The University of New South Wales

Engineering

1982 Faculty Handbook
How to use this Handbook

The information in this book has been divided into seven parts.

General Information (the lilac coloured pages) lists what you need to know about the University as a whole, introduces some of the services available and notes the most important rules and procedures. You should read this part in its entirety.

For further information about the University and its activities, see the University Calendar.

Faculty Information.

Undergraduate Study outlines the courses available in each school in the faculty.

Graduate Study is about higher degrees.

Subject Descriptions lists each subject offered by the schools in the faculty. The schools are listed numerically.

Information includes:
• Subject number, title and description
• Prerequisite, co-requisite and excluded subjects, where applicable
• Additional information about the subject such as unit values, credit hours, teaching hours per week, sessions when taught

Financial Assistance to Students is a list of scholarships and prizes, available at undergraduate and graduate level in the faculty.

Staff list.

For detailed reference, see the list of Contents.
The University of New South Wales

Engineering

1982 Faculty Handbook
The address of the University of New South Wales is:

PO Box 1, Kensington,
New South Wales, Australia 2033

Telephone: (02) 663 0351
Telegraph: UNITECH, SYDNEY
Telex AA26054

The University of New South Wales Library has catalogued this work as follows:

UNIVERSITY OF NEW SOUTH WALES
Faculty of Engineering
Handbook.
Annual. Kensington.
1962+

University of New South Wales —
Faculty of Engineering — Periodicals.
Subjects, courses and any arrangements for courses including staff allocated, as stated in the Calendar or any Handbook or any other publication, announcement or advice of the University, are an expression of intent only and are not to be taken as a firm offer or undertaking. The University reserves the right to discontinue or vary such subjects, courses, arrangements or staff allocations at any time without notice.

Information in this Handbook has been brought up to date as at 14 September 1981, but may be amended without notice by the University Council.

Contents

General Information .......................... 1
Some People Who Can Help You ............. 1
Calendar of Dates
The Academic Year .......................... 2
1982 ........................................ 2
1983 ........................................ 4
Organization of the University .............. 5
Arms of the University/Council/Professors/Board/Old Boys' Board/Study/Schools/Executive Officers/Administration/
Student Representation/Award of the University Medal/Subject Numbers/Textbook Lists/Co-operative Bookshop/General Studies
Student Services and Activities
Accommodation ................................ 7
Residential Colleges ......................... 7
Other Accommodation ........................ 7
Associations, Clubs and Societies .......... 7
The Sports Association ...................... 7
School and Faculty Associations .......... 8
Australian Armed Services ................. 8
Chaplaincy Centre ........................... 8
Deputy Registrar (Student Services) ........ 8
Student Amenities and Recreation Section ........................................ 8
Physical Education and Recreation Centre ........................................ 8
Student Counselling and Research Unit ... 9
Student Employment Section ................ 9
Student Health Unit .......................... 9
The Students' Union ......................... 9
The University Library ...................... 10
The University Union ....................... 10
Financial Assistance to Students .......... 11
Tertiary Education Assistance Scheme/Other Financial Assistance/Financial Assistance to Aboriginal Students/Fund for Physically Handicapped and Disabled Students
## Undergraduate Study: Course Outlines

