<tr>
<td>CHEM101 Chemistry 101</td>
<td>10</td>
</tr>
<tr>
<td>MATH111 Mathematics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>PHYS111 Physics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>CHEE111 Industrial Process Principles</td>
<td>5</td>
</tr>
<tr>
<td>CHEE112 Introduction to Chemical Engineering</td>
<td>10</td>
</tr>
<tr>
<td>CHEM102 Chemistry 102</td>
<td>10</td>
</tr>
<tr>
<td>MATH112 Mathematics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>MECH102 Introduction to Engineering Computing</td>
<td>5</td>
</tr>
<tr>
<td>* Approved Options</td>
<td></td>
</tr>
<tr>
<td>1. MATH102 and MATH103 may replace MATH111 and MATH112.</td>
<td></td>
</tr>
<tr>
<td>2. PHYS113 may replace PHYS111.</td>
<td></td>
</tr>
<tr>
<td>YEAR II</td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CHEE241 Design Principles</td>
<td>10</td>
</tr>
<tr>
<td>CHEE265 Transfer Processes 1</td>
<td>5</td>
</tr>
<tr>
<td>CHEE266 Energy and Extractive Processes</td>
<td>5</td>
</tr>
<tr>
<td>CHEE268 Transfer Processes 3</td>
<td>5</td>
</tr>
<tr>
<td>CHEE281 Laboratory 1</td>
<td>5</td>
</tr>
<tr>
<td>MATH201 Multivariable Calculus</td>
<td>5</td>
</tr>
<tr>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>CHEE267 Transfer Processes 2</td>
<td>5</td>
</tr>
<tr>
<td>CHEE282 Laboratory 2</td>
<td>10</td>
</tr>
<tr>
<td>CHEE241 Physical Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>MATH202 Partial Differential Equations 1</td>
<td>5</td>
</tr>
<tr>
<td>MATH203 Ordinary Differential Equations 1</td>
<td>5</td>
</tr>
<tr>
<td>Both Semesters</td>
<td></td>
</tr>
<tr>
<td>CHEE242 Chemical Engineering Computation</td>
<td>10</td>
</tr>
<tr>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

Year III

Semester 1
| CHEE321 Modelling of Processes | 5 |
| CHEE332 Thermodynamics | 10 |
| CHEE341 Project Engineering | 10 |
| CHEE382 Laboratory 3 | 5 |
| Technical Electives | 10 |
| Semester 2 |
| CHEE342 Safety and Environment | 10 |
| CHEE372 Separation Processes | 10 |
| CHEE381 Engineering Applications Laboratory | 5 |
| CHEE383 Laboratory 4 | 5 |
| Technical Electives | 10 |
| Semester 3 |
| CHEE342 Process Control and Instrumentation | 10 |
| CHEE343 Kinetics and Reaction Engineering | 10 |
| Semester 4 |
| CHEE491 Seminar | 5 |
| CHEE495 Design Project | 20 |
| CHEE497 Research Project | 20 |
| General Course Policies |

The attention of students is drawn to the General Course Policies of the Faculty published in the Faculty Policy Section of this Handbook. These policies are particularly important for students intending to enrol in a non-standard program.

Technical Electives

Technical Elective subjects must be selected from the list below. Not all Technical Elective subjects will be offered in any one year. The subjects to be offered will be displayed on the Department Notice Board in September of the previous year.

Technical Elective Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEE351 Electrochemistry and Corrosion</td>
<td>5</td>
</tr>
<tr>
<td>CHEE352 Transport Phenomena</td>
<td>5</td>
</tr>
<tr>
<td>CHEE353 Surface Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEE354 Biotechnology</td>
<td>5</td>
</tr>
<tr>
<td>CHEE356 Process Synthesis</td>
<td>5</td>
</tr>
<tr>
<td>CHEE357 Fuel Technology</td>
<td>5</td>
</tr>
</tbody>
</table>
### Bachelor Degree Course Programs

**Combined Degree Programs**

Combined degree programs are available which allow completion of the requirements for the Bachelor of Engineering (BE) degree in the specialisation of Chemical Engineering together with the requirements for a degree of Bachelor of Mathematics (BMath) and Bachelor of Science (BSc) (Chemistry Major). The subjects undertaken in the first year of study of each program are identical to those required in the Chemical Engineering program except that the inclusion of MATH102 and MATH103 is required. Combined degree programs each require a minimum of 5 years full-time study.

- **Civil Engineering**
  - Bachelor of Engineering (BE) awarded in the specialisation of Civil Engineering
  - **Designated Department**: Department of Civil Engineering and Surveying
  - **Course Coordinator**: Dr W. G. Field
  - **Course Code**: 10100

### Section Five

<table>
<thead>
<tr>
<th>Bachelor Degree Course Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>CHEE358</strong> Process Metallurgy 1</td>
</tr>
<tr>
<td><strong>CHEE365</strong> Introduction to Mineral Processing</td>
</tr>
<tr>
<td><strong>CHEE356</strong> Waste Management</td>
</tr>
<tr>
<td><strong>CHEE357</strong> Analysis of Pollution</td>
</tr>
<tr>
<td><strong>CHEE403</strong> Environmental Process Technology</td>
</tr>
</tbody>
</table>

### General Electives

General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BE, BSc, BMath or BS, provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject).

**Recommended General Electives** are listed below. Not all General elective subjects may be chosen from any subjects which the candidate is enrolled and the requirements of the program given above.

**Recommended**

<table>
<thead>
<tr>
<th><strong>Credit Points</strong></th>
<th><strong>Course Code</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>*</td>
<td>CHEE400</td>
</tr>
</tbody>
</table>

**Elective Subjects**

| **CHEE191** Industrial Experience | 5 |
| **CHEE192** Industrial Experience | 5 |
| **CHEE193** Industrial Experience | 5 |
| **CHEE194** Industrial Experience | 5 |
| **CHEE451** Surface Chemistry | 5 |
| **CHEE452** Mineral Processing | 5 |
| **CHEE453** Process Optimization | 5 |
| **CHEE454** Fuel Technology | 5 |
| **CHEE455** Heat Transfer | 5 |
| **CHEE456** Process Metallurgy | 5 |
| **CHEE462** Principles of Wastewater Treatment | 10 |
| **CHEE464** Environmental Process Technology | 5 |
| **CHEE496** Advanced Design Project | 10 |
| **CHEE498** Advanced Research Project | 10 |
| **MECH407** Air Pollution Management | 5 |
| **PHIL391** Technology and Human Values | 10 |
| **SCEN202** Environmental Planning and Pollution Control | 10 |
| **SCEN302** Environmental Impact Assessment Techniques | 10 |
| **STAT205** Engineering Statistics | 5 |

* May be taken by part-time students after Stage 1.

### Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

**Part-time Attendance**

All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

**Subjects**

<table>
<thead>
<tr>
<th><strong>Stage</strong></th>
<th><strong>Credit Points</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>STAGE 1</strong></td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CHEE113 Chemical and Manufacturing Processes</td>
<td>10</td>
</tr>
<tr>
<td>CHEM101 Chemistry 101</td>
<td>10</td>
</tr>
<tr>
<td><strong>STAGE 2</strong></td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>MATH111 Mathematics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>PHYS111 Physics 111 *</td>
<td>10</td>
</tr>
<tr>
<td><strong>STAGE 3</strong></td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CHEE112 Introduction to Chemical Engineering</td>
<td>10</td>
</tr>
<tr>
<td>MATH112 Mathematics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>Both Semesters</td>
<td></td>
</tr>
<tr>
<td>CHEE191 Industrial Experience</td>
<td>5</td>
</tr>
</tbody>
</table>

* Approved Options

1. MATH102 and MATH103 may replace MATH111 and MATH112.
2. PHYS113 may replace PHYS111.

In the latter years of the course, attendance will be required at various times during the day depending upon the subjects in which the candidate is enrolled and the requirements of the timetable. Full-time study is recommended by the Faculty Board after Stage 2 (see the Guide to Attendance Patterns at the beginning of this section of the Handbook). However, students in Chemical Engineering may follow a program enabling the requirements of the Course Program to be met in a minimum of 7 years of part-time study. Details of this program are available from the Course Coordinator.
Bachelor Degree Course Programs

<table>
<thead>
<tr>
<th>Section Five</th>
<th>Bachelor Degree Course Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL271</td>
<td>Transportation Engineering</td>
</tr>
<tr>
<td>CIVL314</td>
<td>Theory of Structures 2</td>
</tr>
<tr>
<td>CIVL315</td>
<td>Stress Analysis</td>
</tr>
<tr>
<td>CIVL317</td>
<td>Steel Design</td>
</tr>
<tr>
<td>CIVL325</td>
<td>Soil Mechanics 1</td>
</tr>
<tr>
<td>CIVL334</td>
<td>Open Channel Hydraulics</td>
</tr>
<tr>
<td>CIVL381</td>
<td>Statistical Methods</td>
</tr>
<tr>
<td>CIVL316</td>
<td>Reinforced Concrete Design</td>
</tr>
<tr>
<td>CIVL326</td>
<td>Soil Mechanics 2</td>
</tr>
<tr>
<td>CIVL327</td>
<td>Concrete and Metals Technology</td>
</tr>
<tr>
<td>CIVL342</td>
<td>Hydrology</td>
</tr>
<tr>
<td>CIVL352</td>
<td>Management</td>
</tr>
<tr>
<td>CIVL382</td>
<td>Finite Element Methods</td>
</tr>
<tr>
<td>PHIL391</td>
<td>Technology and Human Values</td>
</tr>
<tr>
<td>CIVL410</td>
<td>Dynamics and Stability of Structures</td>
</tr>
<tr>
<td>CIVL429</td>
<td>Rock Mechanics</td>
</tr>
<tr>
<td>CIVL435</td>
<td>River and Coastal Engineering</td>
</tr>
<tr>
<td>CIVL444</td>
<td>Water Resources Engineering II</td>
</tr>
<tr>
<td>CIVL447</td>
<td>Environmental Modelling</td>
</tr>
<tr>
<td>CIVL458</td>
<td>Engineering Risk Assessment</td>
</tr>
<tr>
<td>CIVL472</td>
<td>Highway Engineering</td>
</tr>
<tr>
<td>CIVL491</td>
<td>Special Topic</td>
</tr>
<tr>
<td>CIVL492</td>
<td>Special Topic</td>
</tr>
<tr>
<td>ECOS371</td>
<td>Principles of Biosciences</td>
</tr>
<tr>
<td>MATH202</td>
<td>Partial Differential Equations</td>
</tr>
<tr>
<td>SURV213</td>
<td>Surveying 3</td>
</tr>
<tr>
<td>SURV214</td>
<td>Optics and Mining Surveying</td>
</tr>
<tr>
<td>SURV215</td>
<td>Electronic Distance Measurement</td>
</tr>
<tr>
<td>SURV361</td>
<td>Photogrammetry</td>
</tr>
<tr>
<td>SURV473</td>
<td>Town Planning</td>
</tr>
</tbody>
</table>

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of Department, may approve selection of other elective subjects. Students will be advised in September of the preceding year which CIVL400 level elective subjects will be available.

Recommended Elective Subjects

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHE342</td>
<td>Safety and Environment</td>
</tr>
<tr>
<td>CIVL191</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>CIVL192</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>CIVL193</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>CIVL194</td>
<td>Industrial Experience</td>
</tr>
<tr>
<td>CIVL431</td>
<td>Environmental Modelling</td>
</tr>
<tr>
<td>CIVL434</td>
<td>Environmental Modelling 2</td>
</tr>
<tr>
<td>CIVL435</td>
<td>Environmental Modelling 3</td>
</tr>
<tr>
<td>CIVL436</td>
<td>Environmental Modelling 4</td>
</tr>
<tr>
<td>CIVL419</td>
<td>Masonry and Timber Design</td>
</tr>
<tr>
<td>CIVL410</td>
<td>Dynamics and Stability of Structures</td>
</tr>
<tr>
<td>CIVL225</td>
<td>Introduction to Engineering</td>
</tr>
<tr>
<td>MECH121</td>
<td>Mechanics and Structures</td>
</tr>
<tr>
<td>PHYS111</td>
<td>Physics 111</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH111</td>
<td>Mathematics 111</td>
</tr>
<tr>
<td>SURV111</td>
<td>Surveying 1</td>
</tr>
<tr>
<td>MATH112</td>
<td>Mathematics 112</td>
</tr>
<tr>
<td>SURV112</td>
<td>Surveying 2</td>
</tr>
<tr>
<td>CIVL111</td>
<td>Mechanics and Structures</td>
</tr>
<tr>
<td>MECH112</td>
<td>Materials 1</td>
</tr>
<tr>
<td>PHYS111</td>
<td>Physics 111</td>
</tr>
</tbody>
</table>

Previous subject: CIVL225 and CIVL226

New Subject: CIVL237

Students who have only completed CIVL225 will be required to complete CIVL491 in Semester 1.

Students who have only completed CIVL226 will be required to complete CIVL492 in Semester 1.

In exceptional circumstances the Dean may determine the transition pattern to be followed.

Combined Degree Programs

BE(Civil Engineering)/BSurv

A program which allows completion of the requirements of the BE(Civil Engineering) and BSurv is also available. The subjects undertaken in the first year of study of each program are identical to those required in the Civil Engineering program. The combined BE/BSurv program requires a minimum of 5 years full-time study.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to the combined BE/BSurv program may be gained via UAC by applicants who achieve high marks in the NSW HSC (or equivalent). Students commencing studies after 1994 may also enter combined degree programs at the conclusion of Year 11 if they have achieved a WAM of 70.

Students enrolled in either the BE(Civil) or BSurv programs prior to 1993 should consult the Faculty Office for information on admission requirements. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.

The detailed BE(Civil Engineering)/BSurv combined degree program is summarised in the Surveying section of this Handbook.

Other Combined Degree Programs

Combined degree programs may also be available which allow completion of the requirements for the Bachelor of Engineering (BE) degree in the specialisation of Civil Engineering together with the requirements for another degree, for example Bachelor of Mathematics (BMath) and Bachelor of Science (BSc). The development of an individual
program which meet with the approval of the Deans of the faculties concerned will be required. The Faculty Office may be consulted regarding application forms and course requirements.

Computer Engineering

Degree: Bachelor of Engineering (BE) awarded in the specialisation of Computer Engineering

Designated Department: Department of Electrical and Computer Engineering

Course Coordinator: Associate Professor P.J. Moylan

Course Code: 10475


course program

Subjects

<table>
<thead>
<tr>
<th>YEAR I</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>COMP111 Introduction to Computer Science</td>
<td>10</td>
</tr>
<tr>
<td>MATH111 Mathematics 111*</td>
<td>10</td>
</tr>
<tr>
<td>PHYS113 Physics 113</td>
<td>10</td>
</tr>
<tr>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ELEC101 Introduction to Electrical and Computer Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MATH112 Mathematics 112*</td>
<td>10</td>
</tr>
<tr>
<td>MEC112 Materials 1</td>
<td>10</td>
</tr>
<tr>
<td>PHYS114 Physics 114</td>
<td>10</td>
</tr>
<tr>
<td>Both Semesters</td>
<td></td>
</tr>
<tr>
<td>ELEC130 Electrical Engineering 1</td>
<td>10</td>
</tr>
<tr>
<td>ELEC170 Computer Engineering 1</td>
<td>10</td>
</tr>
<tr>
<td>* Approved Option: MATH102 and MATH103 may be taken in lieu of MATH111 and MATH112.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>YEAR II</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC210 Introduction to Energy Systems</td>
<td>10</td>
</tr>
<tr>
<td>MATH201 Multivariable Calculus</td>
<td>10</td>
</tr>
<tr>
<td>MATH206 Complex Analysis</td>
<td>10</td>
</tr>
<tr>
<td>MATH219 Matrix Methods***</td>
<td>10</td>
</tr>
<tr>
<td>PHYS201 Quantum Mechanics and Electromagnetics</td>
<td>10</td>
</tr>
<tr>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>MATH203 Ordinary Differential Equations 1</td>
<td>10</td>
</tr>
<tr>
<td>ELEC220 Electronics 1</td>
<td>10</td>
</tr>
<tr>
<td>ELEC231 Electrical Circuits</td>
<td>10</td>
</tr>
<tr>
<td>COMP112 Discrete Structures</td>
<td>10</td>
</tr>
<tr>
<td>Both Semesters</td>
<td></td>
</tr>
<tr>
<td>ELEC270 Computer Engineering II **</td>
<td>10</td>
</tr>
<tr>
<td>** ELEC270 will commence in 1996. See transition arrangements below for 1995 Year II.</td>
<td></td>
</tr>
</tbody>
</table>

Elective Requirements

A total of 30 credit points is to be chosen from the subjects listed below and for which the student can satisfy subject prerequisites. Computer Engineering Electives must include at least 10cp of 400 level subjects. Not all Computer Engineering Electives may be offered in any one year. Students will be advised in September of the preceding year which 400 level elective subjects will be available.

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC420 VLSI Design</td>
<td>10</td>
</tr>
<tr>
<td>ELEC421 Electronics Design</td>
<td>10</td>
</tr>
<tr>
<td>ELEC440 Advanced Control</td>
<td>10</td>
</tr>
<tr>
<td>ELEC441 Control System Design and Management</td>
<td>10</td>
</tr>
<tr>
<td>ELEC445 Advanced Signal Processing</td>
<td>10</td>
</tr>
<tr>
<td>ELEC454 Engineering Electromagnetics</td>
<td>10</td>
</tr>
<tr>
<td>ELEC455 Advanced Communications</td>
<td>10</td>
</tr>
<tr>
<td>ELEC470 Advanced Computer Architectures</td>
<td>10</td>
</tr>
<tr>
<td>ELEC460 Computer Software</td>
<td>10</td>
</tr>
<tr>
<td>COMP321 Software Engineering</td>
<td>10</td>
</tr>
<tr>
<td>COMP322 Computer Vision and Robotics</td>
<td>10</td>
</tr>
<tr>
<td>COMP323* Computational Logic</td>
<td>10</td>
</tr>
<tr>
<td>COMP324 Parallel Processing</td>
<td>10</td>
</tr>
<tr>
<td>COMP325 Database Systems</td>
<td>10</td>
</tr>
<tr>
<td>COMP326 Data Security</td>
<td>10</td>
</tr>
<tr>
<td>COMP327 Operating Systems</td>
<td>10</td>
</tr>
<tr>
<td>COMP328 Computer Networks</td>
<td>10</td>
</tr>
<tr>
<td>COMP339* Compiler Design</td>
<td>10</td>
</tr>
<tr>
<td>COMP330 Graphic User Interfaces</td>
<td>10</td>
</tr>
<tr>
<td>COMP331 Geometric Data Structures</td>
<td>10</td>
</tr>
<tr>
<td>COMP332 Computer Graphics</td>
<td>10</td>
</tr>
</tbody>
</table>

... It is possible that elective subjects which have prerequisites that do not occur as core subjects in the BE Computer course may only be available to students completing the course in more than four years.

General Electives (Year IV)

General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BE, BEd, BM Ath or BSc provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject).

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of department, may approve selection of other elective subjects.
Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

Part-time Attendance

All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

**STAGE 1**
- Semester 1: MATH111 Mathematics 111* 10
- Semester 2: MATH112 Mathematics 112 * 10
- Both Semesters: ELEC130 Electrical Engineering 1 10
  ELEC170 Computer Engineering 1 10
  *Approved Option

**STAGE 2**
- Semester 1: ELEC101 Introduction to Electrical and Computer Engineering 5
  MECH111 Engineering Drawing 5
  PHYS113 Physics 113 10
- Semester 2: CIVL111 Mechanics and Structures 5
  MECH121 Materials 1 5
  PHYS114 Physics 114 10

After completion of the above program attendance will be required at various times during the day depending upon the subjects in which the candidate 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 Course Program has been amended with effect from the beginning of the 1995 academic year. All students enrolled in this course or any combined degree program of which it forms part, are required to meet the requirements of the new Course Program.

Year by Year Transition

Students who were in phase with the previous Course Program should proceed as follows.

**Year Completed** 
Required to Complete
by end of 1994
- Year I
  - Year Ill: MATH102 plus COMP111
  - Year III: COMP112 Discrete Structures 10
  - Year IV: MATH112

- Year I and Year II
  - Year III: COMP121 Theory of Computation
  - Year IV: MATH208

- Year I, Year II and Year III
  - New Subject

Year by Year Transition: Subject by Subject Transition

Students should re-enrol in accordance with the transition arrangements.

For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply.

**Previous subject** 
New Subject

- CIVL111 & MECH111: ELEC270
- CIVL111 only: 5 credit points of General Elective
- MECH111 only: 5 credit points of General Elective
- MATH217: MATH219
- MATH218: MATH208

For the purpose of re-enrolment in 1995, students partially completing an any year program in 1994 may need to obtain a transition statement from the Faculty Office, as their transitions will be determined individually. Any student who believes that they are disadvantaged by the program set down on the Transition Statement may, after consulting the course co-ordinator, apply in writing to the Dean for consideration of their case. In order to provide for exceptional cases in transition the Dean may determine the transition program to be followed.

Combined Degree Programs

Combined degree programs are available which allow completion of the requirements for the Bachelor of Engineering (BE) degree in the specialisation of Computer Engineering together with the requirements for a degree of Bachelor of Computer Science (BCompSc), Bachelor of Mathematics (BMath) and Bachelor of Science (BSc) (Physics Major). The subjects undertaken in the first year of study of each program are identical to those required in the Computer Engineering program except that the inclusion of MATH102 and MATH105 is required for most combined degree programs. Combined degree programs each require a minimum of 5 years full-time study.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to combined programs may be gained via UAC by applicants who achieve high marks in the equivalent). Students may also enter combined degree programs at the completion of Year 1 if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.

Bachelor of Computer Science (BCompSc), Bachelor of Mathematics (BMath) and Bachelor of Science (BSc) (Physics Major). The subjects undertaken in the first year of study of each program are identical to those required in the Computer Engineering program except that the inclusion of MATH102 and MATH105 is required for most combined degree programs. Combined degree programs each require a minimum of 5 years full-time study.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to combined programs may be gained via UAC by applicants who achieve high marks in the equivalent). Students may also enter combined degree programs at the completion of Year 1 if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.

**YEAR I**

Semester 1:
- COMP111 Introduction to Computer Science 10
- MATH111 Mathematics 111* 10
  - 100-level General Electives

Semester 2:
- COMP112 Discrete Structures 10
- MATH112 Mathematics 112* 10
  - 100-level General Electives

**Both Semesters**
- COMP113 Introduction to Artificial Intelligence 10
- ELEC170 Computer Engineering 1** 10

*Approved Options
- MATH102 and MATH105 may replace MATH111 and MATH112.
- Students wishing to take an additional 10cp of 100-level General Electives in their first year may postpone ELEC170 until their second year. The extra 10cp would then count towards the second-year General Elective requirement.

**YEAR II**

Semester 1:
- COMP221 Comparative Programming Languages 10
- COMP223 Analysis of Algorithms 10

Semester 1 or Semester 2:
- 200-level Directed Electives 30
  - 100/200/300-level General Electives

Semester 2:
- COMP222 Theory of Computation 10

**YEAR III**

Semester 1 or Semester 2:
- 300-level Directed Electives 40
  - 300-level General Electives 20
Section Five

Both Semesters

COMP321 Software Engineering 20

General Course Policies

The attention of students is drawn to the General Course Policies of the Faculty published in the Faculty Policy Section of this Handbook. These policies are particularly important for students intending to enrol in a non-standard program.

Elective Requirements

A total of 60 credit points of General Electives are to be taken, comprising at least 20 credit points at 100 level and at least 20 credit points at 300 level. A total of 70 credit points of Directed Electives are to be taken consisting of 30 credit points at 200 level and 40 credit points at 300 level.

General Electives

General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BE, BEc, BMath or BSc provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject).

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of department, may approve selection of other elective subjects.

It is not appropriate for Computer Science students to enrol in the subjects MEC205 and CHER242 which are deemed to be similar to subjects available in the Department of Computer Science.

Recommended General Electives are listed below.