<table>
<thead>
<tr>
<th>School of Civil Engineering</th>
<th>3620 Civil Engineering (BE)</th>
<th>37</th>
<th>37</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-time</td>
<td></td>
<td>37</td>
<td></td>
</tr>
<tr>
<td>Part-time</td>
<td></td>
<td>38</td>
<td></td>
</tr>
<tr>
<td>Combined Course</td>
<td></td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>3730 Combined Course (BE BSc) in Civil Engineering</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Electrical Engineering and Computer Science</th>
<th>3640 Electrical Engineering (BE)</th>
<th>43</th>
</tr>
</thead>
<tbody>
<tr>
<td>3650 Electrical Engineering (BSc(Eng))</td>
<td></td>
<td>45</td>
</tr>
<tr>
<td>Combined Courses</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>3725 BE BSc in Electrical Engineering</td>
<td></td>
<td>48</td>
</tr>
<tr>
<td>3720 BE BA in Electrical Engineering</td>
<td></td>
<td>46</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Mechanical and Industrial Engineering</th>
<th>3680 Mechanical Engineering (BE) Full-time (New Course)</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>3680 Mechanical Engineering (BE) Full-time (Old Course)</td>
<td></td>
<td>51</td>
</tr>
<tr>
<td>3680 Mechanical Engineering (BE) Part-time (New Course)</td>
<td></td>
<td>52</td>
</tr>
<tr>
<td>3680 Mechanical Engineering (BE) Part-time (New Course) Broken Hill</td>
<td></td>
<td>53</td>
</tr>
<tr>
<td>3710 Aeronautical Engineering (BE) Full-time (New Course)</td>
<td></td>
<td>55</td>
</tr>
<tr>
<td>3710 Aeronautical Engineering (BE) Full-time (Old Course)</td>
<td></td>
<td>56</td>
</tr>
<tr>
<td>3710 Aeronautical Engineering (BE) Part-time (New Course)</td>
<td></td>
<td>56</td>
</tr>
<tr>
<td>3700 Naval Architecture (BE) Full-time (New Course)</td>
<td></td>
<td>57</td>
</tr>
<tr>
<td>3700 Naval Architecture (BE) Full-time (Old Course)</td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>3700 Naval Architecture (BE) Part-time (New Course)</td>
<td></td>
<td>58</td>
</tr>
<tr>
<td>3710 Naval Architecture (BSc(Eng)) Part-time (Old Course)</td>
<td></td>
<td>59</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Department of Industrial Engineering</th>
<th>3660 Industrial Engineering (BE) Full-time (New Course)</th>
<th>59</th>
</tr>
</thead>
<tbody>
<tr>
<td>3660 Industrial Engineering (BE) Full-time (Old Course)</td>
<td></td>
<td>60</td>
</tr>
<tr>
<td>3660 Industrial Engineering (BE) Part-time (New Course)</td>
<td></td>
<td>61</td>
</tr>
<tr>
<td>3760 Industrial Engineering (BSc(Eng)) Part-time (Old Course)</td>
<td></td>
<td>62</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School of Surveying</th>
<th>3740 Surveying (BSurv)</th>
<th>62</th>
</tr>
</thead>
<tbody>
<tr>
<td>3750 Surveying Science (BSurvSc)</td>
<td></td>
<td>63</td>
</tr>
<tr>
<td>3760 Surveying Science (BSurvSc)</td>
<td></td>
<td>65</td>
</tr>
</tbody>
</table>

## Graduate Study

<table>
<thead>
<tr>
<th>Graduate School of Engineering</th>
<th>Research Degrees</th>
<th>66</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course Work Degrees</td>
<td>Graduate Diploma</td>
<td>66</td>
</tr>
<tr>
<td>Graduate Subjects</td>
<td>Civil Engineering</td>
<td>67</td>
</tr>
<tr>
<td>Electrical Engineering and Computer Science</td>
<td>68</td>
<td></td>
</tr>
<tr>
<td>Mechanical and Industrial Engineering</td>
<td>69</td>
<td></td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>Nuclear Engineering</td>
<td>70</td>
</tr>
<tr>
<td>Surveying</td>
<td>Centre for Biomedical Engineering</td>
<td>71</td>
</tr>
<tr>
<td>Graduate Diplomas</td>
<td>71</td>
<td></td>
</tr>
</tbody>
</table>

## Projects and Research Projects

| Civil Engineering | 72 |
| Electrical Engineering and Computer Science | 73 |
| Mechanical and Industrial Engineering | 74 |
| Nuclear Engineering | 75 |
| Surveying | 75 |
| Biomedical Engineering | 76 |
| Remote Sensing | 76 |
### Conditions for the Award of Higher Degrees

<table>
<thead>
<tr>
<th>Degree</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Doctor of Philosophy</td>
<td>77</td>
</tr>
<tr>
<td>Master of Biomedical Engineering</td>
<td>79</td>
</tr>
<tr>
<td>Master of Engineering</td>
<td>81</td>
</tr>
<tr>
<td>Master of Engineering Science and Master of Surveying Science</td>
<td>83</td>
</tr>
<tr>
<td>Master of Science</td>
<td>84</td>
</tr>
<tr>
<td>Master of Science, Master of Engineering or Master of Surveying</td>
<td>85</td>
</tr>
<tr>
<td>without supervision</td>
<td>86</td>
</tr>
<tr>
<td>Master of Surveying</td>
<td>87</td>
</tr>
<tr>
<td>Graduate Diploma</td>
<td>88</td>
</tr>
</tbody>
</table>