Credit Points

100-level Subjects

ELEC130 Electrical Engineering 1 10

INFO101 Introduction to Information Systems 10

INFO102 Information Storage and Management 10

PHIL101 Introduction to Philosophy 20

PSYC101 Psychology Introduction 1 10

STAT101 Introductory Statistics 10

* Students intending to take INFO203 Analysis of Information Systems, INFO206 Information Systems Design or INFO209 Commercial Programming as Year II Electives should select INFO101 and INFO102 as Year I Elective subjects.

200-level Subjects

INFO201 Human Context of Information Systems 10

PHIL203 Non-linear Dynamic Models & Cognitive Science 10

PSY207 Experimental Methodology 10

STAT202 Regression Analysis 10

300-level Subjects

ELEC371 Microprocessor Systems 10

INFO302 Information Systems Methods and Technologies 10

INFO303 Information Systems and the Organization 10

INFO304 Knowledge Systems 10

PHIL391 Technology & Human Values I 10

PSYC301 Advanced Foundations for Psychology 10

PSYC309 Topics in Neural Science 10

Directed Electives

Directed Electives must be chosen from the appropriate lists given below.

Credit Points

200-level Subjects

COMP324 The Unix Operating System 10

COMP325 Artificial Intelligence 10

INFO202 Analysis of Information Systems 10

INFO203 Information Systems Design 10

INFO204 Commercial Programming 10

MATH208 Linear Algebra 5

MATH213 Mathematical Modelling 5

MATH215 Operations Research 5

MATH216 Numerical Analysis 5

MATH217 Mathematical Statistics 5

MATH219 Matrix Methods 5

PSYC202 Basic Processes 10

STAT201 Mathematical Statistics 10

* Only one of MATH219 and MATH208 may be taken, not both.

** Note that PSYC207 Experimental Methodology is a corequisite for PSYC202. If PSYC202 is to be taken, then PSYC207 should be taken as a General Elective.

300-level Subjects***

COMP332 Computer Vision and Robotics 10

COMP333 Computational Logic 10

COMP341 Parallel Processing 10

COMP343 Database Systems 10

COMP356 Unix Security 10

COMP372 Operating Systems 10

COMP378 Computer Networks 10

COMP379 Compiler Design 10

* Approved Option MATH102 and MATH103 may replace MATH111 and MATH112.

Bachelor Degree Course Programs

Section Five

Bachelor Degree Course Programs

COMP330 Graphic User Interfaces 10

COMP331 Geometric Data Structures 10

COMP332 Computer Graphics 10

ELEC272 Computer Architecture 10

** Under special circumstances the Head of Department may approve enrolment in COMP400 subjects in lieu of 300 level Directed Elective subjects.

Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

Part-time Attendance

All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

Subjects Credit Points

STAGE 1

Semester 1

COMP111 Introduction to Computer Science 10

MATH111 Mathematics 111* 10

Semester 2

COMP112 Discrete Structures 10

MATH112 Mathematics 112* 10

* Approved Option MATH102 and MATH103 may replace MATH111 and MATH112.

STAGE 2

Both Semesters

COMP113 Introduction to Artificial Intelligence 10

ELEC170 Computer Engineering 1 10

Year I Electives 20

After completion of the above program attendance will be required at various times during the year depending upon the subjects in which the candidate 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.

Combined Degree Programs

Combined degree programs are available which allow completion of the requirements for the Bachelor of Computer Science together with the requirements for a degree of Bachelor of Arts, Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) (Physics or Psychology Major). These programs require a minimum of 4 years full-time study. A program which allows completion of the requirements of the BCompSc and BCompSc is also available and requires a minimum of 5 years full-time study. Students enrolled in the BCompSc course who wish to undertake the combined degree program should contact the Faculty Office.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to combined programs may be gained via UAC by applicants who achieve highly at the NSW HSC (or equivalent). Students may also enter combined degree programs at the completion of Year I if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.
### Bachelor Degree Course Programs

#### Section Five

## Computer Science Honours

**Degree** Bachelor of Computer Science (Honours)  
(BCompSc(Hons))

**Designated Department** Department of Computer Science

**Course Coordinator** Dr. H. Elgindy

**Course Code** 10043

The BCompSc(Hons) program is a postgraduate degree taken over one full-time year or two part-time years. The program is normally undertaken by students with a superior record in the BCompSc program who wish to deepen their knowledge in the discipline of Computer Science as further preparation for professional practice or to meet the requirements for admission to a research degree program. Entry to the honours program is possible for graduates of other disciplines. Enquiries regarding admission should be directed to the Course Coordinator.

The BCompSc(Hons) course program approved by the Faculty Board is presented below.

### COURSE PROGRAM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP425 Honours Project</td>
<td>20</td>
</tr>
<tr>
<td>COMP400 Level Subjects</td>
<td>60</td>
</tr>
<tr>
<td>COMP400 Level Subjects</td>
<td>80</td>
</tr>
</tbody>
</table>

#### COMP400 Level Subjects

A total of 60 credit points of Computer Science electives chosen from the following list is to be completed. It should be noted that all the listed 400 level COMP electives may not be offered every year. In exceptional circumstances the 400 level electives may be substituted with 300 level COMP subjects, but only with written permission of the Head of Department of Computer Science.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP411 Special Topic A</td>
<td>10</td>
</tr>
<tr>
<td>COMP412 Special Topic B</td>
<td>10</td>
</tr>
<tr>
<td>COMP413 Special Topic C</td>
<td>10</td>
</tr>
<tr>
<td>COMP414 Special Topic D</td>
<td>10</td>
</tr>
<tr>
<td>COMP425 Honours Project</td>
<td>20</td>
</tr>
<tr>
<td>COMP415 Special Topic E</td>
<td>20</td>
</tr>
<tr>
<td>COMP416 Cryptographic Techniques</td>
<td>10</td>
</tr>
<tr>
<td>COMP417 Natural Language Processing</td>
<td>10</td>
</tr>
<tr>
<td>COMP418 Formal Reasoning in Artificial Intelligence</td>
<td>10</td>
</tr>
<tr>
<td>COMP419 Program Semantics</td>
<td>10</td>
</tr>
<tr>
<td>COMP420 Computational Geometry</td>
<td>10</td>
</tr>
<tr>
<td>COMP421 Advanced Computational Geometry</td>
<td>10</td>
</tr>
<tr>
<td>COMP422 Graph Algorithms</td>
<td>10</td>
</tr>
<tr>
<td>COMP423 Advanced Compiler Design</td>
<td>10</td>
</tr>
<tr>
<td>COMP449 Advanced Parallel Processing Theory</td>
<td>10</td>
</tr>
<tr>
<td>COMP450 Distributed Operating Systems</td>
<td>10</td>
</tr>
<tr>
<td>COMP451 Advanced Parallel Processing Applications</td>
<td>10</td>
</tr>
<tr>
<td>COMP452 Theory of Databases</td>
<td>10</td>
</tr>
</tbody>
</table>

### Electrical Engineering

**Degree** Bachelor of Engineering (BE) awarded in the specialisation of Electrical Engineering

**Designated Department** Department of Electrical and Computer Engineering

**Course Coordinator** Dr. J. Webster

**Course Code** 10173

### COURSE PROGRAM

#### Credit Points

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR I Semester 1</td>
<td></td>
</tr>
<tr>
<td>COMP110 Introduction to Programming</td>
<td>5</td>
</tr>
<tr>
<td>MATH111 Mathematics 111*</td>
<td>10</td>
</tr>
<tr>
<td>MECH121 Materials 1</td>
<td>5</td>
</tr>
<tr>
<td>PHYS113 Physics 113</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
</tr>
<tr>
<td>YEAR I Semester 2</td>
<td></td>
</tr>
<tr>
<td>ELEC101 Introduction to Electrical and Computer Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MATH112 Mathematics 112*</td>
<td>10</td>
</tr>
<tr>
<td>MECH111 Engineering Drawing</td>
<td>5</td>
</tr>
<tr>
<td>PHYS114 Physics 114</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>60</strong></td>
</tr>
</tbody>
</table>

**Both Semesters**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC130 Electrical Engineering 1</td>
<td>10</td>
</tr>
<tr>
<td>ELEC170 Computer Engineering 1</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>80</strong></td>
</tr>
</tbody>
</table>

* Approved Option MATH102 and MATH103 may be taken in lieu of MATH111 and MATH112.

### YEAR II

#### Semester 1

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH201 Multivariable Calculus</td>
<td>5</td>
</tr>
<tr>
<td>MATH219 Matrix Methods ***</td>
<td>5</td>
</tr>
<tr>
<td>MEC223 Dynamics</td>
<td>5</td>
</tr>
<tr>
<td>PHYS201 Quantum Mechanics and Electromagnetics</td>
<td>10</td>
</tr>
<tr>
<td>ELEC210 Introduction to Energy Systems</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

#### Semester 1 or Semester 2

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mathematics Elective ****</td>
<td>5</td>
</tr>
</tbody>
</table>

### YEAR III

#### Semester 1

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH206 Complex Analysis I</td>
<td>5</td>
</tr>
<tr>
<td>MECI482 Engineering Economics 1</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

#### Semester 2

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC338 Engineering Management</td>
<td>5</td>
</tr>
<tr>
<td>MECI471 Thermodynamics</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>10</strong></td>
</tr>
</tbody>
</table>

### Both Semesters

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC312 Electrical Systems</td>
<td>5</td>
</tr>
<tr>
<td>ELEC332 Switching Electronics</td>
<td>5</td>
</tr>
<tr>
<td>ELEC351 Telecommunications</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>15</strong></td>
</tr>
</tbody>
</table>

### YEAR IV

#### Semester 1 / Semester 2

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Electives ****</td>
<td>10</td>
</tr>
<tr>
<td>Electrical Engineering Electives ****</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>20</strong></td>
</tr>
</tbody>
</table>

### Both Semesters

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC480 Electrical Engineering Project</td>
<td>30</td>
</tr>
<tr>
<td>PHIL391 Technology and Human Values</td>
<td>10</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>40</strong></td>
</tr>
</tbody>
</table>

* Approved Option MATH208 may be taken in lieu of MATH219 by students who successfully complete MATH102 and MATH103.

#### Section Five

**Electrical Engineering Policies**

The attention of students is drawn to the General Course Policies of the Faculty published in the Faculty Handbook. These policies are particularly important for students intending to enrol in non-standard programs.

### Elective Requirements

The requirements of each of the three elective categories are given below.

**ELEC270 will commence in 1996. See transition arrangements below for 1995 Year II.**
Mathematics Elective (Year II)

One 5 credit point subject is to be selected from those subjects offered by the Department of Mathematics at 200 or 300 level. The prerequisite and corequisite requirements of the selected subject must be satisfied or written permission to enrol gained from the Head of the Department of Mathematics.

Engineering Electives (Year IV)

A total of 30 credit points is to be chosen from the subjects listed below.

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC411</td>
<td>Electrical System Design 5</td>
</tr>
<tr>
<td>ELEC412</td>
<td>Electrical System Dynamics and Control 5</td>
</tr>
<tr>
<td>ELEC413</td>
<td>Electrical Technology 5</td>
</tr>
<tr>
<td>ELEC420</td>
<td>VLSI Design 10</td>
</tr>
<tr>
<td>ELEC421</td>
<td>Electronics Design 10</td>
</tr>
<tr>
<td>ELEC440</td>
<td>Advanced Control 10</td>
</tr>
<tr>
<td>ELEC441</td>
<td>Control System Design and Management 10</td>
</tr>
<tr>
<td>ELEC454</td>
<td>Advanced Signal Processing 5</td>
</tr>
<tr>
<td>ELEC455</td>
<td>Engineering Electromagnetics 5</td>
</tr>
<tr>
<td>ELEC455</td>
<td>Advanced Communications 5</td>
</tr>
<tr>
<td>ELEC470</td>
<td>Advanced Computer Architectures 10</td>
</tr>
<tr>
<td>ELEC460</td>
<td>Computer Software 10</td>
</tr>
</tbody>
</table>

Not all Electrical Engineering Electives may be offered in any one year. Students will be advised in September of the preceding year which 400 level elective subjects will be available.

General Electives (Year IV)

General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCommSc, BE, BEng, BMath or BSocSci provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject).

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of Department, may approve selection of other elective subjects.

Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

Part-time Attendance

All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH111</td>
</tr>
<tr>
<td>MATH112</td>
</tr>
<tr>
<td>ELEC130</td>
</tr>
<tr>
<td>ELEC170</td>
</tr>
</tbody>
</table>

* Approved Option

See note on Year I Mathematics Option above.

STAGE 2

Semester 1

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC101</td>
</tr>
<tr>
<td>PHYS113</td>
</tr>
<tr>
<td>MECH111</td>
</tr>
<tr>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL111</td>
</tr>
<tr>
<td>MECH121</td>
</tr>
<tr>
<td>PHYS114</td>
</tr>
</tbody>
</table>

After completion of the above program attendance will be required at various times during the day depending upon the subjects in which the candidate 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 Course Program has been amended with effect from the commencement of the 1995 academic year. All students enrolled in this course are required to meet the requirements of the new Course Program.

Year by Year Transition

Students who were in phase with the previous Course Program should proceed as follows.

Year I

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH120</td>
</tr>
<tr>
<td>ELEC170</td>
</tr>
</tbody>
</table>

Year II

<table>
<thead>
<tr>
<th>Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH130</td>
</tr>
<tr>
<td>ELEC170</td>
</tr>
</tbody>
</table>

Subject by Subject Transition

Students should re-enrol in accordance with the transition arrangements.

For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply:

<table>
<thead>
<tr>
<th>Previous Subject</th>
<th>New Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL111 &amp; MECH234</td>
<td>ELEC370</td>
</tr>
<tr>
<td>CIVL111 only</td>
<td>ELEC370</td>
</tr>
<tr>
<td>MATH217</td>
<td>MATH219</td>
</tr>
<tr>
<td>MATH208</td>
<td>MATH208</td>
</tr>
<tr>
<td>MATH206</td>
<td>MATH206</td>
</tr>
<tr>
<td>MECH234 only</td>
<td>ELEC370</td>
</tr>
</tbody>
</table>

For the purpose of re-enrolment in 1995, students partially completing any year program in 1994 may need to obtain a transition statement from the Faculty Office, as their transitions will be determined individually. Any student who believes that they are disadvantaged by the program set down on the Transition Statement must, after consulting the course co-ordinator, apply in writing to the Dean for consideration of their case. In order to provide for exceptional cases in transition the Dean may determine the transition program to be followed.

Combined Degree Programs

Combined degree programs are available which allow completion of the requirements for the Bachelor of Engineering (BEng) or Bachelor of Science (BSc) (Physics Major) by a minimum of 5 years full-time study. The subjects undertaken in the first year of study of each program are identical to those required in the Electrical Engineering program except that the inclusion of MATH102 and MATH103 is required for most combined degree programs.

Note that students taking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by each program may exceed the normal annual load of 60 credit points. Also note that HRES will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to combined programs may be gained via UAC by applicants who achieve high marks in the NSW HSC (or equivalent). Students may also enter combined degree programs at the completion of Year I if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.

Engineering together with the requirements for a degree of Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) (Physics Major) by a minimum of 5 years full-time study. The subjects undertaken in the first year of study of each program are identical to those required in the Electrical Engineering program except that the inclusion of MATH102 and MATH103 is required for most combined degree programs.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by each program may exceed the normal annual load of 60 credit points. Also note that HRES will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to combined programs may be gained via UAC by applicants who achieve high marks in the NSW HSC (or equivalent). Students may also enter combined degree programs at the completion of Year I if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.
Environmental Engineering

Degree Bachelor of Engineering (BE) awarded in the specialisation of Environmental Engineering

Designated Department Department of Civil Engineering and Surveying

Course Coordinator Dr B.J. Williams

Course Code 10694

** COURSE PROGRAM **

** Subjects Credit Points **

** YEAR I **

Semester 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM101 Chemistry 101</td>
<td>10</td>
</tr>
<tr>
<td>CIVL111 Mechanics and Structures</td>
<td>5</td>
</tr>
<tr>
<td>MATH111 Mathematics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>MECH121 Materials 1</td>
<td>5</td>
</tr>
<tr>
<td>PHYS111 Physics 111 *</td>
<td>10</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEE111 Industrial Process Principles</td>
<td>5</td>
</tr>
<tr>
<td>CHEM102 Chemistry 102</td>
<td>10</td>
</tr>
<tr>
<td>CIVL131 Fluid Mechanics 1</td>
<td>5</td>
</tr>
<tr>
<td>CIVL141 Environmental Engineering 1</td>
<td>5</td>
</tr>
<tr>
<td>MATH112 Mathematics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>MECH120 Introduction to Engineering Computing</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>

* Approved Options

1. MATH102 and MATH103 may replace MATH111 and MATH112.
2. PHYS111 may replace PHYS111.

** YEAR II **

Semester 1

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL101 Plant and Animal Biology</td>
<td>10</td>
</tr>
<tr>
<td>CHEE265 Environmental Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CIVL232 Fluid Mechanics</td>
<td>5</td>
</tr>
<tr>
<td>CIVL227 Geotechnical Investigation</td>
<td>5</td>
</tr>
<tr>
<td>MATH201 Multivariable Calculus</td>
<td>5</td>
</tr>
</tbody>
</table>

Semester 2

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL455 Project</td>
<td>10</td>
</tr>
<tr>
<td>CIVL457 Environmental Engineering Design</td>
<td>15</td>
</tr>
<tr>
<td>PHIL301 Technology and Human Values 1</td>
<td>10</td>
</tr>
</tbody>
</table>

* Students taking the Chemical Engineering Strand who took CIVL456 Transfer Processes 1 and CIVL457 Transfer Processes 2 in place of CHEM261 in Year II take CIVL456 in place of 10 credit points of Elective in Year IV.

** Elective Requirements **

Elective subjects may be chosen from the list of Approved Elective Subjects provided the prerequisite and corequisite requirements of the chosen subjects are met. Note that to gain maximum advantage from the choice of Elective subjects and to avoid timetabling difficulties, students are expected to follow one of the recommended strands below.

** Approved Electives Credit Points **

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL201 Biochemistry</td>
<td>10</td>
</tr>
<tr>
<td>BIOL207 Ecology</td>
<td>10</td>
</tr>
<tr>
<td>BIOL204 Cell and Molecular Biology</td>
<td>10</td>
</tr>
<tr>
<td>BIOL303 Environmental Plant Physiology</td>
<td>10</td>
</tr>
<tr>
<td>BIOL311 Environmental Biology</td>
<td>10</td>
</tr>
<tr>
<td>CHEE265 Transfer Processes 1</td>
<td>5</td>
</tr>
<tr>
<td>CHEE267 Transfer Processes 2</td>
<td>5</td>
</tr>
<tr>
<td>CHEE202 Transfer Processes Laboratory</td>
<td>5</td>
</tr>
<tr>
<td>CHEE372 Separation Processes</td>
<td>10</td>
</tr>
<tr>
<td>CHEE462 Principles of Wastewater Treatment</td>
<td>10</td>
</tr>
<tr>
<td>CHEE463 Environmental Process Technology 1</td>
<td>5</td>
</tr>
<tr>
<td>CHEE464 Environmental Process Technology 2</td>
<td>5</td>
</tr>
<tr>
<td>CHEM211 Analytical Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEM221 Inorganic Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEM231 Organic Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEM241 Physical Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEM201 Environmental Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CHEM301 Environmental Chemistry</td>
<td>10</td>
</tr>
<tr>
<td>CIVL213 Theory of Structures 1</td>
<td>5</td>
</tr>
<tr>
<td>CIVL225 Geotechnical Investigations 2</td>
<td>5</td>
</tr>
<tr>
<td>CIVL325 Soil Mechanics 1</td>
<td>5</td>
</tr>
<tr>
<td>CIVL326 Soil Mechanics 2</td>
<td>5</td>
</tr>
<tr>
<td>CIVL382 Finite Element Methods</td>
<td>5</td>
</tr>
<tr>
<td>CIVL420 Geotechnical Engineering</td>
<td>10</td>
</tr>
<tr>
<td>LAW201 Introduction to Legal Studies</td>
<td>10</td>
</tr>
<tr>
<td>MATH202 Partial Differential Equations</td>
<td>10</td>
</tr>
<tr>
<td>MATH206 Complex Analysis</td>
<td>5</td>
</tr>
<tr>
<td>MATH308 Linear Algebra</td>
<td>10</td>
</tr>
<tr>
<td>MATH313 Mathematical Modelling</td>
<td>5</td>
</tr>
<tr>
<td>MATH319 Matrix Methods</td>
<td>10</td>
</tr>
<tr>
<td>MECH309 Noise Pollution and Control</td>
<td>5</td>
</tr>
</tbody>
</table>

In exceptional circumstances the Head of the Department of Civil Engineering and Surveying may approve alternative Elective subjects.

** Recommended Elective Strands **

The following Elective Strands have been formulated to allow some additional specialisation within the Environmental Engineering program. Advice regarding Elective strand selection may be obtained from the Course Coordinator.

<table>
<thead>
<tr>
<th>Strand</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology Strand</td>
<td>Year II, Sem 2: Elective (5cp)</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 1: Elective (5cp)</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 2: BIOL207</td>
</tr>
<tr>
<td></td>
<td>Year IV, Sem 1: BIOL303</td>
</tr>
<tr>
<td>Chemical Engineering Strand</td>
<td>Year II, Sem 1: CHEE265 and CHEE292 in lieu of CHEM261</td>
</tr>
<tr>
<td></td>
<td>Year II, Sem 2: CHEE267</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 1: Elective (5cp)</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 2: CHEE372</td>
</tr>
<tr>
<td></td>
<td>Year IV, Sem 1: CHEM261</td>
</tr>
<tr>
<td></td>
<td>Year IV, Sem 2: CHEE463 and CHEE464 taken in lieu of CHEM261</td>
</tr>
<tr>
<td>Geotechnical Engineering Strand</td>
<td>Year II, Sem 2: CIVL213</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 1: CIVL325</td>
</tr>
<tr>
<td></td>
<td>Year III, Sem 2: CIVL326 and CIVL382</td>
</tr>
<tr>
<td></td>
<td>Year IV, Sem 1: CIVL420</td>
</tr>
<tr>
<td>Prerequisite and Corequisite Requirements</td>
<td>The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.</td>
</tr>
<tr>
<td>Part-time Attendance</td>
<td>All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures.</td>
</tr>
</tbody>
</table>

** General Course Policies **

The attention of students is drawn to the General Course Policies of the Faculty published in the Faculty Policy Section of this Handbook. These policies are particularly important for students intending to enrol in a non-standard program.
The Course Program

Transition

For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply:

**Previous subject**  
**New subject**  
CIVL225 and CIVL226  
CIVL327

Students who have only completed CIVL225 will be required to complete CIVL491 in Semester 1

Students who have only completed CIVL226 will be required to complete CIVL492 in Semester 1

Students following the previous standard programs will proceed as follows.

**Year I**  
Year completed: Required to complete subsequently in 1994

1. Students who have only completed CIVL225 will be required to complete CIVL491 in Semester 1.
2. Students who have only completed CIVL226 will be required to complete CIVL492 in Semester 1.

In order to provide for exceptional cases in transition, the Dean may determine the transition program to be followed.

**Year II**  
Year III

In Year II, students must complete at least 10 credit points of Electives.

In Year III, students must complete at least 10 credit points of Electives.

**Year IV**

In Year IV, students must complete at least 10 credit points of Electives.

**Approved Options**

1. MATH101 and MATH102 may replace MATH111 and MATH112.
2. PHYS111 may replace PHYS112.

After completion of the above program attendance will be required at various times during the day depending upon the subjects in which the candidate 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 Course Program has been amended with effect from the commencement of the 1995 academic year. All students enrolled in this course or any combined degree program of which it forms part, are required to meet the requirements of the new Course Program.

Subject by Subject Transition

For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply:

**Previous subject**  
**New subject**  
CIVL225 and CIVL226  
CIVL327

Students who have only completed CIVL225 will be required to complete CIVL491 in Semester 1.