### Subject Descriptions

#### Identification of Subjects by Numbers

<table>
<thead>
<tr>
<th>Subject Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>90</td>
</tr>
<tr>
<td>Chemistry</td>
<td>92</td>
</tr>
<tr>
<td>Metallurgy</td>
<td>93</td>
</tr>
<tr>
<td>Mechanical and Industrial Engineering</td>
<td>94</td>
</tr>
<tr>
<td>Electrical Engineering and Computer Science</td>
<td>94</td>
</tr>
<tr>
<td>Mining Engineering</td>
<td>103</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>119</td>
</tr>
<tr>
<td>Mathematics</td>
<td>119</td>
</tr>
<tr>
<td>Accountancy</td>
<td>125</td>
</tr>
<tr>
<td>Mathematics</td>
<td>132</td>
</tr>
<tr>
<td>Graduate Study</td>
<td>134</td>
</tr>
<tr>
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<td>134</td>
</tr>
<tr>
<td>Graduate Study</td>
<td>134</td>
</tr>
<tr>
<td>Economics</td>
<td>134</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>134</td>
</tr>
<tr>
<td>Nuclear Engineering</td>
<td>141</td>
</tr>
<tr>
<td>Geography</td>
<td>141</td>
</tr>
<tr>
<td>Surveying</td>
<td>143</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>143</td>
</tr>
<tr>
<td>Chemical Engineering and Industrial Chemistry</td>
<td>148</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>150</td>
</tr>
<tr>
<td>Town Planning</td>
<td>151</td>
</tr>
<tr>
<td>Biotechnology</td>
<td>152</td>
</tr>
</tbody>
</table>

### Undergraduate Study

<table>
<thead>
<tr>
<th>Subject Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physics</td>
<td>90</td>
</tr>
<tr>
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<td>92</td>
</tr>
<tr>
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<td>93</td>
</tr>
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<td>94</td>
</tr>
<tr>
<td>Electrical Engineering and Computer Science</td>
<td>94</td>
</tr>
<tr>
<td>Mining Engineering</td>
<td>103</td>
</tr>
<tr>
<td>Civil Engineering</td>
<td>119</td>
</tr>
<tr>
<td>Mathematics</td>
<td>119</td>
</tr>
<tr>
<td>Accountancy</td>
<td>125</td>
</tr>
<tr>
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<td>132</td>
</tr>
<tr>
<td>Graduate Study</td>
<td>134</td>
</tr>
<tr>
<td>Accountancy</td>
<td>134</td>
</tr>
<tr>
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<td>134</td>
</tr>
<tr>
<td>Economics</td>
<td>134</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>134</td>
</tr>
<tr>
<td>Nuclear Engineering</td>
<td>141</td>
</tr>
<tr>
<td>Geography</td>
<td>141</td>
</tr>
<tr>
<td>Surveying</td>
<td>143</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>143</td>
</tr>
<tr>
<td>Chemical Engineering and Industrial Chemistry</td>
<td>148</td>
</tr>
</tbody>
</table>

### Graduate Study

<table>
<thead>
<tr>
<th>Subject Description</th>
<th>Page</th>
</tr>
</thead>
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<td>93</td>
</tr>
<tr>
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<td>94</td>
</tr>
<tr>
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<td>94</td>
</tr>
<tr>
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<td>103</td>
</tr>
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<td>119</td>
</tr>
<tr>
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<td>119</td>
</tr>
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<td>125</td>
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<td>132</td>
</tr>
<tr>
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<td>134</td>
</tr>
<tr>
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<td>134</td>
</tr>
<tr>
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<td>134</td>
</tr>
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<td>Economics</td>
<td>134</td>
</tr>
<tr>
<td>Industrial Engineering</td>
<td>134</td>
</tr>
<tr>
<td>Nuclear Engineering</td>
<td>141</td>
</tr>
<tr>
<td>Geography</td>
<td>141</td>
</tr>
<tr>
<td>Surveying</td>
<td>143</td>
</tr>
<tr>
<td>Biomedical Engineering</td>
<td>143</td>
</tr>
<tr>
<td>Chemical Engineering and Industrial Chemistry</td>
<td>148</td>
</tr>
<tr>
<td>Section</td>
<td></td>
</tr>
<tr>
<td>------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Anatomy</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Study</td>
<td>153</td>
</tr>
<tr>
<td>Pathology</td>
<td></td>
</tr>
<tr>
<td>Graduate Study</td>
<td>153</td>
</tr>
<tr>
<td>Physiology and Pharmacology</td>
<td></td>
</tr>
<tr>
<td>Undergraduate Study</td>
<td>153</td>
</tr>
<tr>
<td>Division of Postgraduate Extension Studies</td>
<td></td>
</tr>
<tr>
<td>Graduate Study</td>
<td>153</td>
</tr>
<tr>
<td>Financial Assistance to Students</td>
<td>155</td>
</tr>
<tr>
<td>Scholarships</td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>155</td>
</tr>
<tr>
<td>Graduate</td>
<td>157</td>
</tr>
<tr>
<td>Prizes</td>
<td></td>
</tr>
<tr>
<td>Undergraduate</td>
<td>161</td>
</tr>
<tr>
<td>Graduate</td>
<td>165</td>
</tr>
<tr>
<td>Staff</td>
<td></td>
</tr>
<tr>
<td>Faculty of Engineering</td>
<td>166</td>
</tr>
<tr>
<td>Broken Hill Division</td>
<td>174</td>
</tr>
</tbody>
</table>
General Information

To obtain the maximum benefit from your studies you should make an effort to learn what facilities the University offers, to investigate the best methods of study and to discover as much as possible about the course for which you are enrolled.

This Handbook has been specially designed as a detailed source of reference for you in all matters related to your Faculty. This General Information Section is intended to help you put the Faculty into perspective with the University as a whole, to introduce you to some of the services available to students and to note some of the most important rules and procedures.

For fuller details about some aspects of the University and its activities you might need to consult the University Calendar.

Note: All phone numbers below are University extension numbers. If you are outside the University, dial 663 0351 and ask for the extension or dial 662 – and then the extension number. This prefix should only be used when you are certain of the extension that you require. Callers using 662 cannot be transferred to any other number.

Some people who can help you

If you are experiencing difficulties in adjusting to the requirements of the University you will probably need advice. The best people to talk to on matters relating to progress in studies are your tutors and lecturers. If your problem lies outside this area there are many other people with specialized knowledge and skills who may be able to help you.

The Deputy Registrar (Student Services), Mr Peter O’Brien, and his Administrative Assistant, Mrs Anne Beaumont, are located on the first floor of the Chancellery. They will help those students who need advice and who have problems but who do not seem to be provided for by the other organizations and services mentioned. As well as dealing with general enquiries they are especially concerned with the problems of physically handicapped and disabled students. Enquire at room 148E, phone 2482.

The Assistant Registrar (Admissions and Examinations), Mr Jack Hill, is located on the ground floor of the Chancellery. General enquiries should be directed to 3715. For information regarding examinations, including examination timetables and clash of examinations, contact the Senior Administrative Officer, Mr John Grigg, phone 2143.
The Assistant Registrar (Student Records and Scholarships – Undergraduate and Postgraduate), Mr Graham Mayne is located on the ground floor of the Chancellery. For particular enquiries regarding illness and other matters affecting performance in examinations and assessment, academic statements, graduation ceremonies, prizes, release of examination results and variations to enrolment programs, phone 3711.

The Adviser for Prospective Students, Mrs Fay Lindsay, is located in the Chancellery and is available for personal interview. For an appointment phone 3453.

The Assistant Registrar (Careers and Employment), Mr Jack Foley, is located in the Chancellery. Enquiries should be directed to 3259.

The Off-campus Housing Officer, Mrs Judy Hay, is located in Room 148E in the Chancellery. For assistance in obtaining suitable lodgings phone 3260.

Student Loans enquiries should be directed to Mrs Judy Hay, Room 148E in the Chancellery, phone 3164.

The Student Health Unit is located in Hut E15b at the foot of Basser Steps. The Director is Dr Geoffrey Hansen. For medical aid phone 2679, 2678 or 2677.

The Student Counselling and Research Unit is located at the foot of Basser Steps. For assistance with educational or vocational problems ring 3681 or 3685 for an appointment.

The University Librarian is Mr Allan Horton. Library enquiries should be directed to 2048.

The Chaplaincy Centre is located in Hut E15a at the foot of Basser Steps. For spiritual counselling phone Anglican – 2684; Catholic – 2379; Greek Orthodox – 2683; Lutheran – 2683; Uniting Church – 2685.

The Students' Union is located on the second floor of Stage III of the University Union, where the SU President, Secretary-Treasurer, Education Vice-President, Welfare-Research Officer, and Director of Overseas Students are available to discuss any problems you might have.

Cashier’s Hours The University Cashier’s office is open from 9.30 am to 1.00 pm and from 2.00 pm to 4.30 pm, Monday to Friday. It is open for additional periods at the beginning of Session 1. Consult noticeboards for details.

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**Calendar of Dates**

### The Academic Year

The academic year is divided into two sessions, each containing 14 weeks for teaching. There is a recess of five weeks between the two sessions and there are short recesses of one week within each of the sessions. Session 1 commences on the first Monday of March.