Students who have only completed CIVL226 will be required to complete CIVL492 in Semester 1.
### Bachelor Degree Course Programs

#### Section Five

<table>
<thead>
<tr>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH431</td>
<td>Robotics</td>
<td>5</td>
</tr>
<tr>
<td>MECH453</td>
<td>Introduction to Turbulence</td>
<td>5</td>
</tr>
<tr>
<td>MECH473</td>
<td>Thermodynamics 3</td>
<td>5</td>
</tr>
<tr>
<td>MECH474</td>
<td>Heat Transfer 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH497</td>
<td>Directed Reading **</td>
<td>5</td>
</tr>
<tr>
<td>MECH498</td>
<td>Directed Reading **</td>
<td>10</td>
</tr>
<tr>
<td>INFO101</td>
<td>Introduction to Information Systems</td>
<td>10</td>
</tr>
<tr>
<td>INFO102</td>
<td>Information Storage and Management</td>
<td>10</td>
</tr>
<tr>
<td>INFO202</td>
<td>Analysis of Information Systems</td>
<td>10</td>
</tr>
<tr>
<td>INFO203</td>
<td>Information Systems Design</td>
<td>10</td>
</tr>
<tr>
<td>INFO204</td>
<td>Commercial Programming</td>
<td>10</td>
</tr>
<tr>
<td>PHIL392</td>
<td>Technology and Human Values 2</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>General Electives ***</td>
<td>15</td>
</tr>
</tbody>
</table>

*Industrial Experience subjects may be taken by part-time students after Stage 1.

**MECH497 and MECH498 are normally taken as substantial extensions to MECH496. Supervision must be arranged and the written permission of the Head of the Department obtained before enrolment will be permitted in these subjects."

***General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BB, BSc, BMath or BEng provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject). In exceptional circumstances the Dean, on the recommendation of the relevant Heads of Department, may approve selection of other elective subjects.

### Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrollment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

### Transition Arrangements

The Course Program has been amended with effect from the commencement of the 1995 academic year. All students enrolled in this course or any combined degree program of which it forms part, are required to meet the requirements of the new Course Program.

Subject by Subject Transition

For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply.

- **Previous subject**
- **New Subject**
- MECH205
- MECH205
- MECH305
- MECH305

In exceptional circumstances the Dean may determine the transition pattern to be followed.

### Mechanical Engineering

**Degree**: Bachelor of Engineering (BE) awarded in the specialisation of Mechanical Engineering

**Designated Department**: Department of Mechanical Engineering

**Course Coordinator**: Dr B.J. Hill

**Degree Course Program**

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL111 Mechanics and Structures</td>
<td>5</td>
</tr>
<tr>
<td>MATH111 Mathematics 111 *</td>
<td>5</td>
</tr>
<tr>
<td>MECH102 Introduction to Engineering Computing</td>
<td>5</td>
</tr>
<tr>
<td>MECH111 Engineering Drawing</td>
<td>5</td>
</tr>
<tr>
<td>PHYS111 Physics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>MATH112 Mathematics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>MECH101 Introduction to Mechanical Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH103 Engineering Chemistry</td>
<td>5</td>
</tr>
<tr>
<td>MECH121 Materials 1</td>
<td>5</td>
</tr>
<tr>
<td>PHYS112 Physics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>ELEC170 Computer Engineering 1</td>
<td>10</td>
</tr>
<tr>
<td>ELEC170 Computer Engineering 1</td>
<td>80</td>
</tr>
</tbody>
</table>

*Approved Options

1. MATH102 and MATH103 may replace MATH111 and MATH112.
2. PHYS114 and PHYS116 may replace PHYS111 and PHYS112.

**Year I**

**Semester 1**

- MATH201 Multivariable Calculus                                         | 5             |
- MECH204 Experimental Methods 1                                         | 5             |
- MECH233 Dynamics                                                      | 5             |
- MECH241 Mechanics of Solids 1                                          | 5             |
- MECH271 Thermodynamics 1                                               | 5             |
- STAT205 Engineering Statistics                                        | 5             |
**Semester 2**

- MATH203 Ordinary Differential Equations 1                             | 5             |
- MECH205 Engineering Computations 1                                     | 5             |
- MECH212 Design of Machine Components                                  | 5             |
- MECH222 Materials 2                                                   | 5             |
- MECH234 Dynamics of Engineering Systems                               | 5             |
- MECH251 Fluid Mechanics 1                                              | 5             |
Both Semesters

MECH211 Mechanical Engineering Design 1 10
ELEC130 Electrical Engineering 1 10

YEAR III
Semester 1
ELEC211 Electrical Energy Conversion 5
MECH333 Materials 3 5
MECH334 Dynamics of Machines 5
MECH352 Fluid Mechanics 2 10

Semester 2
MATH202 Partial Differential Equations 1 5
MECH319 Introduction to Finite Element Analysis 5
MECH342 Mechanics of Solids 2 5
MECH372 Heat Transfer 1 5
MECH373 Thermodynamics 2 5

Both Semesters
MECH304 Experimental Methods 2 10
MECH311 Mechanical Engineering Design 2 10
PHIL391 Technology and Human Values 1 10

YEAR IV
Semester 1
MECH482 Engineering Economics 1 5

Semester 2
ELEC382 Engineering Management 5

Both Semesters
MECH361 Automatic Control 10
MECH415 Mechanical Engineering Design 3 10
MECH490 Project/Seminar 25
Directed Electives 15
General Electives 10

General Course Rules
The attention of students is drawn to the General Course Rules of the Faculty published in the Faculty Policy Section of this Handbook. These rules are particularly important for students intending to enrol in a non-standard program.

Elective Requirements
Directed Electives
Directed Electives allow students to specialise in one of the strands listed below. Students must choose Directed Electives from only one of the specialist strands.

(Note: If MECH101 and MECH192 are taken as General Electives, MECH193 may be included in any of the Directed Electives strands).

<table>
<thead>
<tr>
<th>Engineering Science</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH305 Engineering Computations 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH334 Advanced Dynamics</td>
<td>5</td>
</tr>
<tr>
<td>MECH353 Fluid Machines</td>
<td>5</td>
</tr>
<tr>
<td>MECH385 Quality Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH435 Computation of Turbulent Flows</td>
<td>5</td>
</tr>
<tr>
<td>MECH407 Air Pollution Management</td>
<td>5</td>
</tr>
<tr>
<td>MECH431 Robotics</td>
<td>5</td>
</tr>
<tr>
<td>MECH453 Introduction to Turbulence</td>
<td>5</td>
</tr>
<tr>
<td>MECH473 Thermodynamics</td>
<td>5</td>
</tr>
<tr>
<td>MECH474 Heat Transfer 2</td>
<td>5</td>
</tr>
</tbody>
</table>

* Not available to students who have completed MECH333.

<table>
<thead>
<tr>
<th>Industrial Management</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH381 Methods Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH383 Quality Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH384 Computer Simulation</td>
<td>5</td>
</tr>
<tr>
<td>MECH385 Computer Simulation 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH386 Computer Aided Manufacturing</td>
<td>5</td>
</tr>
<tr>
<td>MECH387 Operations Research 1</td>
<td>5</td>
</tr>
<tr>
<td>MECH388 Operations Research 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH407 Air Pollution Management</td>
<td>5</td>
</tr>
<tr>
<td>MECH431 Robotics</td>
<td>5</td>
</tr>
<tr>
<td>MECH484 Engineering Economics 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH485 Production Scheduling</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Industrial Systems</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH309 Noise Pollution and Control</td>
<td>5</td>
</tr>
<tr>
<td>MECH317 Bulk Materials Handling 1</td>
<td>5</td>
</tr>
<tr>
<td>MECH318 Conveying of Bulk Solids</td>
<td>5</td>
</tr>
<tr>
<td>MECH353 Fluid Machines</td>
<td>5</td>
</tr>
<tr>
<td>MECH383 Quality Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH384 Computer Simulation 1</td>
<td>5</td>
</tr>
<tr>
<td>MECH385 Computer Simulation 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH386 Computer Aided Manufacturing</td>
<td>5</td>
</tr>
<tr>
<td>MECH408 Machine Condition Monitoring</td>
<td>5</td>
</tr>
<tr>
<td>MECH412 Bulk Materials Handling 2</td>
<td>5</td>
</tr>
<tr>
<td>MECH418 Maintenance Management</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Materials/Design</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH315 Computer Aided Design</td>
<td>5</td>
</tr>
<tr>
<td>MECH324 Ceramic Science and Technology</td>
<td>5</td>
</tr>
<tr>
<td>MECH325 Polymer Science and Technology</td>
<td>5</td>
</tr>
<tr>
<td>MECH356 Fabrication of Metals</td>
<td>5</td>
</tr>
<tr>
<td>MECH383 Quality Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH386 Computer Aided Manufacturing</td>
<td>5</td>
</tr>
<tr>
<td>MECH415 Advanced Finite Element Analysis</td>
<td>5</td>
</tr>
<tr>
<td>MECH421 Composites in Engineering</td>
<td>5</td>
</tr>
</tbody>
</table>

General Electives
General Elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BE, BSc, BMath or BSc provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject). General elective subjects may include subjects not completed in any of the specialist strands.

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of Department, may approve selection of other elective subjects.

The Industrial Experience subjects MECH191, MECH192 or MECH193 may be counted as General Electives. If MECH191 and MECH192 are taken as General Electives, MECH193 may be included in any of the Directed Electives strands.

Prerequisite and Corequisite Requirements
The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

Part-time Attendance
All candidates for the degree must complete the requirements of the Course Program as given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVIL111 Mechanics and Structures</td>
<td>5</td>
</tr>
<tr>
<td>MATH111 Mathematics 111</td>
<td>10</td>
</tr>
<tr>
<td>MECH111 Engineering Drawing</td>
<td>5</td>
</tr>
<tr>
<td>MATH12 Mathematics 112</td>
<td>10</td>
</tr>
<tr>
<td>MECH101 Introduction to Mechanical Engineering</td>
<td>5</td>
</tr>
<tr>
<td>MECH103 Engineering Chemistry</td>
<td>40</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>STAGE 2</th>
<th>Semester 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH102 Introduction to Engineering Computing</td>
<td>5</td>
</tr>
<tr>
<td>PHYS111 Physics 111 *</td>
<td>10</td>
</tr>
<tr>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>MECH121 Materials 1</td>
<td>5</td>
</tr>
<tr>
<td>PHYS112 Physics 112 *</td>
<td>10</td>
</tr>
<tr>
<td>Both Semesters</td>
<td></td>
</tr>
<tr>
<td>ELEC170 Computer Engineering 1</td>
<td>10</td>
</tr>
</tbody>
</table>

* Approved Options
1. MATH102 and MATH103 may replace MATH111 and MATH112.
2. PHYS113 and PHYS114 may replace PHYS111 and PHYS112.

After completion of the above program attendance will be required at various times during the day depending upon the subjects in which the candidate 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.

Industrial Experience subjects may be taken by part-time students after Stage 1.

Transition Arrangements
The Course Program has been amended with effect from the commencement of the 1995 academic year. All students enrolled in this course or any combined degree program of which it forms part, are required to meet the requirements of the new Course Program.

Subject by Subject Transition
For the purposes of transition to the new Course Program, the following equivalence between previously completed subjects and new subjects will apply:

<table>
<thead>
<tr>
<th>Previous subject</th>
<th>New Subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH205</td>
<td>MECH205</td>
</tr>
<tr>
<td>MECH305</td>
<td>MECH305</td>
</tr>
<tr>
<td>MECH305</td>
<td>MECH305</td>
</tr>
</tbody>
</table>

In exceptional circumstances the Dean may determine the transition pattern to be followed.

Combined Degree Programs
Combined degree programs are available which allow completion of the requirements for the Bachelor of Engineering (BE) degree in the specialisation of Mechanical Engineering together with the requirements for a degree of Bachelor of Mathematics (BMath) or Bachelor of Science (BSc) in the specialisation of Physics by a minimum of 5 years full-time study. The latter combined degree
encompasses Materials Science. The subjects undertaken in the first year of study of the program are identical to those required in the Mechanical Engineering program except that the inclusion of MATH102 and MATH103 is required.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degrees of which it forms part and not on the proportion it contributes to any combined degree program. Timetabling constraints may limit the choice of optional subjects.

Direct entry to the combined programs may be gained via UAC by applicants who achieve highly at the NSW HSC (or equivalent). Students may also enter combined degree programs at the conclusion of Year 1 if they have achieved a WAM of 70. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements.

### Surveying

**Degree**: Bachelor of Surveying (BSurv)

**Designated Department**: Department of Civil Engineering and Surveying

**Course Coordinator**: Professor J.G. Fryer

**Course Code**: 10374

### COURSE PROGRAM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>YEAR 1</td>
<td></td>
</tr>
<tr>
<td><strong>Semester 1</strong></td>
<td></td>
</tr>
<tr>
<td>CIVL111</td>
<td>Mechanics and Structures 5</td>
</tr>
<tr>
<td>MATH111</td>
<td>Mathematics 111 * 10</td>
</tr>
<tr>
<td>MECH111</td>
<td>Materials 1 5</td>
</tr>
<tr>
<td>PHYS111</td>
<td>Physics 111 * 10</td>
</tr>
<tr>
<td>SURV111</td>
<td>Surveying 1 10</td>
</tr>
<tr>
<td><strong>Semester 2</strong></td>
<td></td>
</tr>
<tr>
<td>CIVL131</td>
<td>Fluid Mechanics 1 5</td>
</tr>
<tr>
<td>CIVL141</td>
<td>Environmental Engineering 1 5</td>
</tr>
<tr>
<td>MATH112</td>
<td>Mathematics 112 * 10</td>
</tr>
<tr>
<td>MECH101</td>
<td>Introduction to Engineering Computing 5</td>
</tr>
<tr>
<td>MECH111</td>
<td>Engineering Drawing 5</td>
</tr>
<tr>
<td>SURV112</td>
<td>Surveying 2 10</td>
</tr>
<tr>
<td>* Approved Options *</td>
<td>80</td>
</tr>
<tr>
<td>1. MATH102 and MATH103 may replace MATH111 and MATH112.</td>
<td></td>
</tr>
<tr>
<td>2. PHYS113 may replace PHYS111.</td>
<td></td>
</tr>
</tbody>
</table>

### YEAR II

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL212</td>
<td>Mechanics of Solids 5</td>
</tr>
<tr>
<td>CIVL227</td>
<td>Geotechnical Investigation 10</td>
</tr>
<tr>
<td>CIVL232</td>
<td>Fluid Mechanics 2 5</td>
</tr>
<tr>
<td>LAW291</td>
<td>Introduction to Legal Studies 5</td>
</tr>
<tr>
<td>MATH201</td>
<td>Multivariable Calculus 5</td>
</tr>
<tr>
<td>SURV214</td>
<td>Optics and Mining Surveying 5</td>
</tr>
<tr>
<td>CIVL251</td>
<td>Systems 5</td>
</tr>
<tr>
<td>LAW292</td>
<td>Property and Survey Law 5</td>
</tr>
<tr>
<td>MATH203</td>
<td>Ordinary Differential Equations 1 5</td>
</tr>
<tr>
<td>SURV215</td>
<td>Surveying 10</td>
</tr>
<tr>
<td>SURV215</td>
<td>Electronic Distance Measurement 5</td>
</tr>
<tr>
<td>SURV233</td>
<td>Survey Computations 5</td>
</tr>
<tr>
<td><strong>Both Semesters</strong></td>
<td></td>
</tr>
<tr>
<td>CIVL271</td>
<td>Transportation Engineering 10</td>
</tr>
</tbody>
</table>

### YEAR III

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL325</td>
<td>Soil Mechanics 1 5</td>
</tr>
<tr>
<td>CIVL381</td>
<td>Statistical Methods 5</td>
</tr>
<tr>
<td>ECON371</td>
<td>Principles of Economics 10</td>
</tr>
<tr>
<td>SURV316</td>
<td>Hydrographic Surveying 5</td>
</tr>
<tr>
<td>SURV334</td>
<td>Error Theory 5</td>
</tr>
<tr>
<td>SURV351</td>
<td>Geodesy 1 10</td>
</tr>
<tr>
<td><strong>Semester 2</strong></td>
<td></td>
</tr>
<tr>
<td>CIVL326</td>
<td>Soil Mechanics 2 5</td>
</tr>
<tr>
<td>CIVL342</td>
<td>Hydrology 5</td>
</tr>
<tr>
<td>CIVL352</td>
<td>Management 5</td>
</tr>
<tr>
<td>SURV361</td>
<td>Photogrammetry 1 10</td>
</tr>
<tr>
<td>SURV362</td>
<td>Remote Sensing 5</td>
</tr>
<tr>
<td>SURV393</td>
<td>Land Boundary Definition* 10</td>
</tr>
<tr>
<td>* A ten day live-in Survey Camp is a compulsory part of SURV393</td>
<td></td>
</tr>
</tbody>
</table>

### YEAR IV

<table>
<thead>
<tr>
<th>Semester 1</th>
<th>Semester 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL443</td>
<td>Water Resources Engineering 5</td>
</tr>
<tr>
<td>SURV441</td>
<td>Astronomy and Satellite Positioning 5</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
<tr>
<td><strong>Semester 2</strong></td>
<td></td>
</tr>
<tr>
<td>SURV419</td>
<td>Industrial Surveying 5</td>
</tr>
<tr>
<td>SURV472</td>
<td>Land Valuation 10</td>
</tr>
<tr>
<td>Electives</td>
<td></td>
</tr>
</tbody>
</table>

**Both Semesters**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURV420</td>
<td>Survey Design and Management* 10</td>
</tr>
<tr>
<td>SURV473</td>
<td>Town Planning 10</td>
</tr>
<tr>
<td>SURV481</td>
<td>Project 15</td>
</tr>
<tr>
<td>* A five day live-in Survey Camp is a compulsory part of SURV420</td>
<td></td>
</tr>
</tbody>
</table>

### General Course Policies

The attention of students is drawn to the General Course Policies of the Faculty published in the Faculty Policy Section of this Handbook. These policies are particularly important for students intending to enrol in a non-standard program.

### Elective Requirements

General elective subjects may be chosen from any subjects which may normally be counted towards the award of the degrees of BA, BCom, BCompSc, BE, BEc, BMath or BSc provided that prerequisites are met (or written permission is obtained from the Head of the Department offering the subject).

In exceptional circumstances the Dean, on the recommendation of the relevant Heads of Department, may approve selection of other elective subjects. Recommended General Electives are listed below. Not all electives may be offered in any one year. Students will be advised in September of the preceding year in which SURV400 level elective subjects will be available.

**Recommended Elective Subjects**

<table>
<thead>
<tr>
<th>Subject</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>SURV109</td>
<td>Industrial Experience * 5</td>
</tr>
<tr>
<td>SURV192</td>
<td>Industrial Experience * 5</td>
</tr>
<tr>
<td>SURV193</td>
<td>Industrial Experience * 5</td>
</tr>
<tr>
<td>SURV425</td>
<td>Geodesy 2 5</td>
</tr>
<tr>
<td>SURV452</td>
<td>Photogrammetry 5</td>
</tr>
<tr>
<td>SURV464</td>
<td>Spatial Information Systems 5</td>
</tr>
<tr>
<td>SURV498</td>
<td>Special Topic 5</td>
</tr>
<tr>
<td>SURV499</td>
<td>Special Topic 5</td>
</tr>
<tr>
<td>CIVL222</td>
<td>Materials 2 5</td>
</tr>
<tr>
<td>CIVL223</td>
<td>Materials 3 5</td>
</tr>
<tr>
<td>CIVL223</td>
<td>Fluid Mechanics 3 5</td>
</tr>
<tr>
<td>CIVL34</td>
<td>Environmental Engineering 5</td>
</tr>
<tr>
<td>CIVL334</td>
<td>Open Channel Hydraulics 5</td>
</tr>
<tr>
<td>MATH103</td>
<td>Mathematics 10</td>
</tr>
<tr>
<td>MATH202</td>
<td>Partial Differential Equations 1 5</td>
</tr>
<tr>
<td>MECH204</td>
<td>Experimental Methods 1 5</td>
</tr>
<tr>
<td>PHIL301</td>
<td>Technology and Human Values 1 10</td>
</tr>
<tr>
<td>* May be taken by part-time students after stage 1.</td>
<td></td>
</tr>
</tbody>
</table>

### Prerequisite and Corequisite Requirements

The prerequisite and corequisite requirements of individual subjects are listed in the schedule presented in Section 9 of this Handbook. Enrolment in a subject contrary to the provisions of this schedule will not be approved without the written permission of the Head of the Department offering the subject concerned.

### Part-time Attendance

All candidates for the degree must complete the requirements of the Course Program given above. All or part of this program may be completed by part-time attendance. Part-time students will normally take two years for each equivalent full-time year. As far as resources allow, the first two stages of the course are timetabled to permit a single-day work release attendance pattern with some evening lectures. These stages are:

**Subjects**

<table>
<thead>
<tr>
<th>Stage</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>STAGE 1</td>
<td></td>
</tr>
<tr>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CIVL111</td>
<td>Mathematics 111 * 10</td>
</tr>
<tr>
<td>SURV111</td>
<td>Surveying 1 10</td>
</tr>
</tbody>
</table>
In exceptional circumstances the Dean may determine the transition pattern to be followed.

**Combined BE/BSurv Degree Program**

The combined degree program allows completion of the requirements for the Bachelor of Engineering (BE) degree in the specialisation of Civil Engineering together with the requirements for a degree of Bachelor of Surveying (BSurv) degree in a minimum of 5 years full-time study.

Note that students undertaking a combined degree program are attempting two distinct programs concurrently and therefore the annual enrolment required by such a program may exceed the normal annual load of 80 credit points. Also note that HECS will be calculated on the basis of the proportion which each individual subject counts in the program of the separate degree of which it forms part and not on the proportion it contributes to any combined degree program.

Direct entry to the combined BE/BSurv program may be gained via UAC by applicants who achieve high marks in the NSW HSC (or equivalent). Students commencing studies after 1994 may also enter combined degree programs at the conclusion of Year 1 if they have achieved a WAM of 70. Students enrol in either the BE(Civil) or BSurv programs prior to 1995 should consult the Faculty Office for information on admission requirements. Application should be made in conjunction with submission of the re-enrolment application. The Faculty Office may be consulted regarding application forms and course requirements. The Course Coordinator may be consulted regarding course requirements.

The detailed requirements are set out below.

**Year 1**

1. (1) These Rules shall apply to the Doctoral Degrees of the University.
   
2. (2) These Rules shall not apply to degrees conferred honoris causa.

**Applicability of Rules**

The faculty governing the following research degrees offered by the University in the discipline of Engineering and its specialisations may apply these Rules, unless the context or subject matter indicates or requires otherwise.

**About This Section**

This section contains the University Rules governing the following research degrees offered in the Faculty of Engineering:

- Higher Doctoral Degrees (Doctor of Engineering and Doctor of Science)
- Doctor of Philosophy
- Master of Computer Science
- Master of Engineering
- Master of Science
- Master of Surveying

**DOCTORAL DEGREE RULES**

**PART 1 — PRELIMINARY**

**Application of Rules**

1. (1) These Rules shall apply to the Doctoral Degrees of the University.

   (2) These Rules shall not apply to degrees conferred honoris causa.

**Interpretation**

2. In these Rules, unless the context or subject matter otherwise indicates or requires —

   "Committee" means the Graduate Studies Committee of the Academic Senate established pursuant to the Graduate Studies Committee Rules;

   "degree" means the doctoral degree for which a person is, or proposes to be, a candidate;

   "Department" means the department in which a candidate is carrying out the program of study and research;

   "Head of Department", where the Faculty does not have a departmental structure, means the Dean of the Faculty, or the Dean's nominee;

   "schedule" means the schedule to these Rules relevant to the degree;

   "supervisor" means the person appointed by the Committee, or where more than one such person is appointed, the person to whom is assigned the responsibility as principal supervisor;

   "thesis" means a thesis as defined by Rule 9;
Section Six

Master and Doctoral Degree Rules

PART 2 — GENERAL

Admission to Candidature

3. An applicant for admission to candidature for a degree shall satisfy:
   (a) the requirements of the University governing admission and enrolment; and
   (b) the additional requirements prescribed in the schedule.

Concurrent Enrolment

4. Except with the permission of the Committee, a candidate for the degree shall not be concurrently enrolled as a candidate for any other degree or award, whether of this or another tertiary institution.

Qualification for the Degree

5. To qualify for admission to the degree a candidate shall enrol and satisfy the requirements prescribed in the schedule.

Determination of Result

6. The Committee shall consider the reports of examiners and shall take action to determine the outcome of the examination in accordance with the Graduate Studies Committee Rules.

Withdrawal

7. A candidate may withdraw from the program of study by informing the University Secretary in writing and the withdrawal shall take effect from the date of receipt of such notification.

Relaxing Provision

8. In order to provide for exceptional circumstances arising in a particular case, the Academic Senate on the recommendation of the Committee may relax any provision of these Rules.

PART 3 — PROVISIONS RELATING TO THESIS

Thesis

9. A thesis submitted for a degree shall embody the result of an original investigation or design or other original research undertaken by the candidate, and shall comply with the following requirements, namely:
   (1) A thesis —
      (a) shall be written in English or in another language approved by the Committee;
      (b) shall be accompanied by an abstract of approximately 300 words describing its content; and
      (c) shall be typed, bound or presented in the manner prescribed by the Committee.
   (2) A thesis —
      (a) must consist of a candidate's own account of the research undertaken by the candidate, the greater part of which must have been completed subsequent to admission to candidature for the degree. Work done jointly with other persons may be accepted provided the Committee is satisfied on the candidate's part in the joint research; and
      (b) must not contain as its main content any work or material which has previously been submitted for a University degree or other similar qualification unless the Committee otherwise permits.

Submission of Thesis for Examination

10. (1) A candidate shall give to the University Secretary not less than two months written notice of intention to submit the thesis for examination.
    (2) A candidate shall submit to the University Secretary four copies of the thesis together with —
        (a) a certificate signed by the candidate that the thesis complies with Rule 9(2); and
        (b) if the candidate so desires, any documents or work published by the candidate bearing on the subject of the thesis.
    (3) Except in the case of the Higher Doctoral Degrees and the Doctor of Medicine, the supervisor shall provide a report —
        (a) advising that the candidate has completed the program in the University, under the direction of the supervisor; and
        (b) confirming that the thesis is of sufficient merit to warrant examination;
    (4) In the event that the supervisor does not provide the report required under sub-Rule (3) within two weeks following submission, or that such report is unfavourable, a candidate may make a request in writing to the Committee that the thesis nevertheless be accepted for examination. The Committee shall seek —
        (a) the comments of the supervisor on the thesis; and
        (b) such other information as the Committee may require;

and shall determine whether or not the thesis will be accepted for examination.

Availability of Thesis

11. (1) The University shall be entitled to retain the submitted copies of the thesis.
    (2) A copy of the thesis of a candidate satisfying the requirements for the degree shall be deposited in the University Library.
    (3) The copy of the thesis deposited in the University Library shall be available immediately to any person for consultation or copying unless, on the application of the candidate concerned, a Committee comprising the Chair of the Graduate Studies Committee, the Dean of the Faculty concerned or the Dean's nominee on the Graduate Studies Committee and one other member of the Graduate Studies Committee from a cognate Faculty appointed by that Committee, determines that it shall not be made available without the written consent of the author for a period which shall not exceed two years.
    (4) Subject to any determination by the Committee constituted under sub-Rule (3), the Library may supply in any medium, a copy of the thesis upon request to any person or library.

SCHEDULE — HIGHER DOCTORAL DEGREES

Application of Schedule

1. This schedule shall apply to the degrees of Doctor of Engineering, Doctor of Law, Doctor of Letters, Doctor of Music and Doctor of Science.

The Degree

2. The degree shall be awarded in recognition of an original contribution or contributions of distinguished merit to any branch of learning of concern to the Faculty in which the candidature is undertaken.

Admission to Candidature

3. (1) An applicant for admission to candidature —
       (a) shall be a graduate of not less than eight years standing either —
           (i) of the University; or
           (ii) of another university, approved for this purpose by the Committee, who has carried out advanced study and research in the University for a period of not less than three years.
       (b) shall lodge with the University Secretary a written application for admission to candidature setting out full details of the applicant's academic qualifications and including —
           (i) a list of published work proposed to be submitted in the event that candidature is approved;
           (ii) a short discourse describing the research embodied in such work and making clear the extent of originality and the candidate's part in any collaborative work; and
           (iii) the names of three people whose advice as referees may be sought.
   (2) The application shall be considered by the Committee which in determining whether admission to candidature shall be approved may seek such other advice as it deems fit.

Submission for the Degree

4. (1) The candidate shall lodge with the University Secretary for examination four copies of the submission within one year of admission to candidature.
    (2) The submission shall consist of —
        (a) all the work listed in the application;
        (b) any additional work published or unpublished which the candidate may desire to include in the submission; and
        (c) a discourse describing the general subject of the published work submitted and stating how the various publications are related to one another and to that subject.
    (3) The submission shall be presented in such form as the Committee considers appropriate.

Examination

5. (1) The Committee shall appoint three examiners of whom at least two shall not be members of the staff of the University.
    (2) The examiners may require a candidate to answer further oral or written questions concerning the submitted work.
    (3) The Committee shall consider the reports of the examiners and shall take action to determine the outcome of the examination in accordance with the Graduate Studies Committee Rules.
(4) There shall be no provision for a candidate to revise and resubmit for further examination.

Availability of Submission

6. (1) The University shall be entitled to retain copies of the submitted material.
(2) Such submitted material of a candidate satisfying the requirements for the degree as the Committee shall determine shall be deposited in the University Library.
(3) The submitted material deposited in the University Library shall be available immediately to any person for consultation or copying unless, on the application of the candidate concerned, a Committee comprising the Chair of the Graduate Studies Committee, the Dean of the Faculty concerned or the Dean's nominee on the Graduate Studies Committee and one other member of the Graduate Studies Committee from a cognate Faculty appointed by that Committee, determines that it shall not be made available without the written consent of the author for a period which shall not exceed two years.
(4) Subject to any determination by the Committee constituted under sub-Rule (3), the Library may supply in any medium, a copy of the submission upon request to any person or library.

SCHEDULE - RULES FOR THE DEGREE OF DOCTOR OF PHILOSOPHY

The Degree

1. The degree of Doctor of Philosophy shall be awarded for an original and significant contribution of merit achieved through a program of advanced study and research to any branch of learning of concern to the University.

Admission to Candidature

2. (1) An applicant for admission to candidacy for the degree shall -
(a) have satisfied all of the requirements for admission to the degree of Master or the degree of Bachelor with first class honours or second class honours Division 1 in the University or any other degree approved for this purpose by the Committee; or
(b) have satisfied all of the requirements for admission to the degree of Bachelor in the University or any other degree approved for this purpose by the Committee, and have achieved by subsequent work and study a standard recognised by the Committee as equivalent to at least second class honours Division 1; or
(c) in exceptional cases submit such other evidence of general and professional qualifications as may be approved by the Committee.
(2) An applicant shall not be admitted to candidacy unless adequate supervision and resources are available. Whether these are available shall be determined by the Committee after considering advice from the Head of Department.

Enrolment

3. The Committee shall approve the enrolment of a candidate as either full-time or part-time.

Program of Study and Research

4. (1) A candidate shall enrol and complete to the satisfaction of the Committee a program of advanced study and research approved by the Committee ("the program"). The research shall be embodied in a thesis.
(2) The program shall be carried out under the direction of a supervisor or supervisors appointed by the Committee on the recommendation of the Head of the Department.
(3) A candidate shall be required to carry out the program in the University, except as otherwise permitted by the Committee.

Thesis Topic

5. A candidate shall submit the topic of the thesis for approval by the Committee not later than one year after admission to candidacy. After the thesis topic has been approved it may be changed only with the permission of the Committee.

Transfer of Candidature

8. (1) A candidate for a master degree by research in the University may be permitted to transfer candidature to the degree under such terms and conditions as the Committee shall determine.
(2) Except with the permission of the Committee, candidates who transfer from a master degree shall be deemed to have commenced from the time of admission to candidacy to that degree.

Time Requirements

9. The thesis shall be completed and submitted for examination in not less than two years of full-time and four years of part-time enrolment from admission to candidacy and except with the permission of the Committee, not more than five years of full-time or eight years of part-time enrolment.

Examination of Thesis

7. (1) The Committee shall appoint three examiners of whom at least two shall not be members of the staff of the University.
(2) The Committee shall consider the reports of examiners and any other recommendations and shall:
(a) recommend that the candidate be admitted to the degree subject to any condition that the Committee may impose; or
(b) permit the candidate to amend and resubmit the thesis; or
(c) require the candidate to undertake further oral, written or practical examinations; or
(d) recommend that the candidate not be admitted to the degree, and that the candidacy be terminated;
(3) A candidate will be permitted to amend and resubmit a thesis shall re-enrol as a candidate for the degree. Upon request in writing by a candidate the Committee may grant to that candidate leave of absence for a period not exceeding six months, and shall:
(a) recommend that the candidate be admitted to the degree subject to any condition that the Committee may impose; or
(b) permit the candidate to amend and resubmit the thesis; or
(c) require the candidate to undertake further oral, written or practical examinations; or
(d) recommend that the candidate not be admitted to the degree, and that the candidacy be terminated;
(e) in exceptional cases submit such other evidence of unsatisfactory progress may be permitted to transfer candidature to a cognate degree.

Absence

10. (1) Upon request in writing by a candidate the Committee may grant to that candidate leave of absence for a period not exceeding six months, and shall:
(a) recommend that the candidate be admitted to the degree subject to any condition that the Committee may impose; or
(b) permit the candidate to amend and resubmit the thesis; or
(c) require the candidate to undertake further oral, written or practical examinations; or
(d) recommend that the candidate not be admitted to the degree, and that the candidacy be terminated;
(e) in exceptional cases submit such other evidence of unsatisfactory progress may be permitted to transfer candidature to a cognate degree.

RULES GOVERNING MASTER DEGREES BY RESEARCH

PART 1 — PRELIMINARY

Application of Rules

1. (1) These Rules shall apply to degrees classified as Master degrees by research of the University.
(2) These Rules shall not apply to degrees conferred honoris causa or to degrees classified as Master degrees by coursework.

Interpretation

2. (1) In these Rules, unless the context or subject matter otherwise indicates or requires:
"Committee" means the Graduate Studies Committee of the Academic Senate established pursuant to the Graduate Studies Committee Rules;
"Dean" means the Dean of the Faculty in which the degree is offered;
"degree" means the degree of Master for which a person is, or proposes to be, a candidate;
"Department" means the Department in which the candidate is carrying out the program of advanced study and research;
"Head of Department" where the Faculty does not have a Departmental structure, means the Dean of the Faculty, or the Dean's nominee;
"schedule" means the schedule to these Rules pertaining to the degree;
"subject" means any part of the program for which a result may be recorded, other than a thesis;
"supervisor" means the person appointed by the Committee, or where more than one such person is appointed, the person to whom is assigned the responsibility as principal supervisor;
"thesis" means a thesis as defined by Rule 12.
(2) These Rules are subject to any provisions in the schedule.
PART 2 — GENERAL

The Degree

3. The degree of Master shall be an ungraded degree awarded for a significant contribution achieved through a program of advanced study and research to any branch of learning of concern to the Faculty in which the candidate is enrolled.

Admission

4. (1) An applicant for admission to candidacy for a degree shall satisfy the requirements of the University governing admission and enrolment, and any other additional requirements prescribed in the schedule.

(2) Before approving an admission to candidacy the Committee may require the applicant to sit for such examinations or carry out such work as the Committee may prescribe.

(3) An applicant shall not be admitted to candidacy unless adequate supervision and resources are available. Whether these are available shall be determined by the Committee after considering advice from the Head of Department.

(4) The Committee shall approve the enrolment of a candidate as either full-time or part-time.

Concurrent Enrolment

5. Except with the permission of the Committee, a candidate for a degree shall not be concurrently enrolled as a candidate for any other degree or award whether of this or another tertiary institution.

Program of Study and Research

6. (1) A candidate shall enrol and complete to the satisfaction of the Committee the program of advanced study and research prescribed in the schedule. The research shall be embodied in a thesis.

(2) The program shall be carried out under the direction of a supervisor or supervisors appointed by the Committee on the recommendation of the Head of the Department.

(3) A candidate shall be required to carry out the program in the University, except as otherwise permitted by the Committee.

Examinations

7. Examinations in subjects shall be conducted in accordance with the Examination Rules and any further provisions specified in the schedule.

Progress

8. (1) The candidate, the supervisor and the Head of Department shall submit annual progress reports to the Committee.

(2) For the purpose of assessing a candidate's progress in a degree by research, the supervisor and the Head of Department may submit to the Committee reports at any time on the candidate’s progress.

(3) The Committee, after considering any reports and other evidence of unsatisfactory progress may terminate or place conditions on the continuation of the candidate.

(4) Before exercising the power referred to in sub-rule (3), the Committee shall give the candidate an opportunity to make representations orally or in writing and shall take such representations into account before reaching its decision.

Absence

9. (1) Upon request in writing by a candidate the Committee may grant to that candidate leave of absence from the program. Such leave shall not be taken into account in calculating the period for the program prescribed in the schedule.

(2) On return from leave of absence, a candidate must enrol prior to submission of a thesis.

Withdrawal

10. (1) A candidate may withdraw from the program only by informing the Academic Registrar in writing and the withdrawal shall take effect from the date of receipt of such notification.

(2) A candidate shall not be permitted to withdraw from a subject except with the permission of the Dean, on the advice of the Head of Department.

Relaxing Provision

11. In exceptional circumstances arising in a particular case, the Academic Senate, on the recommendation of the Committee, may relax any provision of these Rules.

PART 3 — PROVISIONS RELATING TO THESESES

Thesis

12. (1) The topic of a thesis shall be approved by the Committee on the recommendation of the Head of the Department in which the candidate is carrying out the research for the thesis.

(2) A thesis submitted for a degree shall embody the result of an investigation or design or other research undertaken by the candidate, and shall comply with the following requirements, namely -

(a) A thesis -

(i) shall be written in English or in another language approved by the Committee;

(ii) shall be accompanied by an abstract of approximately 500 words describing its content; and

(iii) shall be typed, bound or presented in the manner prescribed by the Committee.

(b) A thesis -

(i) must consist of a candidate's own account of the research undertaken by the candidate the greater part of which must have been completed subsequent to admission to candidacy for the degree. Work done conjointly with other persons may be accepted provided the Committee is satisfied on the candidate's part in the joint research; and

(ii) must not contain as its main content any work or material which has previously been submitted for a University degree or other similar qualification unless the Committee otherwise permits.

Submission of Thesis for Examination

13. (1) A candidate shall give to the University Secretary not less than two months written notice of intention to submit the thesis for examination.

(2) A candidate shall submit to the University Secretary three copies of the thesis together with -

(a) a certificate signed by the candidate that the thesis complies with Rule 12(2); and

(b) if the candidate so desires, any documents or work published by the candidate bearing on the subject of the thesis.

(3) The supervisor shall provide a report -

(a) advising that the candidate has completed the program in the University, under the direction of the supervisor; and

(b) confirming that the thesis is of sufficient merit to warrant examination.

(4) In the event that the supervisor does not provide the report required under sub-rule (3) within two weeks following submission, or that such report is unfavourable, a candidate may make a request in writing to the Committee that the thesis nevertheless be accepted for examination. The Committee shall seek -

(a) the comments of the supervisor on the thesis; and

(b) such other information as the Committee may require;

and shall determine whether or not the thesis will be accepted for examination.

Examination of Thesis

14. (1) For each candidate two examiners, at least one of whom shall not be a member of the staff of the University, shall be appointed by the Committee.

(2) The Committee shall consider the results in subjects, the reports of examiners and any other recommendations prescribed in the schedule and shall:

(a) recommend that the candidate be admitted to the degree subject to any condition that the Committee may impose; or

(b) permit the candidate to amend and resubmit the thesis; or

(c) require the candidate to undertake further oral, written or practical examinations; or

(d) recommend that the candidate not be admitted to the degree, and that the candidacy be terminated.

Availability of Thesis

15. (1) The University shall be entitled to retain the submitted copies of the thesis.

(2) A copy of the thesis of a candidate satisfying the requirements for the degree shall be deposited in the University Library.

(3) The copy of the thesis deposited in the University Library shall be available immediately to any person for consultation or copying unless, on the application of the candidate concerned, a Committee comprising the Chair of the Graduate
Studies Committee, the Dean of the Faculty concerned or the Dean's nominee and one other member of the Graduate Studies Committee from a cognate Faculty appointed by that Committee, determines that it shall not be made available without the written consent of the author for a period which shall not exceed two years.

(4) Subject to any determination by the Committee constituted under sub-Rule (3), the Library may supply in any medium, a copy of the thesis upon request to any person or library.

SCHEDULE — MASTER OF COMPUTER SCIENCE

Classification
1. The degree of Master of Computer Science shall be a degree by research offered in the Faculty of Engineering.

Admission to Candidature
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 to an Honours degree, approved for this purpose by the Committee, of the University or any other university; or
(b) have satisfied all the requirements for admission to a degree of the University or to a degree, approved for this purpose by the Committee, of another tertiary institution and have completed such work and such examinations as determined by the Committee; or
(c) in exceptional cases produce evidence of possessing such academic or professional qualifications as may be approved by the Committee on the recommendation of the Head of the Department in which the applicant proposes to carry out the program.

Qualification for the Degree
3. To qualify for admission to the degree a candidate shall complete to the satisfaction of the Committee a program consisting of:
(a) such work and examinations as may be prescribed by the Committee; and
(b) a thesis embodying the results of an original investigation or design.

Time Requirements
4. Except with the permission of the Committee:
(a) a full-time candidate shall complete the program in not less than two and not more than three calendar years from its commencement;
(b) a part-time candidate shall complete the program in not less than three and not more than five calendar years from its commencement.

SCHEDULE — MASTER OF ENGINEERING

Classification
1. The degree of Master of Engineering shall be a degree by research offered in the Faculty of Engineering.

Admission to Candidature
2. To be eligible for admission to candidature an applicant shall:
(a) have satisfied all the requirements for admission to a degree in the University or to a degree, approved for this purpose by the Faculty Board, of this or any other university; or
(b) have satisfied all the requirements for admission to the degree of Bachelor of Science with Honours Class I or Class II of the University or to a degree, approved for this purpose by the Faculty Board, of this or any other university; or
(c) have satisfied all the requirements for admission to a degree in the University or other university approved for this purpose by the Faculty Board and have completed such work and passed such examinations as determined by the Committee; or
(d) 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 in which the candidate proposes to carry out the program.

Qualification for the Degree
3. To qualify for admission to the degree a candidate shall complete to the satisfaction of the Committee a program consisting of:
(a) such work and examinations as may be prescribed by the Committee; and
(b) a thesis embodying the results of an original investigation or design.

Time Requirements
4. The program shall be completed:
(a) in not less than two years except that, in the case of a candidate who has completed the requirements for a degree of Bachelor with honours or a qualification deemed by the Committee to be equivalent or who has had previous research experience, the Committee may reduce this period to not less than one year; and
(b) except with the permission of the Committee, not more than 5 years.
research experience, the Faculty Board may reduce this period to not less than one academic year; and

(b) in not more than 5 years, except with the permission of the Faculty Board.

SCHEDULE —  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 the requirements for admission to a degree in Surveying with Honours in the University of Newcastle or other university approved for this purpose by the Faculty Board; or

   (b) have satisfied the requirements for admission to a degree in the University of Newcastle or other tertiary institution approved for this purpose by the Faculty Board and have completed to the satisfaction of the Faculty Board such work and such examinations as determined by the Faculty Board; or

   (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 of Civil Engineering and Surveying.

3. To qualify for admission to the degree a candidate shall complete to the satisfaction of the Faculty Board a program consisting of:

   (a) such work and examinations as may be prescribed by the Faculty Board; and

   (b) a thesis embodying the results of an original investigation or design.

4. The program shall be completed:

   (a) in not less than two academic years except that, in the case of a candidate who has completed the requirements for a degree of Bachelor 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, in not more than five years.

5. Except with the permission of the Faculty Board a candidate shall take part in research seminars within the Department of Civil Engineering and Surveying.

---

section seven

Graduate Coursework Programs

About This Section
This section contains the course programs which have been approved by Faculty Board in accordance with the Rules governing Graduate Diplomas and coursework Masters programs offered in the Faculty of Engineering
Enquiries may be directed to the Faculty Office or the Course Coordinator indicated in the course entry concerned.

Graduate Diploma in Computer Science
Designated Department  Department of Computer Science
Course Coordinator  Dr H. Elgindy
Course Code  10179

The GradDipCompSc is intended as a part-time degree for graduates of various disciplines to provide them with sufficient computer science knowledge to fully utilise their computer systems, to collaborate effectively with computing professionals, or to pursue a career in computer science. The required credit points are to be expected to be accumulated by part-time students over a two year period. However, candidates with a strong background in at least one programming language (such as Pascal or C) may be able to meet the requirements in one year.

To qualify for admission to the award of GradDipCompSc, a candidate must pass a program of subjects totaling 80 credit points which include COMP321 'Software Engineering & Project' and 20 credit points of 300 level or 400 level Computer Science (COMP) subjects and 40 credit points of directed electives.

The GradDipCompSc course program approved by the Faculty Board is presented below.

COURSE PROGRAM

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP321</td>
<td>20</td>
</tr>
<tr>
<td>300 or 400 level Computer Science subjects</td>
<td>20</td>
</tr>
<tr>
<td>Directed Electives</td>
<td>40</td>
</tr>
<tr>
<td></td>
<td>80</td>
</tr>
</tbody>
</table>
Upon the completion of 40 credit points of Computer Science (COMP) subjects at the 300 level or higher, GradDipCompSc students may apply for transfer to the Master of Computing program. It should be noted there is no guarantee that an application to transfer will be successful. Recommendation for admission will be based on demonstrated performance and perceived potential.

Subject prerequisites are prescribed in the schedule of subjects and primarily relate to the BCompSc program. The prescribed prerequisites may therefore be waived for GradDipCompSc students with an appropriate background. Enquiries regarding waiver of prerequisites should be directed to the Course Coordinator.

Elective Requirements

Directed Electives

A total of 40 credit points of electives are to be chosen from the list of approved subjects given below and approved by the Course Coordinator. In exceptional circumstances the Head of the Computer Science Department may approve enrolment in other subjects.

Sample Subject Selections for GradDipCompSc

The elective structure of the GradDipCompSc program allows candidates to choose subjects which best match their individual needs and objectives. The sample selections appearing below illustrate only some of the ways these choices may be made. Many other combinations are possible.

The following sample selection of subjects totalling 60 credit points assumes no previous knowledge of computer science.

Graduate Diploma in Surveying

Designated Department: Department of Civil Engineering and Surveying

Course Coordinator: Professor J.G. Fryer

Course Code: 105007

The Graduate Diploma in Surveying is designed to broaden and further the education of the practicing surveyor, particularly in the light of recent technological changes which have significantly altered the role and operational techniques of professional surveyors. While a full workload for a single year of a course is normally considered to be 80 credit points, it might not be possible to complete the requirements of the GradDipSurv course program in a single year of attendance because of subject prerequisite requirements. Subject prerequisites are, however, prescribed mainly in relation to the BSurv program. The prescribed prerequisites may therefore be waived for DipSurv students with an appropriate background. Enquiries regarding waiver of prerequisites should be directed to the Course Coordinator.

The GradDipSurv course program approved by the Faculty Board requires completion of 80 credit points selected from the list of approved subjects given below and approved by the Course Coordinator. In exceptional circumstances the Head of the Department of Civil Engineering and Surveying may approve enrolment in other subjects.