#### 1982

**Faculties other than Medicine**

<table>
<thead>
<tr>
<th>Session 1</th>
<th>1 March to 9 May</th>
</tr>
</thead>
<tbody>
<tr>
<td>(14 weeks)</td>
<td>May Recess: 10 May to 16 May</td>
</tr>
<tr>
<td></td>
<td>17 May to 13 June</td>
</tr>
<tr>
<td>Examinations</td>
<td>Midyear Recess: 14 June to 18 July</td>
</tr>
<tr>
<td></td>
<td>15 June to 30 June</td>
</tr>
<tr>
<td>Session 2</td>
<td>19 July to 22 August</td>
</tr>
<tr>
<td>(14 weeks)</td>
<td>August Recess: 23 August to 29 August</td>
</tr>
<tr>
<td></td>
<td>30 August to 31 October</td>
</tr>
<tr>
<td></td>
<td>Study Recess: 1 November to 7 November</td>
</tr>
<tr>
<td>Examinations</td>
<td>8 November to 26 November</td>
</tr>
</tbody>
</table>

**Faculty of Medicine**

<table>
<thead>
<tr>
<th>First and Second Years</th>
<th>As for other faculties</th>
</tr>
</thead>
<tbody>
<tr>
<td>Third and Fourth Years</td>
<td>Term 1 (10 weeks) 26 January to 4 April</td>
</tr>
<tr>
<td></td>
<td>Term 2 (9 weeks) 13 April to 9 May</td>
</tr>
<tr>
<td></td>
<td>May Recess: 10 May to 16 May</td>
</tr>
<tr>
<td></td>
<td>17 May to 20 June</td>
</tr>
<tr>
<td></td>
<td>Term 3 (8 weeks) 26 June to 22 August</td>
</tr>
<tr>
<td></td>
<td>Term 4 (11 weeks) 30 August to 14 November</td>
</tr>
<tr>
<td>Fifth Year</td>
<td>Term 1 (8 weeks) 26 January to 21 March</td>
</tr>
<tr>
<td></td>
<td>Term 2 (8 weeks) 29 March to 23 May</td>
</tr>
<tr>
<td></td>
<td>Term 3 (8 weeks) 31 May to 25 July</td>
</tr>
<tr>
<td></td>
<td>Term 4 (8 weeks) 2 August to 26 September</td>
</tr>
<tr>
<td></td>
<td>Term 5 (8 weeks) 5 October to 28 November</td>
</tr>
</tbody>
</table>

**January**

<table>
<thead>
<tr>
<th>Friday 1</th>
<th>Friday 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>New Year’s Day – Public Holiday</td>
<td>Last day for acceptance of applications by Admissions Office for transfer to another undergraduate course within the University</td>
</tr>
</tbody>
</table>

<p>| Monday 4 | |
|----------| Last day for applications for review of results of annual examinations |</p>
<table>
<thead>
<tr>
<th>February</th>
<th>June</th>
<th>July</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday 1</td>
<td>Australia Day – Public Holiday</td>
<td>Publication of timetable for June/July examinations</td>
</tr>
<tr>
<td>Thursday 4</td>
<td>Enrolment period begins for new undergraduate students and undergraduate students repeating first year</td>
<td><strong>Session 1 ends</strong></td>
</tr>
<tr>
<td>Monday 15</td>
<td>Enrolment period begins for second and later year undergraduate students and graduate students enrolled in formal courses</td>
<td>Queen’s Birthday – Public Holiday</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Midyear Recess begins</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examinations begin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Examinations end</td>
</tr>
<tr>
<td>March</td>
<td></td>
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<tr>
<td>Monday 1</td>
<td><strong>Session 1 commences</strong></td>
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<td></td>
<td>Last day for undergraduate students who have completed requirements for pass degrees to advise the Registrar they are proceeding to an honours degree or do not wish to take out their degree for any other reason</td>
<td></td>
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<tr>
<td>Wednesday 10</td>
<td>List of graduands for April/May ceremonies and of 1981 prize-winners published in <em>The Sydney Morning Herald</em></td>
<td>Examination results mailed to students</td>
</tr>
<tr>
<td>Friday 12</td>
<td>Last day for acceptance of enrolment by new undergraduate students (late fee payable thereafter)</td>
<td>Examination results displayed on University noticeboards</td>
</tr>
<tr>
<td>Monday 15</td>
<td>Last day for notification of correction of details published in the press on 10 March concerning April/May graduation ceremonies</td>
<td>Students to amend enrolment programs following receipt of June examination results</td>
</tr>
<tr>
<td>Friday 28</td>
<td>Last day for acceptance of enrolment by undergraduate students re-enrolling in second and later years (late fee payable thereafter)</td>
<td><strong>Midyear Recess ends</strong></td>
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<td></td>
<td><strong>Session 2 begins</strong></td>
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<td></td>
<td></td>
<td>Last day for application for review of June examination results</td>
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<tr>
<td></td>
<td></td>
<td>Foundation Day (no classes held)</td>
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<td>Last day for students to discontinue without failure subjects which extend over the whole of academic year</td>
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<tr>
<td>April</td>
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<tr>
<td>Friday 9 to</td>
<td>Easter</td>
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<tr>
<td>Monday 12</td>
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<tr>
<td>Friday 16</td>
<td>Last day for undergraduate students to discontinue without failure subjects which extend over Session 1 only</td>
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<tr>
<td>Sunday 25</td>
<td>Anzac Day</td>
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<tr>
<td>Monday 26</td>
<td>Public Holiday</td>
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<tr>
<td>Tuesday 27</td>
<td>Confirmation of Enrolment forms despatched to all students</td>
<td></td>
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<tr>
<td>May</td>
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<tr>
<td>Wednesday 5</td>
<td>Last day for undergraduate students completing requirements for degrees or diplomas at the end of Session 1 to submit Application for Admission to Degree form</td>
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<td>Last day for acceptance of corrected Confirmation of Enrolment forms</td>
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<tr>
<td>Monday 10</td>
<td><strong>May Recess begins</strong></td>
<td></td>
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<tr>
<td>Thursday 13</td>
<td>Publication of provisional timetable for June/July examinations</td>
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<tr>
<td>Sunday 16</td>
<td><strong>May Recess ends</strong></td>
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<tr>
<td>Friday 21</td>
<td>Last day for students to advise of examination timetable clashes</td>
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October
Monday 4  Eight Hour Day – Public Holiday
Friday 8  Last day for students to advise of examination timetable clashes
Thursday 21  Publication of timetable for examinations
Sunday 31  Session 2 ends