Approved Diploma in Surveying Subjects

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>ECON110</td>
<td>Microeconomics</td>
</tr>
<tr>
<td>ECON111</td>
<td>Macroeconomics</td>
</tr>
<tr>
<td>ECON371</td>
<td>Principles of Economics</td>
</tr>
<tr>
<td>GEOG101</td>
<td>Introduction to Physical Geography</td>
</tr>
<tr>
<td>GEOG102</td>
<td>Introduction to Human Geography</td>
</tr>
<tr>
<td>LAW201</td>
<td>Legal Process</td>
</tr>
<tr>
<td>LAW202</td>
<td>Property and Survey Law</td>
</tr>
<tr>
<td>SURV316</td>
<td>Hydrographic Surveying</td>
</tr>
<tr>
<td>SURV334</td>
<td>Error Theory</td>
</tr>
<tr>
<td>SURV361</td>
<td>Photogrammetry I</td>
</tr>
<tr>
<td>GYLS52</td>
<td>Management</td>
</tr>
<tr>
<td>SURV351</td>
<td>Geodesy I</td>
</tr>
<tr>
<td>SURV363</td>
<td>Remote Sensing</td>
</tr>
<tr>
<td>SURV393</td>
<td>Land Boundary Definition</td>
</tr>
<tr>
<td>SURV419</td>
<td>Industrial Surveying</td>
</tr>
<tr>
<td>SURV420</td>
<td>Survey Design and Management</td>
</tr>
<tr>
<td>SURV441</td>
<td>Astronomy</td>
</tr>
<tr>
<td>SURV452</td>
<td>Geodesy 2</td>
</tr>
</tbody>
</table>
Section Seven

SURV462 Photogrammetry 2 5
SURV464 Spatial Information Systems 5
SURV472 Land Valuation 10
SURV473 Town Planning 10
SURV481 Project ** 15
SURV482 Minor Project A ** 20
SURV483 Minor Project B ** 20
SURV484 Major Project ** 40

* A ten day live-in Survey Camp is included as part of SURV393.
** No more than 40cp of project subjects may be counted towards Diploma requirements.

Students enrolling in Graduate Diploma courses are referred to the Award Rules in Section 3 of this handbook.

Master of Computing
Designated Department Department of Computer Science
Course Coordinator Dr. H. Elgindy
Course Code 10067

The Master of Computing (MComp) program is a postgraduate coursework degree program which incorporates advanced project work.

To be eligible to be considered for admission to candidature an applicant must have satisfied all the requirements for admission to a Bachelor's degree at the University of Newcastle (or any other equivalent degree approved for that purpose by the Faculty Board) with knowledge of computer science equivalent to that of students who have completed year two of the BCompSc course program, and must complete such additional work and pass such examinations as the Faculty Board may determine.

To qualify for admission to the degree of MComp a candidate must pass a program of subjects totalling 160 credit points, the equivalent of 2 years' full-time study, including a compulsory advanced project of 60 credit points, 60 credit points of 400 level Computer Science (COMP) subjects and 40 credit points of 300 or 400 level Computer Science (COMP) subjects. The compulsory project work may be taken as COMP503 in a single year or as both COMP501 and COMP502 over 2 years.

COURSE PROGRAM

Subjects Credit Points
Master of Computing Project

<table>
<thead>
<tr>
<th>Master of Computing Project</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP501 Project A</td>
<td>30</td>
</tr>
<tr>
<td>COMP502 Project B</td>
<td>30</td>
</tr>
<tr>
<td>or COMP503 Project C</td>
<td>60</td>
</tr>
<tr>
<td>COMP 400 level subjects</td>
<td>60</td>
</tr>
<tr>
<td>COMP 300 or 400 level subjects</td>
<td>40</td>
</tr>
<tr>
<td>160</td>
<td></td>
</tr>
</tbody>
</table>

Subject prerequisites are prescribed in the schedule of subjects and primarily relate to the BCompSc program. The prescribed prerequisites may therefore be waived for MComp students with an appropriate background. Enquiries regarding waiver of prerequisites should be directed to the Course Coordinator.

A candidate may be granted credit by the Faculty Board in up to 60 credit points in recognition of subjects completed as part of the GradDipCompSc.

GENERAL INFORMATION

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that such a space is available. It is essential that, for the protection of the University's landscape and for the safety of students, staff and visitors, vehicles are not parked on grassed areas and footpaths.

The scale of penalties for traffic and parking infringements as contained in the Rules are as follows:

(a) exceeding the speed limit on University roads 
   $30
(b) failing to stop when signalled to do so by a Security Officer 
   $30
(c) refusal to provide information requested by a Security Officer 
   $30
(d) failing to obey instructions given by a Security Officer 
   $30
(e) illegal parking:
   (i) parking on University roadways $15
   (ii) parking on footpaths $15
   (iii) parking on areas marked by sign $50
   (iv) parking in a way that may risk injury to others $50
   (v) not displaying parking permit $30
   (vi) parking in a restricted area $15
   (f) parking in an area reserved for disabled person $50
   (g) any other breach of the Traffic and Parking Rules $1

The penalty will be imposed:

(a) on the spot by an infringement notice being put on the vehicle; or
(b) where applicable, within 28 days of notification that any objection has been rejected by the Senior Facilities Officer.

Any objection to the imposition of the penalty must include the breach as having been committed.

Facilities Officer, after considering an objection, will impose:

Any queries in relation to traffic and parking matters at the Callaghan Campus should be referred to the Manager, Security Services, located in the foyer of the Great Hall and at the Central Coast Campus to the Property and Estates Officer, Finance and Estates Building. Application forms to bring a vehicle on to the campus are also available from these offices.

The Traffic and Parking Rules apply to all University campuses locations.

PUBLIC TRANSPORT
The State Transit Authority provides a comprehensive bus service to and from locations throughout Newcastle. Private bus companies also provide services to Maitland, Wallsend, Toronto and Raymond Terrace. Bus Timetables are available from the Student Enquiry Counter, Callaghan Campus and the Students' Association Office, in the Shortland Union.

Bus Timetables for services between the Central Coast Campus and Gosford and Wyong are available from the Student Administration and Services Counter, Central Coast Campus.

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Subject Descriptions

About This Section
This section contains descriptions of the content of the subjects offered by the departments of the Faculty of Engineering together with subjects offered by other faculties which are included in the course programs set out in Sections 5 and 7.

Guide to Subject Descriptions

Credit Point Value
The course programs require full-time students completing course requirements in minimum time to undertake an annual workload of 80 credit points. The credit point value of a subject thus indicates the workload of a subject as a proportion of a normal annual full-time program. Similarly, the credit point value of a subject indicates the proportion of the annual HECS liability which arises from enrolment in that subject. Further information on the meaning of credit points is given in the General Course Policies and Information in Section 4.

The credit point value (cp) of each subject is indicated in each subject description.

Subject Codes
Each subject has been given a unique code (e.g. CIV1111). This code identifies the subject within the University’s computer system and should be entered on each form dealing with subjects. The alpha section of the code indicates the department responsible for offering the subject. The first number in the code indicates the level at which the subject is offered (i.e. 100, 200, 300, 400 etc.) and, in the Faculty of Engineering, also indicates the WAM weighting of the subject. The latter two numbers may indicate the sequence of a subject in a stream of subjects or within a course.

The departmental indicators included in this Handbook are listed below.

<table>
<thead>
<tr>
<th>Code</th>
<th>Department</th>
</tr>
</thead>
<tbody>
<tr>
<td>BIOL</td>
<td>Biology</td>
</tr>
<tr>
<td>CHEE</td>
<td>Chemical Engineering</td>
</tr>
<tr>
<td>CHEM</td>
<td>Chemistry</td>
</tr>
<tr>
<td>CIVL</td>
<td>Civil Engineering and Surveying (Civil Engineering subject)</td>
</tr>
<tr>
<td>COMM</td>
<td>Commerce</td>
</tr>
</tbody>
</table>

Contact Hours
The credit point value of a subject gives an indication of the workload required of a student as a proportion of the normal full-time annual workload of 80 credit points (see General Course Rules and Information in Section 4). Contact hours vary according to the content and teaching requirements of each subject. In most cases, however, a 5 credit point engineering subject offered in one semester requires 3 contact hours per week. Scheduled contact hours are specified in the University Timetable.

Texts
The information on required texts available at the time of publication is included in each subject description. In most cases it is recommended that students consult with the lecturer concerned before finalising the purchase of texts.

References
Information on reference material is not published in this Handbook. In the case of subjects offered by departments of the Faculty of Engineering, the details of appropriate reference material will be supplied by the lecturer concerned. In the case of other subjects, reference material may be specified in the handbook of the faculty in which the subject originates.

Availability of Subjects
Not all subjects are necessarily available in each academic year. In particular, elective subjects may not proceed if the department concerned considers that there is insufficient demand for the subject or if insufficient resources are available.

Students requesting enrolment in elective subjects should check with the department in the first week of the semester to ensure that the subject that they have chosen will indeed be offered.

Alternations to Subjects
The Faculty Board and the departments of the Faculty reserve the right to amend any aspect of the content of any subject or the arrangements for offering a subject. The details of subjects given in this Handbook and the University Timetable are an expression of intent only and are not to be taken as a firm offer or undertaking.
the structure of the reduction in species diversity of fish, whale and kangaroo on.

Villee, C.A., Solomon, variety of structural and functional adaptations which have further information.

ecology and evolution:

See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL201 BIOCHEMISTRY 10cp


See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL202 ANIMAL PHYSIOLOGY 10cp

Consideration of the processes involved in the transport of oxygen in mammals and emphasizing the relation between structure and function. The course examines molecule, cell and tissue structure and function, particularly of nerve and muscle, the respiratory and cardiovascular and control systems. Particular emphasis is given to physiological adaptations to the environment and the effects of the environment on physiological functions.

See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL204 CELL AND MOLECULAR BIOLOGY 10cp

Cellular organisation and inter-relationships. Organelles, their structure and function. Cellular processes.

See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL205 MOLECULAR GENETICS 10cp


See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL206 PLANT PHYSIOLOGY 10cp

Fundamental processes peculiar to plant cells are examined. These include cell water relations, membrane transport of solutes, fixation of atmospheric nitrogen, and photosynthesis. Cellular regulation of the processes is emphasized.

See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL207 ECOLOGY 10cp


See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL301 ENVIRONMENTAL PLANT PHYSIOLOGY 10cp

Environmental impacts on whole plant growth are interpreted in terms of the responses of susceptible components of plant physiological processes. The processes examined include whole plant water relations, photosynthesis, mineral ion acquisition and nutrient transport.

See Faculty of Science and Mathematics Handbook for further information.

Text


BIOL303 ENVIRONMENTAL BIOLOGY 10cp

The course covers applied aspects of both animal and plant ecology.

SECTION A Topics include


Evaluation of pest control methods (including biological control) on environmental and economic grounds as well as their short and long term effectiveness.

Biological diversity, particularly the relevance of endangered species and species of conservation concern.

Environmental consequences of the release of genetically engineered species.

The choice of topics in Section B should be determined in consultation with the Head of Department.

Text


or


References


Chemical Engineering Subjects

CHEE111 INDUSTRIAL PROCESS PRINCIPLES 5cp

CHEE112 INTRODUCTION TO CHEMICAL ENGINEERING 10cp


Text: Coulson, J.M. and Richardson, J.F. 1990, with reference to the world scene. Descriptions of processes used in the manufacture of the major industrial chemicals, chemical and process metallurgical industries in Australia, including hydrometallurgical and smelting operations. Of typical and preparation of process flow diagrams, to Australian requirements.

CHEE113 CHEMICAL AND MANUFACTURING PROCESSES 10cp

An introduction to the structure and organisation of the chemical and process metallurgical industries in Australia, with reference to the world scene. Descriptions of 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. Introduction to process plant and equipment. Visits to a number of industrial plants illustrate the cover of the course material, and preparation of process flow diagrams, to Australian Standards requirements.


CHEE242 CHEMICAL ENGINEERING COMPUTATIONS 10cp

An introduction into the writing and use of computer programs and packages which use numerical techniques to solve problems in engineering. Emphasis is placed on the use of both main frame and personal computers. Topics include numerical solutions of ordinary and partial differential equations. Techniques for the solution of linear and non-linear algebraic equations, systems of linear and non-linear equations. Numerical integration and differentiation techniques. Sources of errors and error estimation in numerical techniques.


CHEE265 TRANSFER PROCESSES 1 5cp


CHEE266 ENERGY AND EXTRACTIVE PROCESSES 5cp


CHEE267 TRANSFER PROCESSES 2 5cp

Interphase mass transfer and estimation of resistances. Analogies of heat, mass and momentum transfer. Combination of heat and mass transfer. Introduction to design of mass transfer equipment.

CHEE268 TRANSFER PROCESSES 3 5cp


CHEE281 LABORATORY 1 5cp

Experimental investigations into the fundamentals of mass, momentum and heat transfer. An introduction into technical report writing.

CHEE282 LABORATORY 2 10cp

Experimental investigations into elementary unit operations, flow measurement and measurement of chemical and physical properties. Technical report writing. An introduction into applied statistics.


CHEE301 SELECTED TOPIC IN CHEMICAL ENGINEERING 5cp

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

CHEE312 MODELING OF PROCESSES 5cp

An introduction to mathematical modelling and the unsteady-state behaviour of chemical plant and processes. Revision of Laplace transformations, transfer function concept, unsteady state materials and energy balances as a technique for system modelling, first order systems, second order systems, response to disturbances-modelling of selected processes; response of sensing elements. Introduction to the principles of process control.


CHEE332 THERMODYNAMICS 10cp

A general introduction to the first and second law, reversible processes, the Carnot cycle, P-V-T relationships, and the phase rule. The physical properties of pure fluids (residual properties, generalised correlations, fugacity, homogeneous mixtures (partial molar properties, ideal solutions, excess properties, gas mixtures), and vapour-liquid equilibria (Henry’s Law, Lewis Randall Rule, Raoult’s Law, empirical correlation of activity coefficients, charmells correlation). Also covered is the thermodynamics of flow processes, compressible flow, power generation, vapour compression cycles, refrigeration, and chemical equilibria.


CHEE341 PROJECT ENGINEERING AND MANAGEMENT 10cp

Management: A review of background economics, estimation of capital and operating costs, discounting techniques, cash flow, depreciation, incentives, inflation. Sensitivity analysis and uncertainty. Project implementation, the project manager and team, scheduling and network analysis. Budgetary control, engineering procurement, construction and commissioning.

Project Engineering: Assessment of economic feasibility and profitability. Selection of major equipment items appropriate to the operating environment. Plant utilities and process instrumentation. An overview of AC and DC power engineering, transmission, transformers, switchgear. Site inspections of appropriate industries.


CHEE342 SAFETY AND ENVIRONMENT 10cp

General introduction to the inherent hazards of the materials and processes relevant to the chemical industry. Elements of hazard analysis and optimization. Aspects of industrial
CHEE351 ELECTROCHEMISTRY AND CORROSION 5cp

CHEE352 TRANSPORT PHENOMENA 5cp
An introduction to momentum energy and mass transport as a continuous approach. Shell balances and unsteady state solutions by algebraic and numerical procedures using computer packages such as FIDAP. Text Bird, R.B., Stewart, W.E. et al. 1969, Transport Phenomena, Wiley.

CHEE353 SURFACE CHEMISTRY 1 10cp

CHEE354 BIOTECHNOLOGY 5cp
Properties of important micro-organisms; thermodynamic and stoichiometric aspects of microbial metabolism and activity. Product pathways and enzymes. Reactors and flow behaviour of fermentation fluids; transfer processes and unit operations for product recovery; with examples from pharmaceutical, agriculture, food, energy and liquid effluent control.

CHEE356 PROCESS SYNTHESIS 5cp

CHEE357 FUEL TECHNOLOGY 1 5cp
The properties of gaseous, liquid and solid fuels including their analysis. Combustion mechanisms, including air requirements. Mixing and ignition in burners. Coal combustion in suspension and in beds.

CHEE358 PROCESS METALLURGY 1 5cp

CHEE361 APPLICATION LABORATORY 5cp
In addition to formal lecture courses, students undertake relevant practical exercises involving, for example, assembly, installation and operation of equipment. Students will acquire a good level of understanding and experience in the implementation of appropriate safety working practices. Text Boundy, A.W. 1989, Engineering Drawing, 3rd edn, McGraw-Hill.

CHEE362 LABORATORY 3 5cp
A number of investigations illustrating Year III lecture topics, including experiments on instrumentation and control of process plant.

CHEE363 INTRODUCTION TO MINERAL PROCESSING 5cp

CHEE364 WASTE MANAGEMENT 5cp
CHEE456 PROCESS METALLURGY 2 5cp
Chemistry of extraction, metal extractant chemistry, interphase mass transfer, dispersion and coalescence. Computational techniques, industrial extraction equipment and costs, mixer-settlers, columns, bucket, G-machines, heap leaching, biological extraction. Industrial processes.

CHEE462 PRINCIPLES OF WASTEWATER TREATMENT 10cp

CHEE463 ENVIRONMENTAL PROCESS TECHNOLOGY 1 5cp

CHEE464 ENVIRONMENTAL PROCESS TECHNOLOGY 2 5cp

CHEE495 DESIGN PROJECT 20cp
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.

CHEE496 ADVANCED DESIGN PROJECT 10cp
A major extension to CHEE495 Design Project.

CHEE497 RESEARCH PROJECT 20cp
An experimental or theoretical investigation, or the design, reconstruction and testing of experimental equipment to be reported formally in a project report.

CHEE498 ADVANCED RESEARCH PROJECT 10cp
A major extension to CHEE497 Research Project.

CHEE511 COAL COMBUSTION 10cp
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 emission, 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.

CHEE512 COAL TECHNOLOGY 10cp
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; pulverising mills; boilers and furnaces; slagging; fouling, erosion; corrosion; ash collection, NOx and SOx emission and control. Dispersal of heat. Air diffusion modelling and atmospheric chemistry. River, coastal and lake models. Air / Water / Noise Legislation in N.S.W. Environmental Offences and Penalties Act 1983. Environmental Audits and Management. Slurry firing, fluidised bed.

CHEE542 POWER ENGINEERING PROCESSES AND THE ENVIRONMENT 5cp

CHEE594 INDUSTRIAL SYSTEMS PROJECT/SEMESTER A 20cp
The first section of the major project in the Master of Engineering Science - Power Engineering program undertaken in the Department of Chemical Engineering. It is expected that most projects will be of an applied nature in an area relevant to the candidates employment and co-supervised by a professional engineer on site. Coursework components will cover areas of problem identification, research skills, communication skills and strategies for applied research. Progress will be reported at seminars given by candidates and by the submission of a progress report in July. Submission of the final project report will be required by the 31 October following by a formal presentation of the results of the project at a later date.

Chemistry Subjects

CHEM101 CHEMISTRY 101 10cp
Students who have not studied Chemistry previously are strongly advised to read the first six chapters in the main text (Brown and LeMay) before commencement of the academic year.

General Chemistry: (approximately 12 lectures) Revision of basic chemical principles. Introduction to atomic and molecular concepts. Simple ionic and covalent bonding models.

Organic Chemistry: (approximately 24 lectures) Historical development. The shapes, structures and names of organic compounds; reactions of common functional groups; synthesis, differentiation and structural elucidation of organic compounds. Applications of organic chemistry.

Note: The laboratory work will count for 10% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

See Faculty of Science and Mathematics Handbook for further information.
CHEM261 ENVIRONMENTAL CHEMISTRY 10cp

This subject is an introduction to environmental chemistry, focusing on the hydrosphere and the atmosphere. Specific topics include: general introduction; properties, composition, redox equilibria and complexation in natural and waste waters; chemical aspects of microbial cycles; water pollution; nature and composition of the atmosphere; inorganic atmospheric pollutants; photochemical smog; atmospheric monitoring; an overview of energy sources.

The laboratory/library/workshop/site visits will count for 15% of the final assessment but a pass in this work is a prerequisite for a pass in the subject.

See Faculty of Science and Mathematics Handbook for further information.

Text

CHEM321 INORGANIC CHEMISTRY 10cp

A general course exploring the range of modern inorganic chemistry, including synthesis, reactivity and applications of spectroscopic methods. Metal Chemistry; transition elements and coordination chemistry; isomerism, block elements, inorganic reaction mechanisms, electron transfer and battery; Organometallic Chemistry, transition metals; structure and bonding; cyclic donors, carbonyl and olefin complexes; applications to industrial catalysis. Inorganic Spectroscopy; electronic spectroscopy; vibrational spectroscopy; nuclear magnetic resonance spectroscopy; introduction to other methods (e.g. Mossbauer, electron spin resonance, and chiroptical spectroscopy).

Note: The laboratory work will count for 20% of the final assessment but a pass in the laboratory work is a prerequisite for a pass in the subject.

See Faculty of Science and Mathematics Handbook for further information.

Text

Civil Engineering Subjects

CIVL111 MECHANICS AND STRUCTURES

5cp

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

CIVL131 FLUID MECHANICS

5cp

Fluid properties. Fluid stability, stability of submerged and floating bodies, relative equilibrium. Fluid-flow concepts and basic equations of continuity, energy, linear and angular momentum.

Text
<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL141</td>
<td>ENVIRONMENTAL ENGINEERING 1</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL191</td>
<td>INDUSTRIAL EXPERIENCE</td>
<td>5cp</td>
</tr>
<tr>
<td>These subject units are designed to formalise periods of Industrial Experience gained by part-time students only. 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 subjects may be counted by part-time students as electives. (See Section 4 of this Handbook).</td>
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<tr>
<td>CIVL212</td>
<td>MECHANICS OF SOLIDS</td>
<td>5cp</td>
</tr>
<tr>
<td>Revise 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. Revise geometrical properties of plan figures, bending stresses and strains, shear stresses in beams, deflection of beams. Shear centre of open thin walled sections, torsion of circular sections, combined stresses, failure criteria. Column stability.</td>
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<td></td>
</tr>
<tr>
<td>CIVL213</td>
<td>THEORY OF STRUCTURES 1</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL222</td>
<td>MATERIALS 2</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL223</td>
<td>MATERIALS 3</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL227</td>
<td>GEOTECHNICAL INVESTIGATIONS</td>
<td>10cp</td>
</tr>
<tr>
<td>This subject outlines the geotechnical concepts and soils/rock properties that are important in geotechnical design. Techniques for soil sampling and field investigations are discussed. The subject provides an introductory basis for later subjects in soil mechanics.</td>
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<tr>
<td>CIVL232</td>
<td>FLUID MECHANICS 2</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL233</td>
<td>FLUID MECHANICS 3</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL242</td>
<td>ENVIRONMENTAL ENGINEERING 2</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL251</td>
<td>SYSTEMS</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL271</td>
<td>TRANSPORTATION ENGINEERING</td>
<td>10cp</td>
</tr>
<tr>
<td>CIVL314</td>
<td>THEORY OF STRUCTURES 2</td>
<td>5cp</td>
</tr>
<tr>
<td>Revise moment distribution, introduce sway. Revise flexibility (force) method. Stiffness method; member stiffness matrix, structure stiffness matrix by deformation approach. Influence lines. Introduce plastic theory of structures, bounding theorems.</td>
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<tr>
<td>CIVL315</td>
<td>STRESS ANALYSIS</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL316</td>
<td>REINFORCED CONCRETE DESIGN</td>
<td>10cp</td>
</tr>
<tr>
<td>CIVL317</td>
<td>STEEL DESIGN</td>
<td>10cp</td>
</tr>
<tr>
<td>CIVL325</td>
<td>SOIL MECHANICS 1</td>
<td>5cp</td>
</tr>
<tr>
<td>Index properties, classification of soils; permeability, capillarity, seepage and flow nets; stresses in soils. Settlement and consolidation; compaction.</td>
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<tr>
<td>CIVL326</td>
<td>SOIL MECHANICS 2</td>
<td>5cp</td>
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<tr>
<td>Shear strength and failure criteria; stability of retaining walls, surface footings and slopes.</td>
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<tr>
<td>CIVL327</td>
<td>CONCRETE AND METALS TECHNOLOGY</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL334</td>
<td>OPEN CHANNEL HYDRAULICS</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL342</td>
<td>HYDROLOGY</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL343</td>
<td>ENVIRONMENTAL MODELLING 1</td>
<td>5cp</td>
</tr>
<tr>
<td>An introduction to modelling of growth and mixing processes in both physical and biological systems. Birth-death processes, predator prey models, spatial population dynamics, physics of diffusion and dispersion processes in surface and subsurface flows. Dynamics of nutrient cycling in aquatic systems.</td>
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</tr>
<tr>
<td>CIVL344</td>
<td>ENVIRONMENTAL MODELLING 2</td>
<td>5cp</td>
</tr>
<tr>
<td>CIVL345</td>
<td>ENVIRONMENTAL MODELLING 3 - GROUNDWATER</td>
<td>5cp</td>
</tr>
</tbody>
</table>
Text
Freeze, A. and Cherry, J. Groundwater
CIVL346 ENVIRONMENTAL MODELLING 4 5cp

CIVL352 MANAGEMENT 5cp

CIVL381 STATISTICAL METHODS 5cp
This course provides an introduction to probability and statistics useful in civil engineering practice. Overviews of probability and distribution theory. Probability distributions commonly used in civil engineering. Statistical inference. Fitting probability distributions. Bayesian linear and non-linear regression models. Example applications in water resource, structural and transport engineering.

CIVL382 FINITE ELEMENT METHODS 5cp
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 field problems. Theory is reinforced by programming assignments which use the Civil Engineering finite element library.

CIVL410 DYNAMICS AND STABILITY OF STRUCTURES 5cp

CIVL418 THEORY OF STRUCTURES 3 5cp
Yield line analysis of slabs, strip method of design, flat slab systems. Retaining walls. Basic design of prestressed concrete structures. Lower bound design of steel structures, approximate methods of analysis.

CIVL419 MASONRY AND TIMBER DESIGN 5cp
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.

CIVL420 GEOTECHNICAL ENGINEERING 10cp
Site investigation. Design of shallow foundations, raft foundations, piled foundations, Soil improvement. Design of embankments, cuttings, and retaining walls. Applications for geotextiles, geotechnical computer applications and case studies.

CIVL429 ROCK MECHANICS 5cp
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.

CIVL435 RIVER AND COASTAL ENGINEERING 5cp

CIVL443 WATER RESOURCES ENGINEERING 5cp
This course considers several areas of applied water resources engineering emphasizing synthesis of basic principles and design. Multi-objective planning. Urban drainage: layout and design, runoff routing, retarding basins. Water supply systems: objectives, stochastic behaviour, design, operation, modelling.

CIVL444 WATER RESOURCES ENGINEERING II 5cp
This course provides a practical introduction to advanced planning and design techniques in water engineering. It will consider several applications emphasizing first-principles understanding and intelligent use of software to solve problems. Applications will be presented in three self-contained modules which may include: Analysis of water profiles in floodplains and trunk drainage systems; planning and operation of complex water supply networks; calibration of rainfall-runoff models; analysis and design of piping networks.

CIVL447 ENVIRONMENTAL MODELLING 5 - CONTAMINANT HYDROGEOLOGY 5cp

Text
Fetter, C.W. Contaminant Hydrogeology

CIVL453 CIVIL ENGINEERING DESIGN I 15cp
Experiments in 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.

CIVL454 CIVIL ENGINEERING DESIGN II 15cp
Further examples as per CIVL453.

CIVL455 PROJECT 15cp
Literature review, analytical and/or experimental investigation of one or more civil engineering design problems. Presentation of seminar.

CIVL457 ENVIRONMENTAL ENGINEERING DESIGN 15cp
Analysis and design of major case studies. Investigation for Environmental impact assessment; design of pollution control systems. Visits to sites of interest, interaction with a broad range of professionals, regulatory authorities and practising engineers.

CIVL458 ENGINEERING RISK ASSESSMENT 5cp
Consideration of the assessment and evaluation of risks associated with a wide variety of engineering projects, including environmental, mechanical, chemical, geotechnical, water resource and structural engineering projects. The need for risk assessment in decision-making; decision criteria, probabilistic descriptions of uncertainty; stochastic processes and natural phenomena; human error, hazard scenarios; fault and event trees; complex systems; first order reliability methods: simulation; updating; prediction.

CIVL472 HIGHWAY ENGINEERING 5cp
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

CIVL491 SPECIAL TOPIC 5cp
A contemporary topic in civil engineering approved by the Head of Department.

CIVL492 SPECIAL TOPIC 5cp
A contemporary topic in civil engineering approved by the Head of Department.

Commerce Subjects
COMM101 FINANCIAL ACCOUNTING FUNDAMENTALS 10cp
Analysis of the accounting function within the business environment. The development of a conceptual framework of accounting with respect to the preparation of conventional financial reports. Examination of the predominant forms of business organisation (sole traders, partnerships and companies), the relative advantages and disadvantages of each form of business organisation and the primary conventional accounting methods applied to record the financial consequences of business operations. See Faculty of Economics and Commerce Handbook for further information.

COMM102 FINANCIAL MANAGEMENT FUNDAMENTALS 10cp
Consideration of fundamental financial management concepts and practices, and the use of accounting information therein. Introduction to the Australian capital market, and analysis and interpretation of financial statements. Development of basic management accounting techniques to provide data primarily for internal financial assessments by management, including: allocation of overheads, product costing, budgeting, cost-volume-profit analysis, differential analysis and various capital investment models. These are developed in relation to operating, investment and financial decisions of a business entity.
See Faculty of Economics and Commerce Handbook for further information.

Computer Science Subjects

COMP110 INTRODUCTION TO PROGRAMMING 5cp
This subject is not available to candidates enrolled in Computer Science degree programs, or to students who have passed or been exempted from COMP101, COMP201 prior to 1991, COMP212 or COMP111.

An introduction to structured programming and the design of algorithms using a procedural language.

COMP111 INTRODUCTION TO COMPUTER SCIENCE 1 10cp
This subject introduces the computer as a system by which problems may be solved. Students are introduced to the process of designing and implementing algorithms to solve problems, modelling these algorithms in a computer language, and executing them on a computer. The course forms a basic overview of the curriculum is given.

COMP112 DISCRETE STRUCTURES 10cp
This subject continues the development of fundamental ideas in algorithm design and complexity analysis, in conjunction with an introduction to discrete mathematics. The concept of an abstract data type is contrasted with that of a data structure implementation, beginning with stacks, queues, and binary trees. Classical algorithms using these structures are investigated and analysed, using tools drawn from areas of discrete mathematics such as recurrence relations, set theory, combinatorics, probability, and elementary graph theory.

COMP113 INTRODUCTION TO ARTIFICIAL INTELLIGENCE 10cp
This subject deals with problem solving and artificial intelligence. It begins with a discussion of reasoning and logic, and proceeds to a study of proof techniques, both general and formal. The propositional and predicate calculus are introduced in this context and used throughout the discussions. Some fundamental problems of AI are then investigated, and non-procedural solutions are proposed and analysed. Syntax and semantics of non-procedural languages are introduced, and students are required to complete several assignments using non-procedural languages.

COMP199 PROJECT 5cp
A project in computer science for students enrolled in the Bachelor of Computer Science program and the Graduate Diploma in Computer Science program.

COMP221 COMPARATIVE PROGRAMMING LANGUAGES 10cp
This subject introduces the student to the nature of contemporary programming languages, including true object-oriented languages (such as Smalltalk or II68). The evolution of imperative languages (FORTRAN, Algol, PL/I, Pascal, C, Ada) and functional languages (Lisp, Scheme, ML) and logic programming (Prolog) are discussed. In addition, fundamental design and implementation concepts for high-level programming languages are introduced, including the concepts of binding, type checking and run-time storage management.

COMP222 THEORY OF COMPUTATION 10cp
This subject introduces the theory of computability, including important results from the study of automata and formal languages. The subject begins with a discussion of automata and their relationship to regular, context free and context sensitive languages. General theories of computability are presented, including Turing machines, recursive functions and lambda calculus. Notions of decidability and undecidability are discussed and this is related to complexity analysis. Finally, formal program semantics are presented and analysed, leading to the topic of formal program verification.

COMP223 ANALYSIS OF ALGORITHMS 10cp
This subject covers data structures and algorithms in depth. Topics covered include data structures (developed in more depth than in COMP112), and an introduction to complexity classes. Various algorithms are presented in the light of specific problem-solving strategies and complexity issues. Advanced topics such as balanced search trees, graph algorithms, parallel and distributed algorithms, and randomised algorithms are discussed.

COMP224 THE UNIX OPERATING SYSTEM 10cp
A subject on which the Unix operating system is explored in a top-down fashion. Topics covered could include the Unix file system, the shell and other processes, utilities, system calls, security, window management systems (such as X), and system management. The subject is oriented towards the inexperienced or casual Unix user, and is offered to students and professionals alike.

COMP225 ARTIFICIAL INTELLIGENCE 2 10cp
A look at the broad scope of Artificial Intelligence, with particular attention to the topics of knowledge representation, search techniques, computer reasoning, computer learning, computer vision, expert systems, natural language processing, robotics, game playing, and architectures for AI.

COMP229 PROJECT 5cp
A project in computer science.

COMP321 SOFTWARE ENGINEERING AND PROJECT 20cp
This full-year subject presents an in-depth treatment of many software engineering topics, including software engineering paradigms, requirements specification, functional and object-oriented design, software verification and maintenance. Societal implications such as cost of failure and professional responsibilities are considered, and the basic principles of technical writing are presented. Students are expected to complete a major project.

COMP322 COMPUTER VISION AND ROBOTICS 10cp
The field of robotics provides applications for many different areas of Artificial Intelligence. Robots have to be able to see, to plan routes, to form world models; it is an advantage if they can hear; if they can be instructed in natural language rather than esoteric codes; if they can reason; if they can learn and so on. This subject will examine some of these areas of AI with specific reference to their use in robotics.

COMP323 COMPUTATIONAL LOGIC 10cp
The subject covers the concepts of soundness and completeness of inference methods, normal forms, analytic tableaux, resolution, decidability, semidecidability, first-order logic, sets, strategies for theorem proving, connection graphs, applications such as program verification, plan generation, deductive databases, modal logics, temporal logics, and logic programming.

COMP324 PARALLEL PROCESSING 10cp
The main objective of this subject is to develop an understanding of the tools and paradigms needed for the design of parallel algorithms for various models of computations. In addition, various parallel programming languages and systems are briefly discussed as case studies.

COMP325 DATABASE SYSTEMS 10cp
The subject covers the three level architecture for database systems, the relational database model, database normalisation, data security and integrity, recovery and concurrency, and distributed databases. Additionally, students learn the SQL query language, and get a hands-on experience of a modern relational database management system such as Sybase.

COMP326 DATA SECURITY 10cp
This subject covers various topics in data security, including cryptography, encryption algorithms, Database Encryption Standard, public-key encryption, crypanalysis, key exchange protocols, key management, secret sharing schemes, access controls, authentication, digital signatures, information flow controls, security of statistical databases.

COMP327 PRINCIPLES OF OPERATING SYSTEMS 10cp
This subject provides a thorough introduction to operating systems. Topics include tasking and processes, process coordination and synchronisation, resource scheduling, physical and virtual memory organisation, security issues, communications and networking, and distributed operating systems.

COMP328 COMPUTER NETWORKS 10cp
An introduction to data communication networks. Topics include data transmission, transmission media, network protocols, ISO/OSI, public data networks, local area networks, and distributed systems.

COMP329 COMPILER DESIGN 10cp
Introduction to the theory of grammars. Lexical analysers, syntactic analysis, elementary semantic analysis. Parsing techniques, object code generation and optimisation. Scanner and parser generators.

COMP330 GRAPHIC USER INTERFACES 10cp
Almost all computer systems designed in the next 10 years will involve a graphic user interface. Graphic user interfaces are an increasingly common feature of modern computer systems. This subject discusses the use of GUIs in software engineering; this includes visual programming and some aspects of CASE tools. Further, we study the fundamental design issues for GUIs, concentrating on applications to database design and software engineering. The subject involves a major project to create a GUI.

COMP331 GEOMETRIC DATA STRUCTURES 10cp
Geometric data structures are used to represent explicitly geometric structures such in image analysis and solid modelling, as well as implicitly geometric structures such as relational databases. In this subject we study fundamental
data structures which have applications for both implicitly and explicitly geometric data, in such areas as geographic information systems and solid modelling.

**COMP332 COMPUTER GRAPHICS** 10cp
A graphical interface is a cost effective method to present information in a fashion that supports rapid exploration and comprehension. The issues to be studied, all related to the displaying of objects, may include: graphics hardware, windowing programming, graphics interface formats, 2D drawing primitives and their raster algorithms, 2D & 3D geometrical transformations, projections, geometric models, colour theory, 3D viewing, visible-surface determination, illumination and shading, ray tracing and radiosity, and computer animation.

**COMP411 SPECIAL TOPIC A** 10cp
**COMP412 SPECIAL TOPIC B** 10cp
**COMP413 SPECIAL TOPIC C** 10cp
**COMP414 SPECIAL TOPIC D** 10cp
Each of these subjects consists of a series of lectures and/or practical work in an area of advanced computer science of contemporary interest. The content of a particular subject may vary from year to year according to developments in technology and the presence of academic visitors.

**COMP425 HONOURS PROJECT** 20cp
A substantial project usually involving a literature review together with a theoretical and/or practical investigation of a computer science problem. Project work normally commences in early February. The project work is embodied in a thesis, two copies of which are required. Students are also required to present a seminar based on their project work. Attendance at Department of Computer Science seminars, presented by invited speakers, is compulsory.

**COMP441 CRYPTOGRAPHIC TECHNIQUES** 10cp
This subject covers advanced topics in data security. Students are expected to implement additional security features to Sybase using embedded SQL. Possible features include key exchange and authentication protocols, and mechanisms for the protection of statistical databases. Students are also expected to write a major essay on an advanced topic in data security.

**COMP442 NATURAL LANGUAGE PROCESSING** 10cp
Natural language is the sort of language spoken and written by people, as opposed to the codes used to instruct computers. Approaches to the processing of natural languages (which are very unsystematic) on computers (which require very systematic instruction) are examined.

**COMP443 FORMAL REASONING IN ARTIFICIAL INTELLIGENCE** 10cp
Selected topics from machine learning, plan generation, neural networks, multi-agent systems, computer vision, statistical inference, decision support systems, automated geometric reasoning, robotics, non-formal reasoning.

**COMP444 PROGRAM SEMANTICS** 10cp
This subject covers denotational logic, semantic domains, algebraic specification, logics of programs, methods and logics for proving programs, operational and algebraic semantics of concurrent processes, distributed computing.

**COMP445 COMPUTATIONAL GEOMETRY** 10cp
This subject is concerned with the design and analysis of algorithms of a fundamentally geometric nature, and their applications in fields such as graphics, robotics and VLSI design. Topics covered may include convexity and its applications, convex hull algorithms and applications, duality, intersection algorithms, Voronoi diagrams and proximity, and line arrangements.

**COMP446 ADVANCED COMPUTATIONAL GEOMETRY** 10cp
Advanced topics in discrete and computational geometry are covered in a workshop-style setting, where solutions to unsolved research problems are sought.

**COMP447 GRAPH ALGORITHMS** 10cp
Many structures in computing can be modelled as a graph whose nodes represent entities and whose edges represent relations between the entities. This subject covers the theory and implementation of a wide range of operations on graphs.

**COMP448 ADVANCED COMPILER DESIGN** 10cp
In addition to lectures, students complete a major 3-phase project. Symbol table structures for block structured languages, and special features such as importing and exporting. Run-time structures for block structured languages and abstract data types. Code generation to assembly language, machine independent and machine dependent optimisation.

**COMP449 ADVANCED PARALLEL PROCESSING THEORY** 10cp
Advanced techniques and paradigms of parallel processing are discussed, and unsolved problems are investigated.

**COMP450 DISTRIBUTED OPERATIONAL SYSTEMS** 10cp
Techniques of overcoming the classical operating systems problems in a loosely coupled distributed environment. Inter-process communication, synchronisation, naming, resource allocation and protection, deadlock detection, file systems and security in a distributed environment. Several experimental systems are investigated.

**COMP451 ADVANCED PARALLEL PROCESSING APPLICATIONS** 10cp
The use of parallel processing to achieve high performance in certain application areas is investigated. Such areas could include image processing, scientific computing, distributed operating systems, etc. The particular area to be studied in depth will be selected and announced by the lecturer prior to the start of each subject offering.

**COMP452 THEORY OF DATABASES** 10cp
This subject covers advanced topics in the theory of databases. Students are required to implement features in Sybase using embedded SQL. The possible topics include semantic integrity rules, security mechanisms and a treatment of missing values. Students are also expected to write a major essay on an advanced topic in the theory of databases.

**COMP453 INFORMATION VISUALIZATION** 10cp
The spread of graphics workstations throughout the software and information engineering industry has increased emphasis on systems using visual rather than textual interfaces. Such systems commonly represent information in diagrams called "graphs". This course covers recent developments in concepts, algorithms, and systems for visualizing information.

**COMP501 MASTER OF COMPUTING PROJECT PART A** 30cp
A major project at Master level usually involving a literature review together with a theoretical and/or practical investigation of a computer science problem. Project work normally commences in early February. The project work is embodied in a thesis, two copies of which are required. Students are also required to present a seminar based on their project work. Attendance at Department of Computer Science seminars, presented by invited speakers, is compulsory.

**ECON110 MICROECONOMICS I** 10cp
Microeconomics, the foundation of all economics, is the study of the allocation of resources and the distribution of income and wealth arising from the interaction of market forces and government intervention. This course introduces the theoretical concepts, principles and relationships which are the basis of every economist's tool-kit. Taking the household and the firm as decision-making units, the course examines the nature of Demand and Supply and how they interact in competitive, oligopolistic and monopolistic markets for both products and factors. This leads into consideration of the limitations of market forces and the appropriate form of policy intervention.

**Economics Subjects**

**Other References**
ECON101 INTRODUCTION TO ELECTRICAL AND COMPUTER ENGINEERING 5cp

A course intended to give a broad introduction to practical and theoretical aspects of electrical and computer engineering.

ELEC130 ELECTRICAL ENGINEERING 1 10cp

Enrolment in this subject is limited to students enrolled in the BE program in Computer Engineering. Electrical Engineering, Industrial Engineering and Mechanical Engineering or the BCompSc program.


Text

ELEC170 COMPUTER ENGINEERING 1 10cp

Enrolment in this subject is limited to students enrolled in the BE program in Computer Engineering. Electrical Engineering, Industrial Engineering and Mechanical Engineering or the BCompSc program.


Text

ELEC197 INDUSTRIAL EXPERIENCE 10cp

This 10 credit point 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.

ELEC210 INTRODUCTION TO ENERGY SYSTEMS 10cp


ELEC211 ELECTRICAL ENERGY CONVERSION 5cp

This subject is offered as a service subject and is not available to students enrolled in the Computer Engineering or Electrical Engineering programs.

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; synchronous machines; electronic power conversion and control systems.

ELEC220 ELECTRONICS 1 10cp

An introductory subject on the physics of electronic devices and the design of discrete component electronic circuits. Basic terminal characteristics of diodes, transistors, bipolar transistors, field effect transistors, single stage amplifiers (gain, input-output resistance). Basis digital logic gates, TTL and CMOS inverters and/or gates.

Text
Horestein, M.N. Microelectronic Circuits and Devices, Prentice-Hall.

ELEC231 ELECTRICAL CIRCUITS 10cp


Text
Cunningham, D.R. and Stuller, J.A. Basic Circuit Analysis, Houghton & Millin.

Text


ELEC322 SWITCHING ELECTRONICS 5cp


ELEC341 DIGITAL SIGNAL PROCESSING 5cp

Discrete time signal analysis and linear systems, sampling of continuous time signals, z-transforms, delta transforms, structures for discrete time systems, digital filter design techniques, discrete Fourier and fast Fourier transforms, quantization effects in digital signal processing.

Texts

Ninness, B. Lectures Notes in Signal Processing


ELEC351 TELECOMMUNICATIONS 5cp

An introduction to telecommunication systems. Topics include high frequency transmission lines, telephony, television systems, optical fibre communications, satellite communications, and computer networks. Involves lectures, laboratories and projects.

ELEC352 ANALOGUE AND DIGITAL COMMUNICATIONS 10cp

Filter approximations, passive filter design, active filter design, spectral analysis, random signals and noise, fundamentals of analogue signal processing, amplitude modulation, frequency modulation, phase modulation, analysis of commercial communication systems, AM and FM radio, colour television. Information theory and channel capacity, noise in communication systems, bandwidth data transmission, digital carrier modulation, pulse code modulation, speech encoding, error control coding, satellite communications, fibre optic communications.

ELEC371 MICROPROCESSOR SYSTEMS 10cp

Assembly language programming, microprocessor interfacing, multi-programming, low-level aspects of operating systems design.

Texts

Betz, R.E. ELEC371 Class Notes - Operating Systems

Moylan, P.J. 1987, Assembly Language for Engineers, Class Notes.

ELEC372 COMPUTER ARCHITECTURE 10cp

Advanced Synchronous and Asynchronous sequential logic circuit design including state of the art in programmable devices and CAD software. Computer Architecture, including measuring performance, instruction set architecture, datapath and control, pipelining, memory hierarchy (caches), interfacing peripherals and parallel processors.

Text


ELEC380 PROJECT/DIRECTED READING 5cp

This subject is only available to Electrical or Computer Engineering students with the 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.

ELEC382 ENGINEERING MANAGEMENT 5cp

Topics drawed from: organisational models and the role of management; management science models; the legal environment of engineering; especially contracts, professional liability and industrial relations; the management of projects, design and innovation; quality assurance.

Text


ELEC411 ELECTRICAL SYSTEM DESIGN 5cp


Text


ELEC412 ELECTRICAL SYSTEM DYNAMICS AND CONTROL 5cp


ELEC413 ELECTRICAL TECHNOLOGY 5cp

Not offered in 1995.

An advanced subject on materials, instrumentation, high voltage technology testing, lighting, protection and earthing.

ELEC420 VLSI DESIGN 10cp

Introduction to VLSI and MOS technology. MOS transistor theory. Inverters design. MOS processing technology and design rules. Circuit characterisation and performance estimation. Circuit and logic design. Design tools. Subsystem design. The subject consists of lectures and project work on MOS VLSI design.

ELEC421 ELECTRONICS DESIGN 10cp

An advanced subject on electronics: noise and interference in electronic circuits, analogue and digital interfacing, active filters, high frequency amplifiers, oscillators, modulators, phase locked loops, switched capacitor filters.

ELEC440 ADVANCED CONTROL 10cp

Not offered in 1995.

This subject gives an advanced treatment of estimation and control theory with emphasis on techniques with industrial relevance. State space models, digital control, advanced transform techniques, controllability, observability, modern control system design, multivariable systems, digital filtering, adaptive control and digital implementation issues. The material will be illustrated by industrial case studies. The theory outlined above will be used to design controllers for practical examples. Simulation studies and/or laboratory examples will be conducted.

Text


ELEC441 CONTROL SYSTEM DESIGN AND MANAGEMENT 10cp

Design issues in Control Systems. Integration of Control Systems with corporate and management policies. Emphasis will be given to the assessment of control opportunities in the industrial context, the evaluation of cost benefit trade-offs, and total quality control issues. Content will be illustrated by a number of design examples such as: Telescope Control Systems, Superheater Temperature Control, Gauge Thickness Control in Rolling Mills, and Flow Control in Chemical Processes.

ELEC445 ADVANCED SIGNAL PROCESSING 5cp

This subject focuses on theory and application of advanced analogue and digital signal processing techniques. Topics include A/D and D/A conversion, DSP hardware and software, linear prediction, real-time signal processing, adaptive filtering, speech coding, speech recognition and synthesis, spectral estimation, image processing and wavelet transform. Involves lectures, laboratories and projects.

ELEC446 ELECTRICAL ENGINEERING 5cp

Not available to students who completed ELEC350 Communications prior to 1992. Such students who intended to undertake ELEC450 Advanced Communications may undertake ELEC380 and ELEC445.

Revision of Maxwell’s equations, solutions to various media, reflection, refraction, Polarization, Poynting’s power, flow Decays, attenuation and surface impedance, free space and guided wave propagation including coaxial, wave guide and stripline configurations, electromagnetic sources and potential functions, radiation and elementary antenna theory, techniques for obtaining the surface current distribution on an antenna by analytic 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 ionospheric propagation.

ELEC455 ADVANCED ELECTROMAGNETICS 5cp

Not offered in 1995.

This subject focuses primarily on applications of advanced analogue and digital communication techniques. Topics covered include, for example, design and management of baseband and bandpass communication systems, satellite, microwave, optical fibre, and cabled systems, communication standards and protocols, spread spectrum techniques and cellular telephone structure.