November
Monday 1  Study Recess begins
Sunday 7  Study Recess ends
Monday 8  Examinations begin
Friday 26  Examinations end

December
Monday 13  Examination results mailed to students
Tuesday 14  Examination results displayed on University noticeboards
Monday 20  List of graduands in Medicine for February graduation ceremony published in The Sydney Morning Herald
Saturday 25  Christmas Day – Public Holiday
Sunday 26  Boxing Day – Public Holiday

Faculty of Medicine
First and
Second Years
Term 1 (10 weeks) 24 January to 3 April
Term 2 (9 weeks) 11 April to 15 May
May Recess: 16 May to 22 May
Term 3 (9 weeks) 27 June to 28 August
Term 4 (10 weeks) 5 September to 13 November

Third and Fourth Years
Term 1 (10 weeks) 24 January to 3 April
Term 2 (9 weeks) 11 April to 15 May
May Recess: 16 May to 22 May
Term 3 (9 weeks) 27 June to 28 August
Term 4 (10 weeks) 5 September to 13 November

Session 2 ends

Fifth Year
Term 1 (8 weeks) 24 January to 20 March
Term 2 (8 weeks) 28 March to 22 May
Term 3 (8 weeks) 30 May to 24 July
Term 4 (8 weeks) 1 August to 25 September
Term 5 (8 weeks) 4 October to 27 November

January
Monday 3  Public Holiday
Tuesday 4  Last day for applications for review of results of annual examinations
Friday 7  Last day for acceptance of applications by Admissions Office for transfer to another undergraduate course within the University
Monday 31  Australia Day – Public Holiday

February
Tuesday 8  Enrolment period begins for new undergraduate students and undergraduate students repeating first year
Monday 21  Enrolment period begins for second and later year undergraduate students and students enrolled in formal graduate courses

March
Monday 7  Session 1 begins – all courses except Medicine III, IV and V

April
Friday 1 to Monday 4  Easter – Public Holiday
Monday 25  Anzac Day – Public Holiday
General Information

Organization of the University

Rapid development has been characteristic of the University of New South Wales since it was first incorporated by an Act of Parliament in 1949, under the name of the New South Wales University of Technology.

In 1981 the University had 18,844 students and over 3,700 staff who worked in more than eighty buildings. These figures include staff and students at Broken Hill (W.S. and L.B. Robinson University College), Duntroon (the Faculty of Military Studies) and Jervis Bay.

The Chairman of the Council is the Chancellor, the Hon. Mr Justice Samuels.

The Professorial Board

The Professorial Board is one of the two chief academic units within the University and includes all the professors from the various faculties. It deliberates on all questions such as matriculation requirements, the content of courses, the arrangement of syllabuses, the appointment of examiners and the conditions for graduate degrees. Its recommendations on these and similar matters are presented to Council for its consideration and adoption.

Arms of the University of New South Wales

The arms of the University are reproduced on the front cover of this handbook. The arms were granted by the College of Heralds in London, on 3 March 1952, and the heraldic description is as follows:

'Argent on a Cross Gules a Lion passant guardant between four Mullets of eight points Or a Chief Sable charged with an open Book proper thereon the word SCIENTIA in letters also Sable.

'The lion and the four stars of the Southern Cross on the Cross of St George have reference to the State of New South Wales which brought the University into being; the open book with SCIENTIA across its page reminds us of its original purpose. Beneath the shield is the motto 'Manu et Mente', which is the motto of the Sydney Technical College, from which the University has developed. The motto is not an integral part of the Grant of Arms and could be changed at will; but it was the opinion of the University Council that the relationship with the parent institution should in some way be recorded.'