ELEC460 COMPUTER SOFTWARE 5cp

Not offered in 1995.

This subject focuses on application of software design and management techniques. Topics covered include: object-oriented programming, database management, computer networking, data communication, operating systems design, the software/hardware interface, software engineering, computer organisation, and operating system design.

Text

Kaufmann.
ELEC470 ADVANCED COMPUTER ARCHITECTURE 10cp

This subject is specifically directed towards parallel computing involving the most popular network architectures: arrays, trees, hypercubes and some closely related networks. Relationships between the dominant network architectures as well as fastest and most efficient parallel algorithms for a wide variety of problems are covered.

ELEC480 ELECTRICAL ENGINEERING PROJECT 30cp

Final year project for Electrical Engineering students, generally consisting of literature survey and review; analytical and/or experimental investigation of a particular electrical engineering problem. Students are required to give one or more seminars, to prepare a Project Report (2 copies required), and to present their project work for exhibition and/or demonstration.

ELEC485 COMPUTER ENGINEERING PROJECT 30cp

Final year project for Computer Engineering students, generally consisting of literature survey and review; analytical and/or experimental investigation of a particular computer engineering problem. Students are required to give one or more seminars, to prepare a Project Report (2 copies required), and to present their project work for exhibition and/or demonstration.

ELEC511 CONDITION MONITORING 5cp


ELEC512 POWER SYSTEM OPERATION AND CONTROL 5cp


ELEC541 CONTROL SYSTEM DESIGN AND MANAGEMENT 5cp

The aim of this course is to acquaint students with design issues in Control Systems as well as their integration with corporate and management policies. Emphasis will be given to the assessment of control opportunities in the industrial context, the evaluation of cost benefit and trade-offs, and total quality control issues. The course will be illustrated by a number of design examples, including telescope control systems, superheater temperature control, gauge thickness control in rolling mills, and flow control in continuous chemical processors.

ELEC543 OPTIMISATION TECHNIQUES 5cp

Nonlinear programming. Convex optimisation theory. Optimal control. Text
Luenberger, D. 1969, Optimisation by Vector Space Methods, Wiley.

ELEC544 LINEAR SYSTEMS THEORY 5cp

Advanced treatment of multivariable linear systems from frequency domain, matrix fraction, state-space and/or geometric viewpoints.

ELEC545 NONLINEAR SYSTEMS ANALYSIS 5cp

Basic techniques in nonlinear systems analysis: Las punov stability theory, Gronwall Lemma, input-output methods, oscillations, singular perturbations.

Text

ELEC546 TOPICS IN SYSTEM DESIGN 1 5cp

A topic oriented to students concerned with advanced design rather than basic research.

ELEC547 TOPICS IN SYSTEM DESIGN 2 5cp

A topic oriented to students concerned with advanced design rather than basic research.

ELEC552 ADVANCED DIGITAL SIGNAL PROCESSING 5cp

Advanced techniques in recursive filter design: bandwidth, ambiguity functions, two-dimensional imaging, array processing.

ELEC571 COMPUTER AND ELECTRONICS SEMINAR 1 5cp

ELEC572 COMPUTER AND ELECTRONICS SEMINAR 2 5cp

ELEC573 COMPUTER AND ELECTRONICS SEMINAR 3 5cp

Each subject consists of a series of seminars for research postgraduate students. Each student will prepare a seminar on research literature.

ELEC591 SYSTEMS AND CONTROL SEMINAR 1 5cp

ELEC592 SYSTEMS AND CONTROL SEMINAR 2 5cp

ELEC593 SYSTEMS AND CONTROL SEMINAR 3 5cp

Each subject consists of a series of seminars for research postgraduate students. Each student will prepare a seminar on research literature.

ELEC594 INDUSTRIAL SYSTEMS PROJECT/S Y M I A R M 20cp

The first section of the major project in the Master of Engineering Science - Power Engineering programs undertaken in the Department of Electrical and Computer Engineering. It is expected that most projects will be of an applied research nature in an area relevant to the candidates employment and co-supervised by a professional engineer on site. Coursework components will cover areas of problem identification, research skills, communication skills and strategies for applied research. Progress will be reported at seminars given by candidates and by the submission of a progress report in July. Submission of the final project report will be required by 31 October followed by a formal presentation of the results of the project at a later date.

ELEC595 INDUSTRIAL SYSTEMS PROJECT/S Y M I A R M 20cp

The final section of the major project in the Master of Engineering Science - Power Engineering programs undertaken in the Department of Electrical and Computer Engineering commenced in ELEC594. Submission of the final Project Report will be required by 31 October followed by formal presentation of the results of the project at a later date. The result awarded for this subject will reflect the quality of the Project Report resulting from the work undertaken in both ELEC594 and ELEC595.

ELEC599 INDUSTRIAL SYSTEMS PROJECT/S Y M I A R M 40cp

The major project in the Master of Engineering Science - Industrial Systems programs undertaken in the Department of Electrical and Computer Engineering for students intending to complete the course in a single academic year. It is expected that most projects will be of an applied nature in an area relevant to the candidates employment and co-supervised by a professional engineer on site. Coursework components will cover areas of problem identification, research skills, communication skills and strategies for applied research. Progress will be reported at seminars given by candidates and by the submission of a progress report in July. Submission of the final project report will be required by 31 October followed by a formal presentation of the results of the project at a later date.

ELEC641 ADAPTIVE CONTROL 5cp


Text

ELEC642 ESTIMATION AND SYSTEM IDENTIFICATION 5cp


Text
de Souza, C. and Goodwin, G.C. Estimation and System Identification

ELEC643 NONLINEAR CONTROL 5cp

Emphasises modern theory for synthesis of controllers for nonlinear multivariable systems.

Text

ELEC645 ADVANCED TOPICS IN CONTROL 5cp

Variable content emphasising recent developments.

ELEC646 ADVANCED TOPICS IN SYSTEMS THEORY 1 5cp

Variable content emphasising recent developments.
ELEC647 ADVANCED TOPICS IN SYSTEMS THEORY 2 5cp
Variable content emphasising recent developments.

ELEC661 COMPUTER NETWORKS 5cp
Network architectures and topologies. Local network and examples. Distributed operating systems.

Text

ELEC662 ADVANCED TOPICS IN COMPUTERS 5cp
Variable content emphasising recent developments.

ENVR010 ENVIRONMENTAL PLANNING AND POLLUTION CONTROL 10cp
Not offered in 1995.

This course examines the environmental planning and development control system in NSW. Reference is also made to current pollution control legislation. The emphasis in this course is to understand the system which controls development and the various requirements for environmental assessment for different types of development. A number of local and regional case studies will be examined to illustrate the various legislative requirements.

Text

SCEN202 ENVIRONMENTAL IMPACT ASSESSMENT TECHNIQUES 10cp
This course will examine the rationale and methodology of environmental impact assessment (EIA) and will look at a number of impact assessment techniques in practice. The phenomenon of EIA will be discussed and current developments in environmental management will be examined. Reference will also be made to environmental documentation prepared for various developments.

Texts

See Faculty of Science and Mathematics Handbook for further information.

Geography Subjects

GEOG101 INTRODUCTION TO PHYSICAL GEOGRAPHY 10cp
An introduction to physical geography including meteorology and climate; the influence of geomorphic processes on landforms; weathering, rivers, ice, frost, wind and the sea; the physical, chemical and biological characteristics of the soil and the development of soil profiles; environmental and historical factors that influence plant distribution. Practical work includes an introduction to the study of climatic data and maps, and the use of topographic maps and aerial photographs for landform analysis.

Text

GEOG102 INTRODUCTION TO HUMAN GEOGRAPHY 10cp
An introduction to human geography including cultural, population, economic, development and urban geography. Practical work includes an introduction to elementary statistical data and its presentation by thematic maps in human geography.

Text

See Faculty of Science and Mathematics Handbook for further information.

Geology Subjects

GEOG101 THE ENVIRONMENT 10cp
A lecture, field and practical course which examines in the widest context the evolution of our planet and man's environment. Specific topics are the Earth in space, evolution and dynamics of the planet Earth; evolution of the atmosphere, hydrosphere, biosphere and man; the impact of climatic change; mineral resources and society.

See Faculty of Science and Mathematics Handbook for further information.

Additional Geology subjects are described in the Faculty of Science and Mathematics Handbook.

Information Science Subjects

INFO101 INTRODUCTION TO INFORMATION SYSTEMS 10cp
Computers have made it possible to store and retrieve massive amounts of data. "Information age" is now a reality. This course introduces the skills and concepts needed to fully exploit the power of this new tool. After completion of the subject, students will understand how and why organisations build and use information systems, will be able to document information flow through particular systems, and will be able to use the microcomputer as a personal support tool. The course provides a solid grounding in computers and their use, which today is important for all students, irrespective of the discipline which they are studying.

Topics covered include: The evolution of computer hardware and software. Systems and their characteristics, the components of an Information System (hardware, software, data and people). Examples of computer based Information Systems. Problems which cannot/cannot be solved using computers. Types of information systems, formal/ informal, public/private. Types of problems structured/unstructured. The computer as a personal support tool, word-processing, spreadsheets, data base management. The importance of people in the information network, the social, organisational and personal implications of computer based information systems.

INFO102 INFORMATION STORAGE AND MANAGEMENT 10cp
The design and implementation of the data repository for any computer based information system is a skillful and extremely critical task. Overall performance of the system will be seriously compromised by an inefficient data storage and retrieval strategy.

This subject introduces the tools needed to design, implement and maintain computer based database systems. It will be of particular interest to students who will need to design and access large databases regularly in their chosen profession.

Topics covered include: Storage and representation of data in computer systems. Data types, records, file structures and access mechanisms. Standard file maintenance procedures. Introduction to COBOL, a business/file oriented third generation language. Semantic data modelling, entity/relationship modelling, functional independence and other constraints on attribute values. Introduction to database management systems, the hierarchical, network and relational models. Data manipulation languages, with particular emphasis on relational techniques using SQL.

Physical database design, normalisation.

INFO201 HUMAN CONTEXT OF INFORMATION SYSTEMS 10cp
This course focuses on the human and organizational effects of computer based systems. It examines the impacts of computer technology and information systems at the individual, group and organizational levels. In doing so, the course combines both the macro and the micro perspectives surrounding the human/organizational aspects of computer/information technology. More specifically, the course seeks to provide a critical examination of issues such as: the personal, social and organizational factors which affect the success/failure of information systems; the role of information systems in human communication; the nature and implications of computer based human problem solving. The course also attempts to address questions and controversies such as: What factors may affect an organization's potential for successful technology management? Why do certain groups of employees resist technological change in their workplace? Why are certain organizations always riding the crest of the technological wave while others lag behind? Also, a substantial portion of the course will be devoted to examining the practical issues surrounding the implementation of Information Systems in the area of Human Resource Management. Aspects such as the role of Human Resource Information Systems (HRIS) in manpower planning and recruitment; job evaluation and payment systems; monitoring absenteeism, etc. are considered. These latter aspects are examined from a macro/organizational and micro/individual perspective. The course introduces the tools needed to design, implement and maintain computer based human resource information systems. Specific topics include: Characteristics of an information system. The role of the system analyst. System life cycle. Interview techniques. Report writing. Documentation techniques (data flow diagrams, data dictionary, flowcharts, etc). Cost benefit analysis. Implementation techniques.

INFO202 ANALYSIS OF INFORMATION SYSTEMS 10cp
Structured analysis and design methodology will be introduced. Specific topics include: Characteristics of a system. Information systems. The role of the system analyst. The system life cycle. Interview techniques. Report writing. Documentation techniques (data flow diagrams, data dictionary, flowcharts, etc). Cost benefit analysis. Implementation techniques.
processing systems. Specific topics include: file design techniques, form design, security controls and backup, system testing and implementation, the ongoing maintenance of systems.

INFO204 COMMERCIAL PROGRAMMING 10cp
COBOL as a business data processing and file organisation language. Basic concepts of file handling and maintenance. Sequential, relative and indexed sequential file organisation. Structured techniques, as applied to COBOL programming, are emphasised. Structure diagrams, pseudo-code, programming standards, etc. Students are expected to complete assignments using both COBOL 74 and COBOL 85. Graduate Diploma students who enrol in this subject but have not completed INFO102 should obtain INFO102 COBOL notes from the Department of Management prior to the commencement of classes.

INFO304 KNOWLEDGE SYSTEMS AND THE ORGANISATION 10cp
This subject brings together the techniques introduced in the other Information Systems units, highlighting their use in the management of information systems within an organisation.

Specific topics include:
- Systems theory
- Organisational structure
- Decision theory
- The use of information within an organisation
- Division of responsibility for information system development
- End user computing
- Stages of information system growth
- Security disaster planning management control of information systems
- Integration of information systems
- Strategic planning for information systems

INFO302 INFORMATION SYSTEMS METHODS AND TECHNIQUES 10cp
Alternative information system analysis design and development techniques are compared with the aim of identifying their strengths and weaknesses when used in particular problem domains.

Specific topics covered include:
- Strategies such as prototyping, adaptive design and iterative design.
- Alternative conceptual data modelling approaches such as NIAM
- Practical systems development methods for: transaction based systems, real time systems, process systems, management reporting systems, decision support systems, etc.
- Computer aided software engineering techniques
- Application Generators
- Systems Documentation
- Systems Testing and Implementation
- Ongoing Maintenance of Information Systems

INFO304 KNOWLEDGE SYSTEMS 10cp
This subject provides a theoretical and practical foundation for the development of computerised knowledge systems. The theoretical aspects are based on classical and non-classical logics. These logics have well defined semantics and as such allow us to formalise interesting facets of knowledge systems.

Specific topics include:
- Knowledge representation
- Production rules and search strategies
- Reasoning with uncertainty
- Relational theories
- Updating knowledge
- Theory revision
- Planning

The practical aspects involve the study and use of several knowledge processing programming languages

INFO501 COMPUTING AND INFORMATION SYSTEMS 10cp
This course is designed to provide students with an overview of information systems in today’s business environment. The course will introduce personal support software available on microcomputers and their applications to management decision making.

During compulsory workshop sessions students will gain “hands on” experience using software packages such as electronic spreadsheets, database management systems, and word processing.

INFO503 SYSTEMS ANALYSIS 10cp
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.), cost/benefit analysis, implementation techniques.

INFO504 SYSTEMS DESIGN 10cp
Using the techniques introduced in MKG7512 Systems Analysis students will work in small groups to design and implement small on-line 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.

INFO505 MANAGEMENT INFORMATION SYSTEMS 10cp
This course is designed to expose potential managers to the variety of management information systems available today. The aim is to emphasise the role of the computer in the planning function, rather than simply in the day-to-day transaction based operational systems. Specific topics covered will include: database management systems, distributed versus centralised processing, the role of the microcomputer, decision support systems, expert systems, security and privacy implications.

Law Subjects

LAW291 INTRODUCTION TO LEGAL STUDIES 5cp

LAW292 PROPERTY AND SURVEY LAW 5cp
The notion of property. Classification 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 investigations and searches.

Texts
Hallinan, F. 1973, Legal Aspects of Boundary Surveying as apply in New South Wales, Inst. of Surveyors Aust.
Willis, Notes on Survey Investigations, NSW Government Printer.

LAW291 and LAW292 are service subjects offered by the Department of Law.
MATH220 PARTIAL DIFFERENTIAL EQUATIONS 1 5cp
See Faculty of Science and Mathematics Handbook for further information.
Text
Mathematics II Tutorial Notes, 1992, University of Newcastle.

MATH203 ORDINARY DIFFERENTIAL EQUATIONS 1 5cp
See Faculty of Science and Mathematics Handbook for further information.
Text
Mathematics II Tutorial Notes, 1992, University of Newcastle.

MATH206 COMPLEX ANALYSIS 1 5cp
See Faculty of Science and Mathematics Handbook for further information.

MATH208 LINEAR ALGEBRA 5cp
Linear algebra - the study of vector spaces and linear transformations on them - is a fundamental part of modern pure and applied mathematics. This is the key course in which mathematics majors and other potentially sophisticated users learn the basic principles, and it is a prerequisite for most later mathematics subjects.
Vector spaces and subspaces, linear maps, matrix representations, eigenvalues and eigenvectors, diagonalisation, inner product spaces, Laplace transforms. This is a prerequisite for many 300 level Mathematics subjects.
See Faculty of Science and Mathematics Handbook for further information.

MATH219 MATRIX METHODS 5cp
This course aims to give students a thorough grounding, with emphasis on practical calculations, in the matrix methods which find application in many areas of engineering, science and technology.

Vector space $\mathbb{R}$, subspaces of $\mathbb{R}$, bases and dimension, linear maps from $\mathbb{R}^n$ to $\mathbb{R}^m$, Euclidean spaces, Gram–Schmidt process, eigenvalues and eigenvectors, diagonalization, orthogonal matrices, Laplace transforms.
Students intending to do 300 level Mathematics subjects should take MATH208.
See Faculty of Science and Mathematics Handbook for further information.
Text
MATH219 Lecture Notes and Exercises

MATH220 ANALYTIC METHODS 1 5cp
Analysis arose from a need to study the ideas underlying calculus in order to establish a firm foundation for the theory of continuous and differentiable functions. This course is an introduction to the basic techniques of analysis, in the familiar context of functions of one real variable. Analysis is a fundamental to much of modern mathematics and so the techniques learned here are essential for many later mathematics courses. This is a prerequisite for many 300 level Mathematics subjects.
See Faculty of Science and Mathematics Handbook for further information.
Text
Bartle, R.G. 1985, Mathematical Analysis, CUP.
Spivak, M. 1967, Calculus, Benjamin.

MATH221 ANALYTIC METHODS 2 5cp
This course continues the development of the principles and techniques of analysis, particularly in the context of functions of several variables. The essential features of the one variable theory are extracted and applied to the several variable theory of continuous and differentiable functions. This leads naturally to the modern theory of topology, whose basic concepts are introduced in the setting of Euclidean space.
This is a prerequisite for many 300 level Mathematics subjects.
See Faculty of Science and Mathematics Handbook for further information.
References
Giles, J.R. 1989, Introduction to the Analysis of Metric Spaces, CUP.
Giles, J.R. Real Analysis: An Introductory Course (Lecture Notes in Mathematics, Univ.Newcastle, No.6).

MATH222 ALGEBRAIC METHODS 1 5cp
A few simple rules govern calculations with basic mathematical objects, such as numbers, functions and matrices. Because of this, many, apparently different, types of objects share common algebraic structures. In this course, one of the most fundamental of these algebraic structures is studied. Our starting point will be group theory. It will be seen that a group structure underlies familiar things, such as numbers, and also some things which may be less familiar to you. For example, group theory provides a unified way to understand symmetry in geometry, and has thus been used extensively in crystallography and theoretical physics. This is a prerequisite for many 300 level Mathematics subjects.

See Faculty of Science and Mathematics Handbook for further information.

References

MATH232 ALGEBRAIC METHODS 2 5cp
This continues the study of the fundamental algebraic structures which are used throughout mathematics. Here the algebra will be motivated by applications to number theory, polynomials and geometry. Thus, for example, modern algebra provides answers to such ancient questions as the trisection problem: is there a ruler and compass construction which trisects an arbitrary angle?

This is a prerequisite for many 300 level Mathematics subjects.

See Faculty of Science and Mathematics Handbook for further information.

Additional Mathematics subjects are described in the Faculty of Science and Mathematics Handbook.

Mechanical Engineering Subjects

MECH101 INTRODUCTION TO MECHANICAL ENGINEERING 5cp
Manufacturing techniques and materials related to mechanical engineering processes and design. Seminars and plant visits intended to enhance understanding of the mechanical engineering degree coursework and the role of the professional engineer in industry and society.

MECH102 INTRODUCTION TO ENGINEERING COMPUTING 5cp
An introduction to the use of computers and computer programming in Engineering. The programming language is FORTRAN 77 under a Unix operating system. Emphasis is placed on the development of a good programming style and on the logical development of a program. Lecturers will cover variable types and their uses, file and data handling, functions, subroutines, arrays, the computer operating system and text editors. Assessment is based partly on programs written by students.

Text

MECH103 ENGINEERING CHEMISTRY 5cp

Text
Lecture Notes, Murch, G.E. 1995, Department of Mechanical Engineering, The University of Newcastle.

MECH111 ENGINEERING DRAWING 5cp
A study of the basic fundamentals of technical graphics with an emphasis on communication and visualisation. The subject matter is reviewed using CAD, drafting and freehand techniques. The use and interpretation or orthographic projection in engineering is emphasised in association with sectioning, auxiliary views, dimensioning, and Australian Standard AS1100. Development of freehand skills for pictorial presentations is highlighted. An introduction into the basics of Descriptive Geometry including elementary intersections is given.

Text

MECH112 MATERIALS 1 5cp
The course provides a general introduction to materials of engineering significance and to the relationships which exist between structures, properties and applications. The following sections are given approximately equal amounts of time and emphasis. Atomic bonding; atomic arrangements in metals, glasses and polymers; the effects of stress and temperature on simple metals; the control of metallic structures by composition and thermal treatments; common metals of engineering importance; the structures and properties of ceramics and cement products. Polymers and rubbers; engineering applications for polymers; the mechanical testing of materials; composite materials; the electrical, magnetic, optical and thermal properties of solid materials.

Text

MECH111 INDO 801 MATERIALS EXPERIENCE 4cp
MECH112 INDO 801 MATERIALS EXPERIENCE 4cp
MECH113 INDO 801 MATERIALS EXPERIENCE 4cp
These subjects are designed to formalise periods of Industrial Experience gained by part-time students only. Each year of Industrial Experience is worth 5 credit points. Students who wish to study any or all of the Industrial Experience subjects 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 semester. 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. A weekly diary commencing on 1 November of the previous year must be kept and handed to the Class Supervisor or at the beginning of the first semester.

MECH204 EXPERIMENTAL METHODS 1 5cp
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. Interpretation of experimental data and basic principles of error analysis. Proficiency in technical report writing is emphasised.

MECH205 ENGINEERING COMPUTATIONS 1 5cp
Developing algorithms and computer programs. Topics covered include single non-linear equations, systems of linear and non-linear equations, numerical integration and differentiation, interpolation and least squares fitting of data. Solution of ordinary and partial differential equations.

MECH211 MECHANICAL ENGINEERING DESIGN 1 10cp
Students intending to enrol in this subject who completed MECH111 prior to 1992 or who were granted credit in that subject should consult the Head of Department regarding bridging work to be undertaken in February and completed prior to commencement of classes in MECH211.

Philosophy and fundamentals of mechanical engineering design. Conceptual design problems. Advanced mechanical engineering drawing using CAD including geometric tolerances, surface finish, symbols. Technology of design.

Text

MECH212 DESIGN OF MACHINE COMPONENTS 5cp
Basic components of mechanisms and machinery. Load and stress calculations, allowable stresses and factors of safety. Design of standard machine components such as shafts, brackets, levers, springs and bolted connections.

Text

MECH222 MATERIALS 2 5cp
The mechanical behaviour and properties of engineering materials and how they are affected by the environment and by use. An introduction to the factors governing the selection of materials.

The topics treated will include equilibrium and non-equilibrium effects, i.e. martensitic transformations, heat treatments, TTT diagrams and welding, creep, fracture and fatigue. Friction and wear.

Text
MECH233 DYNAMICS 5ep
Text

MECH234 DYNAMICS OF ENGINEERING SYSTEMS 5ep
Text

MECH241 MECHANICS OF SOLIDS 1 5ep
Uniaxial loading, states of stress and strain, stress and strain relationships; internal forces, internal stresses, deflexion of beams, torsion, buckling.
Text

MECH251 FLUID MECHANICS 1 5ep
Fluid properties and definitions. Fluid statics: forces on surfaces, buoyant forces. Types of flow, continuity equation, Euler and Bernoulli equations, energy equation, linear and angular momentum applications. Introduction to dimensional analysis. Analysis of fluid machinery.
Text

MECH271 THERMODYNAMICS 1 5ep
First and second law analysis of processes and cycles. Fundamental thermodynamic concepts, first and second laws and corollaries. Reversible and irreversible processes. Properties of perfect gases, liquids and vapours. Calculations of property changes and energy flows for non-flow, steady flow and unsteady flow processes using various working substances. Examination of various energy conversion systems as examples of the above calculations.
Text

MECH304 EXPERIMENTAL METHODS 2 10ep
Selected engineering laboratory experiments designed to extend the concepts of experimental procedures and to complement formal subject matter in the course.

MECH305 ENGINEERING COMPUTATIONS 2 5ep
Review of basic techniques for solving ordinary differential equations and partial differential equations. Introduction to the control finite volume procedure for discretizing of partial differential equations. The course includes programming sessions to illustrate important principles, and allows hands-on exercises. A small project may be undertaken.
Text

MECH309 NOISE POLLUTION AND CONTROL 5ep

MECH311 MECHANICAL ENGINEERING DESIGN 2 10ep
Text

MECH315 COMPUTER AIDED DESIGN 5ep
Students intending to enrol in this subject who completed MECH213 prior to 1989 and who were granted credit in that subject in MECH211 should consult the Head of Department regarding bridging work in CAD to be undertaken in February and completed prior to commencement of classes in MECH315.

MECH320 INTRODUCTION TO FINE ELEMENT ANALYSIS 5ep
Text
Nafems, 1992, A Finite Element Primer, Nafems.

MECH323 MATERIALS 3 5ep
This subject deals with metals, polymers, ceramics, composites and biological materials in conjunction with the following topics: review of traditional strength tests; fundamentals of fracture mechanics; rate, environment and temperature effect on toughness; fatigue crack propagation; scaling in static fracture and fatigue fracture; classification of materials according to mechanical properties.
Text

MECH324 CERAMIC SCIENCE AND TECHNOLOGY 5ep
Discussion of the engineering properties of ceramics and how these properties are dependent on atomic structure, chemical composition, microstructure and processing. Structures of oxides, silicates and glasses. Point defects and doping. Grain boundaries. Phase transformations. Firing - grain growth, sintering and vitrification. Microstructures. Mechanical and electrical properties.
Texts

MECH325 POLYMER SCIENCE AND TECHNOLOGY 5ep

MECH326 FABRICATION OF METALS 5ep
An introduction to the common metal working techniques and the effects these processes have on the properties of the finished product. Topics presented will be taken from: Rolling, Forging, Deep Drawing, Wire and Tube Drawing, Casting, Extrusion and Powder Metallurgy.
MECH333 DYNAMICS OF MACHINES 5cp

MECH334 ADVANCED DYNAMICS 5cp
Not available to students who have completed MECH323. Three-dimensional motion of particles in inertial, translating and rotating reference frames. Kinematics of plane mechanisms. Kinetics of systems of particles and rigid bodies in three-dimensional motion.

MECH335 MECHANICS OF SOLIDS 2 5cp

MECH336 FLUID MECHANICS 2 10cp
Kinematics of fluids. Dynamics of incompressible fluids. Similarity and the application of dimensional analysis. Exact solutions of the Navier-Stokes equations. Hydrodynamic lubrication. Laminar and turbulent flow. The course includes a number of laboratory experiments dealing with the above topics.

MECH337 THERMODYNAMICS 2 5cp

MECH351 AUTOMATIC CONTROL 10cp

MECH372 HEAT TRANSFER 1 5cp

MECH381 METHODS ENGINEERING 5cp

MECH382 QUALITY ENGINEERING 5cp

MECH385 COMPUTER SIMULATION 2 5cp

MECH386 COMPUTER AIDED MANUFACTURING 5cp

MECH387 OPERATIONS RESEARCH 1 5cp
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.

MECH388 OPERATIONS RESEARCH 2 5cp
Statistical decision theory; Forecasting methods, moving average exponentially smoothed average, Inventory control theory. Fixed order quantity; Fixed order cycle systems; Production - inventory systems. Queuing theory; simple queues, multi-server queues. Queues in series. Transients in queues; simulation of systems. Applications.

MECH405 COMPUTATION OF TURBULENT FLOWS 5cp
Integral methods for solving engineering turbulent flow problems. Introduction to turbulence modelling ideas. Use of existing software packages such as PHENICS to solve engineering problems.

MECH407 AIR POLLUTION MANAGEMENT 5cp
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.

MECH408 MACHINE CONDITIONING MONITORING 5cp

MECH412 BULK MATERIALS HANDLING 2 5cp
MECH415 MECHANICAL ENGINEERING DESIGN 3 10cp
Advanced design topics including the analysis of complete systems, principles of materials selection, the interaction of design geometry, material properties and fabrication processes in mechanical design.

MECH416 ADVANCED FINITE ELEMENT ANALYSIS 5cp

MECH418 MAINTENANCE MANAGEMENT 5cp
Maintenance decision making; the action (replacement, repair, adjustment), timing the action (fixed time, conditional monitoring, operation to failure, designed out maintenance). Preventive maintenance schedule - a six step approach. Equipment life cycle costs and maintenance. Documentation — (manual, computer). Reliability. Staff Motivation. Case studies and examples from local industry.

MECH421 COMPOSITES IN ENGINEERING 5cp

Text
Tsai, S.W. and Han, H.T. 1998, Introduction to Composite Materials, Technomic.

MECH431 ROBOTICS 5cp
Basic concepts, classification of robotic systems, control systems, kinematic analysis and co-ordinate transformations, trajectory interpolators, programming, applications, sensors and intelligent robots, computer integrated manufacturing systems.

Text

MECH453 INTRODUCTION TO TURBULENCE 5cp

Text

MECH473 THERMODYNAMICS 3 5cp
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. Thermodynamics of irreversible processes. Applications of statistical thermodynamics. Direct energy conversion.

Text

MECH474 HEAT TRANSFER 2 5cp
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 conduction and radiation heat transfer. Heat transfer with change of phase.

Text

MECH482 ENGINEERING ECONOMICS 1 5cp

Text

MECH484 ENGINEERING ECONOMICS 2 5cp

Text

MECH485 PRODUCTION SCHEDULING 5cp

MECH496 PROJECT/SEMINAR 25cp
Major undergraduate project usually consisting of literature survey and review, analytical and/or experimental investigations into a mechanical or industrial engineering topic. Presentation of two seminars. Briefing sessions and weekly guest seminars are mandatory. Two (2) copies of the Project Report are required.

MECH497 PROJECT/DIRECTED READING 5cp
Private work of laboratory, literature search or theoretical nature requiring preparation of a report. Work will be undertaken at the direction of a supervisor with whom the topic should be negotiated. The work undertaken in this subject may form part of an extended MECH496 project or an independent topic.

MECH498 PROJECT/DIRECTED READING 10cp
Private work of laboratory, literature search or theoretical nature requiring preparation of a report. Work will be undertaken at the direction of a supervisor with whom the topic should be negotiated. The work undertaken in this subject may form part of an extended MECH496 project or an independent topic.

MECH516 FINITE ELEMENT METHODS IN DESIGN 5cp
Basic concepts of the finite element technique. Introduction to a finite element computer package. Finite element as a tool for mechanical design. Application of a range of element types to the solution of linear elastic stress problems. Introduction to vibration analysis.

MECH573 ADVANCED THERMODYNAMICS 5cp

Text

MECH518 CONVEYING OF BULK SOLIDS 5cp

MECH584 ENGINEERING ECONOMICS 5cp
Review of basic principles of micro-economics - scarcity and choice, supply and demand, market system. Review of basic principles of accounting: financial statements; working capital; capital expenditure; budgeting; costing; overheads; marginal cost. Economic Evaluation of projects: time value of money; present worth; annual equivalent; rate of return; cost-benefit; inflation; taxation; depreciation; capital budgeting. Replacement Analysis. Economic life concepts. Risk analysis: sensitivity; expected value and variance; sequential decision; decision trees. Economics of technical
systems: systems concepts; quality; inventory; lead time; flexibility; reliability; maintenance; models and optimisation techniques.

MECH594 INDUSTRIAL SYSTEMS PROJECT/SEMINAR A 20cp
The first section of the major project in the Master of Engineering Science - Power Engineering program undertaken in the Department of Mechanical Engineering. It is expected that most projects will be of an applied research nature in an area relevant to the candidates employment and co-supervised by a professional engineer on site. Coursework components will cover areas of problem identification, research skills, communication skills and strategies for applied research. Progress will be reported at seminars given by candidates and by the submission of progress reports in July and November. Satisfactory completion of this subject will result in the award of a result of ungraded pass (UP).

MECH595 INDUSTRIAL SYSTEMS PROJECT/SEMINAR B 20cp
The final section of the major project in the Master of Engineering Science - Power Engineering program undertaken in the Department of Mechanical Engineering commenced in MECH594. Submission of the final Project Report will be required by 31 October followed by formal presentation of the results of the project at a later date. The result awarded for this subject will reflect the quality of the Project Report resulting from the work undertaken in both MECH594 and MECH595.

MECH599 INDUSTRIAL SYSTEMS PROJECT/SEMINAR 40cp
The major project in the Master of Engineering Science - Industrial Systems program undertaken in the Department of Mechanical Engineering for students intending to complete the course in a singular academic year. It is expected that most projects will be of an applied nature in an area relevant to the candidates employment and co-supervised by a professional engineer on site. Coursework components will cover areas of problem identification, research skills, communication skills and strategies for applied research. Progress will be reported at seminars given by candidates and by the submission of a progress report in July. Submission of the final project report will be required by the 31 October followed by a formal presentation of the results of the project at a later date.

Philosophy Subjects

PHIL101 INTRODUCTION TO PHILOSOPHY 20cp
First Semester: Book I of Hobbes' classic Leviathan will be read; it will be explained and expounded in detail to bring out the Hobbesian world view systematically, the world view of liberalism that underlies western democracies (1 hour per week). A segment on morality discusses the nature of justice and some views on free will and on the basis of morality (1 hour per week). A segment on critical reasoning aims to develop skills in analysing, evaluating and advancing arguments, considerable emphasis being placed on arguments as they naturally occur, and on reasoning as an everyday practice (1 hour per week).

Second Semester: Some of Plato's dialogues will be read, and the ethical, political and metaphysical questions raised by them will be systematically expounded (1 hour per week). A segment on knowledge and reality examines some questions about belief and knowledge, the mind/body relationship, and the existence of God (1 hour per week). A segment on the historical development of scientific explanation and an introduction to the theory of scientific method (1 hour per week).

Preliminary Reading
Nagel, T. What Does It All Mean?, Oxford U.P.
Texts
Clandinin, P.J. Perspectives of Scientific Explanation .
Hoepers, J. An Introduction to Philosophical Analysis, Routledge.
Sparkes, A.W. Argument Diagrams and Logical Relations, Podarag.
Sparkes, A.W. Talking Philosophy, Routledge.

PHIL104 PRACTICAL LOGIC 10cp
This subject is designed for non-Philosophy students whose disciplinary studies require formal argument and logic-based reasoning. It provides: (i) an introduction to the informal study of reasoning and argument; and (ii) a corresponding introduction to some systems of logic, together with selected applications.

Topics discussed under (i) include the nature of arguments, and the general distinction between valid and sound arguments, methods for recognising arguments in natural language contexts, an introduction to particular valid argument forms and to formal and informal fallacies. Topics discussed under (ii) include the construction of formal languages and translation from English, pose into them, the formal systems of propositional and quantificational logic and the study of methods of proof for valid arguments forms in these, and a basic introduction to naive set theory and relation theory up to equivalence classes and functions, including mathematical induction.

Texts
To be determined
References
See The Philosophy Manual

PHIL242 BASIC SYMBOLIC LOGIC 5cp
Not offered in 1995.
A basic introduction to sentential and predicate calculi, including notations, interpretation, satisfiability, validity and proof construction. Part of the course will deal with the reduction of logical formulae into clausal form to enable their expression in PROLOG.

Text

PHIL263 NON-LINEAR DYNAMIC MODELS & COGNITIVE SCIENCE 10cp
This subject has been primarily designed for students of cognitive science/artificial intelligence to introduce them to the nature and ramifications of the emergence across all the sciences, from physics to economies and cognitive science, of non-linear dynamic models. Of particular interest to cognitive science are those non-linear models which exhibit emergent self-organising properties and capacities.

On the one hand, these models challenge the traditional computational model of mind as a collection of formal symbolic, logic-based algorithms, running in virtual time. On the other hand, they substitute a new conception of mind as an emergent computation from sub-symbolic processes running in real time on a neural processor. These dynamical systems can themselves be formally computationally modelled. Indeed, most of them are essentially computational models in this sense: running computer models of them is the only way presently available to study their emergent capacities.

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 year-long 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/ministerial discussion. Evaluation will be by the Team Report plus staff leader's/teams' 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 two weeks of semester.

PHIL319 TECHNOLOGY AND HUMAN VALUES 1
A course of lectures and discussions focussing on the ethical, spiritual, 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 focuses on the nature and control of technology. It complements Strand A by introducing a range of additional topics which broaden the horizon of consideration and deepen the treatment of specific features of decision making.

Texts
Hooker, C.A. Course Notes
Schumacher, E.F. Small is Beautiful, Abacus
Teich, A.H. (ed.), Technology and Man's Future, St Martin's Press.

PHIL392 TECHNOLOGY AND HUMAN VALUES 2 10cp
Not offered in 1995.
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 year-long 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/ministerial discussion. Evaluation will be by the Team Report plus staff leader's/teams' 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 two weeks of semester.
Uncertainty principle as limitation on measurement. Quantum electronic devices. Ideas of filtering of states (Sterk-Gerlach) and pumping of states. Application to atomic clocks, masers, lasers.  
Nuclear Physics. Mass defect, binding energy curve. Nuclear reactions, neutrons, Coulomb barrier, fission, fission, and mass-energy balance calculations.  
The learning topic for Physics I course will deal with natural phenomena. The conditions under which the concepts and their applications can be better understood will be considered.

**Psychology Subjects**

**PSYC101 PSYCHOLOGY INTRODUCTION 1** 10cp  
See Faculty of Science and Mathematics Handbook for further information.

**Texts**  
General — any recent comprehensive text on General Psychology or Introduction to Psychology. The following alternatives are recommended (others may be added later). 
For Statistics course 

**PSYC102 PSYCHOLOGY INTRODUCTION 2** 10cp  
Three written laboratory reports. Cognition; Social Psychology; Developmental Psychology.  
See Faculty of Science and Mathematics Handbook for further information.  
Texts  
Additional Psychology subjects are described in the Faculty of Science and Mathematics Handbook.  

**PSYC202 BASIC PROCESSES** 10cp  
This subject generally examines such psychological processes as perception, human information processing, memory, sociolinguistics, and learning. Both animal and human models may be considered.  
The Cognition topic will examine the experimental evidence supporting various models for human memory. Emphasis will be placed on the application of psychological processes as well as an introduction to neural network concepts.  
The Perception section will deal primarily with audition. The following topics will be covered: structure of the auditory system, subjective dimensions of sound, sound localization and elementary aspects of speech perception.  
The learning topic will explore ideas about the nature and mechanisms of associative learning. The conditions under which learning occurs and the nature of the representations underlying learning will be described. The implications of these ideas for the application of learning theory to issues such as drug tolerance and addiction will be considered.  
Tutorial and laboratory exercises dealing with the above topics will be used to demonstrate these basic psychological processes.  

**PSYC207 EXPERIMENTAL METHODOLOGY** 10cp  
Prerequisite PSYC102  
*Hours* 2 hours of lectures per week for one semester together with a tutorial and laboratory workshop of 2 hours duration per week.  
*Examination* Students will be assessed by class tests, laboratory assignments and end of semester examination.

**Content**  
(i) A selection of topics in statistics and computing which will focus on the basic of t-testing, ANOVA, non-parametric testing, and univariate linear regression. Students will be shown how to use software packages to manipulate data and perform statistical analyses.  
(ii) Topics in descriptive and graphical analysis of data and research methodology. The first section will deal with graphical and descriptive statistical methods for understanding data patterns as well as methods for preparing data for inferential analysis. The second section will focus on issues of research methodology and the design of experiments.  
The lectures will be accompanied by a tutorial and laboratory workshop series in which practical experience will be given in the application of the topics described above using computer-assisted packages. 

**Text**  
To be advised.  

**PSYC301 ADVANCED FOUNDATIONS FOR PSYCHOLOGY** 10cp  
This course consists of the following topics:  
(a) Experimental design principles in psychology ranging from naturalistic observation to experimental and quasi-experimental designs, including single-case studies.  
(b) Practical computation techniques for the analysis of experimental designs in psychological research, using MINITAB.  
(c) Introduction to multivariate statistical techniques such as Multiple Linear Regression, Discriminant Analysis, and Cluster Analysis.  
(d) The MEL laboratory programs will be used to collect data in the tutorial periods.  

**References**  

**PSYC309 TOPICS IN NEURAL SCIENCE** 10cp  
Prerequisites PSYC207 and PSYC208  
*Hours* 4 hours per week for one semester  
*Examination* One 2 to 3 hour examination and laboratory assessment.

**Content**  
A series of topics at the cellular and molecular level will examine the structural and functional mechanisms responsible for neural processing. The course will include synaptic communication, the physiology of neural networks and examine how neurons and networks develop and function in the brain.  
The course will be complemented with a choice of laboratory sessions which highlight some aspects of the course and introduce students to some techniques for studying the brain at the cellular and molecular level.  

**References**  
The following texts are available on short loan (and in the medical reading room) in the Auchmuty Library. They can...
also be ordered from the bookshop. Additional readings will be made known throughout the course.


Statistics Subjects

STAT101 INTRODUCTORY STATISTICS 10cp


Text

See Faculty of Economics and Commerce Handbook for further information.

STAT201 MATHEMATICAL STATISTICS 10cp


Text

See Faculty of Economics and Commerce Handbook for further information.

STAT202 REGRESSION ANALYSIS 10cp

This course covers the practical and theoretical aspects of regression analysis. Emphasis is placed upon diagnostic and remedial measures to be taken when the assumptions are not met. Transformations, selection of regressors, alternatives to least squares, and nonlinear regression. MINITAB will be the primary statistical computing package that is used; SAS will also be used.

Text
To be advised.

See Faculty of Economics and Commerce Handbook for further information.

STAT205 ENGINEERING STATISTICS 10cp


See Faculty of Economics and Commerce Handbook for further information.

STAT206 DESIGN AND ANALYSIS OF EXPERIMENTS AND SURVEYS 10cp

This course contrasts two methods for collecting and analysing data: experimental studies and non-experimental studies including surveys. The principles of experimental design are illustrated by studying completely randomised designs, randomised block designs and factorial designs. For surveys the topics include: simple random sampling, stratified and cluster sampling, ratio and regression estimators. Class projects are used to illustrate practical problems and the statistical packages MINITAB and SAS are used to carry out analyses.

See Faculty of Economics and Commerce Handbook for further information.

Surveying Subjects

SURV111 SURVEYING 3 10cp


Text

SURV112 SURVEYING 1 10cp

Plane table; contour surveys by stadia; detail surveys, route surveys, areas and volumes, horizontal curves, transverse curves, vertical curves. A brief history of surveying and surveying instruments. A three-day series of field-work exercises form a compulsory component of this subject.

Text

SURV191 INDUSTRIAL EXPERIENCE 5cp

SURV192 INDUSTRIAL EXPERIENCE 5cp

SURV193 INDUSTRIAL EXPERIENCE 5cp

These subject units are designed to formalise periods of Industrial Experience gained by part-time students only. 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 subjects may be counted by part-time students as electives.

SURV213 SURVEYING 3 10cp

Precise levelling, barometric levelling, trigonometric levelling, reciprocal levelling. Plane triangulation with single-second theodolites. This subject includes a five-day survey camp.

SURV214 OPTICS AND MINING SURVEYING 5cp


SURV215 ELECTRONIC DISTANCE MEASUREMENT 5cp


SURV233 SURVEY COMPUTATIONS 2 5cp


SURV316 HYDROGRAPHIC SURVEYING 5cp


Text

SURV334 ERROR THEORY 5cp

Revision and extension of error theory. Adjustment by least squares. Error ellipse calculations.

SURV351 GEODESY 1 10cp


SURV361 PHOTOGRAMMETRY 1 10cp

Stereoscopic vision — geometry of single aerial photograph — stereoscopic pairs — fundamental mathematical relationships — radial triangulation. Inert, relative and absolute orientation with respect to direct optical projection. Cameras, physical properties of photographs.

Text

SURV562 REMOTE SENSING 5cp

Introduction to sensing and sensors; sensor platforms; image processing; applications.

Text

SURV393 LAND BOUNDARY DEFINITION 10cp

Cadastral surveys in H.S.W. Surveying Law, Torrens and Common law titles surveys and searches, Identification surveys. Field records and plans. A ten-day survey camp is a compulsory part of this subject.

Text
Hallinan, F., 1973, Legal Aspects of Boundary Surveying as Applied in NSW, Inst. of Surveyors NSW.


SURV419 INDUSTRIAL SURVEYING 5cp

Revision of statistics errors and error propagation, the pointings accuracy of instruments, the principles of instrument design, optical testing in machine shops, super-precise surveys, and a revision of software systems and their applications in industrial surveying.
SURV420 SURVEY DESIGN AND MANAGEMENT 10cp
Design of Surveys, Integration of Surveys, Construction Control and Management, Deformation Surveys, Design of a Digital Cadastral, Professional Ethics and Design Project. A five-day survey camp is a compulsory part of this subject.

SURV441 ASTRONOMY AND SATELLITE POSITIONING 10cp

[(Text continues...)]
The head of the department offering a subject may waive the prerequisite or corequisite requirements of a subject offered by that department. Students should obtain any such waiver in writing from the Faculty Office and submit the completed form attached to any request for variation of program.

**Assumed Knowledge**

Many subjects also have assumed knowledge requirements. These are also set out in the following pages. Students are strongly advised to have completed the subjects prescribed as assumed knowledge before enrolling or to otherwise discuss the extent of their disadvantage with the head of department or the lecturer concerned.

### Schedule of Subjects Offered by the Department of Chemical Engineering

<table>
<thead>
<tr>
<th>Code</th>
<th>Subject Name</th>
<th>Credit Points</th>
<th>Semester Available</th>
<th>Prerequisites</th>
<th>Corequisites (CR)</th>
<th>Associated Knowledge (AK)</th>
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<td>Industrial Process Principles</td>
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<tr>
<td>CHEE112</td>
<td>Introduction to Chemical Engineering</td>
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<td>CHEE113</td>
<td>Chemical and Manufacturing Processes</td>
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<td>CHEE191</td>
<td>Industrial Experience</td>
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<td>Full year</td>
<td>Part-time enrolment</td>
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<tr>
<td>CHEE192</td>
<td>Industrial Experience</td>
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<td>Full year</td>
<td>Part-time enrolment</td>
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<td>CHEE193</td>
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<td>Full year</td>
<td>Part-time enrolment</td>
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<td>CHEE242</td>
<td>Chemical Engineering Computations</td>
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<td>CHEE246</td>
<td>Transfer Processes 3</td>
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<tr>
<td>CHEE247</td>
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<td>Code</td>
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T.B.D. = To be determined  H.O.D. = Head of Department

### Schedule of Subjects Offered by the Department of Civil Engineering and Surveying

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#### Schedule of Engineering Subjects

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H.O.D. = Head of Department

### Section Nine

#### Schedule of Subjects Offered by the Department of Computer Science

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400 level subjects are normally available only to students in the following programs offered by the Department of Computer Science: BCompSci, MCompSci, MComputing, PhD.
### Schedule of Subjects Offered by the Department of Mechanical Engineering

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<tr>
<th>Code</th>
<th>Subject Name</th>
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**Schedule of Engineering Subjects**
### Schedule of Engineering Subjects

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### Schedule of Selected Subjects Offered by Departments Outside the Faculty of Engineering

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<th>Prerequisites</th>
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### T.R.D. — To be determined

### H.O.D. — Head of Department

* Elective or graduate subjects. Not all such subjects will be available in any one year. The subjects in this category indicated as potentially available may be cancelled if enrolments are insufficient. Availability should be confirmed with the Department Office.

† Students intending to enrol in MECH311 prior to 1992 or who were granted credit in that subject should consult the Head of Department regarding a bridging course to be undertaken in February and completed prior to commencement of classes in MECH311.
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<th>Code</th>
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