The Council

The chief governing body of the University is the Council which has the responsibility of making all major decisions regarding its policy, conduct and welfare.

The Council consists of 44 members from the State Parliament, industry and commerce, agriculture, the trade unions, professional bodies, the staff, the students and the graduates of the University.

The Council meets six times per year and its members also serve on special committees dealing with, for example, academic matters, finance, buildings and equipment, personnel matters, student affairs and public relations.

The Faculties/Boards of Study

The Dean, who is also a professor, is the executive head of the Faculty or Board of Study. Members of each Faculty or Board meet regularly to consider matters pertaining to their own areas of study and research, the result of their deliberations being then submitted to the Professorial Board.

The term 'faculty' is used in two distinct senses in the University. Sometimes it is used to refer to the group of schools comprising the faculty, and at others to the deliberative body of academic members of the Schools within the Faculty.

The eleven faculties are Applied Science, Architecture, Arts, Biological Sciences, Commerce, Engineering, Law, Medicine, Military Studies, Professional Studies and Science. In addition, the Board of Studies of the Australian Graduate School of Management (AGSM) and the Board of Studies in General Education fulfil a function similar to that of the faculties. The Board of Studies in Science and Mathematics, which was established to facilitate the joint academic administration of the Science and Mathematics degree course by the Faculties of Biological Sciences and Science, considers and reports to the Professorial Board on all matters relating to studies, lectures and examinations in the science and mathematics degree course.

The Schools

Once courses of study have been approved they come under the control of the individual schools (eg the School of Chemistry, the School of Mathematics). The head of the school in which you are studying is the person in this academic structure with whom you will be most directly concerned.
Executive Officers

As chief executive officer of the University, the Vice-Chancellor and Principal, Professor Rupert Myers, is charged with managing and supervising the administrative, financial, and other activities of the University.

He is assisted in this task by two Pro-Vice-Chancellors, Professor Ray Golding and Professor Rupert Vallentine, together with the Deans and the three heads of the administrative divisions.

Award of the University Medal

The University may award a bronze medal to undergraduate students who have achieved highly distinguished merit on completion of their final year.

Identification of Subjects by Numbers

For information concerning the identifying number of each subject taught in each Faculty as well as the full list of identifying numbers and subjects taught in the University, turn to the first page of the section Subject Descriptions. This list is also published in the Calendar.

General Administration

The administration of general matters within the University comes mainly within the province of the Registrar, Mr Ian Way, the Bursar, Mr Tom Daly, and the Property Manager Mr Peter Koller.

The Registrar’s Division is concerned chiefly with academic matters such as the admission of students, and the administration of examinations as well as the various student services (health, employment, amenities, and counselling).

The Bursar’s Division is concerned with the financial details of the day-to-day administration and matters to do with staff appointments, promotions, etc.

The Property Division is responsible for the building program and the ‘household’ services of the University (including electricity, telephones, cleaning, traffic and parking control and maintenance of buildings and grounds).

Textbook Lists

Textbook lists are no longer published in the Faculty handbooks. Separate lists are issued early in the year and are available at key points on the campus.

Students should allow quite a substantial sum for textbooks. This can vary from $250 to $600 per year depending on the course taken. These figures are based on the cost of new books. The Students’ Union operates a secondhand bookshop. Information about special equipment costs, accommodation charges and cost of subsistence on excursions, field work, etc. and for hospital residence (medical students) are available from individual schools.

Student Representation on Council and Faculties/Boards

Three members of the University Council may be students elected by students. All students who are not full-time members of staff are eligible to stand for a two-year term of office. The students who are elected to the Council are eligible for election to the Committees of Council.

Students proceeding to a degree or a graduate diploma may elect members for appointment by the Council to their Faculty/Board. Elections are for a one-year term of office.

Open Faculty/Board Meetings

If you wish you may attend a faculty/board meeting. You should seek advice at the office of the faculty whose meeting you wish to attend, as the faculties have their own rules for the conduct of open meetings.

Co-operative Bookshop

Membership is open to all students, on initial payment of a fee of $10, refundable when membership is terminated. Members receive an annual rebate on purchases of books.

General Studies Program

Almost all undergraduates in faculties other than Arts and Law are required to complete a General Studies program. The Department of General Studies within the Board of Studies in General Education publishes its own Handbook which is available free of charge. All enquiries about General Studies should be made to the General Studies Office, Room G56, Morven Brown Building, phone 3476.
The Kensington Colleges

There are seven residential colleges on campus. Each college offers accommodation in a distinctive environment which varies from college to college, as do facilities and fees. A brief description of each college is given below, and further information may be obtained directly from the individual colleges. In addition to basic residence fees, most colleges make minor additional charges for such items as registration fees, caution money or power charges. Intending students should lodge applications before the end of October in the year prior to the one in which they seek admission. Most colleges require a personal interview as part of the application procedure.

The Kensington Colleges

The Kensington Colleges comprise Basser College, Goldstein College and Philip Baxter College. They house 450 men and women students, as well as tutorial and administrative staff members. Fees are payable on a session basis. Apply in writing to the Master, Mr K. W. Bromham, PO Box 24, Kensington, NSW 2033.

International House

International House accommodates 154 students from Australia and up to thirty other countries. Preference is given to more senior undergraduates and graduate students. Apply in writing to the Warden, Emeritus Professor J. S. Ratcliffe, International House, PO Box 1, Kensington, NSW 2033.

New College

New College is an Anglican college and it provides accommodation (with all meals) for 220 graduates and undergraduates, without regard to race, religion, or sex. The College has its own resident tutors, and sponsors a wide range of sporting and social activities. Apply to Dr Stuart Barton Babbage, Master, New College, Anzac Parade, Kensington 2033 (telephone 662 6066).

Shalom College

Shalom College is a Jewish residential college. It provides accommodation for 86 men and women students. Non-resident membership is available to students who wish to avail themselves of the Kosher dining room and tutorial facilities. Fees are payable on a session basis. Conferences are catered for, particularly with Kosher requirements. Rates are available on application. Apply in writing to the Master, Dr S. Engelberg, Shalom College, the University of New South Wales, PO Box 1, Kensington, NSW 2033.

Warrane College

Warrane is a men's college catering for 200 students of all ages, backgrounds and beliefs. A comprehensive tutorial program is offered along with a wide range of activities, professional orientation, and opportunities to meet members of the University staff informally. Non-resident membership is available to male students who wish to participate in College activities and make use of its facilities. The activities of a spiritual nature conducted at Warrane have been entrusted to the Catholic association Opus Dei. Apply in writing to the Master, Dr J. F. Martins, Warrane College, PO Box 123, Kensington, NSW 2033.

Creston Residence

Creston Residence offers accommodation to 25 undergraduate and graduate women students. Activities and tutorials are open to non-resident students. The spiritual activities offered at Creston are entrusted to the Women's Section of Opus Dei. Enquiries: 36 High Street, Randwick 2031. Telephone (02) 398 5893.

Other Accommodation

Off-campus Accommodation

Students requiring other than College accommodation may contact the Housing Officer in the Chancellery, Room 148E for assistance in obtaining suitable accommodation in the way of rooms with cooking facilities, flats, houses, share flats etc. Extensive listings of all varieties of housing are kept up-to-date throughout the year and during vacations. Accommodation in the immediate vicinity of the University is not usually easy to find at short notice, and is expensive.

No appointment is necessary but there may be some delay in February and March. The Housing staff are always happy to discuss any aspect of accommodation.

Special pamphlets on accommodation, lists of estate agents and hints on house-hunting are available on request.

Associations, Clubs and Societies

The Sports Association

The Sports Association is a student organization within the University which caters for a variety of sports for both men and women. In December 1952 the University Council approved the establishment of the Sports Association, which then consisted of five clubs. As the University has grown the Association has expanded, and it now includes thirty-eight clubs.

The Association office is situated in Hut E15C near the foot of Basser Steps, and can be contacted on extension
The control of the Association is vested in the General Committee which includes delegates from all the clubs.

Membership is compulsory for all registered students, and the annual fee is $17. Membership is also open to all members of staff and graduates of the University on payment of an annual fee as prescribed in the By-Laws of the Association. All members are invited to take part in any of the activities arranged by the Association, and to make use of the University's sporting and recreational facilities.

The Association is affiliated with the Australian Universities Sports Association (AUSA) which is the controlling body for sport in all Australian universities.

School and Faculty Associations

Many schools and faculties have special clubs with interests in particular subject fields. Enquire at the relevant Faculty or School Office for information.

Australian Armed Services

The University maintains links with the Royal Australian Navy, the Australian Army Reserve and the Royal Australian Air Force, and opportunities exist for student participation in their activities. See the General Information section of the Faculty Handbooks for details.

Chaplaincy Centre

The University Chapel

The University provides a small chapel for the use of all faiths. In its temporary housing it is located in Hut E15a near the Chemistry Building. The chapel is available for services of worship by arrangement with the full-time chaplains. At other times it is available for private meditation to all members of the University.

Chaplains Service

A Chaplaincy Service is available within the University of New South Wales for the benefit of students and staff.

The Service offers fellowship, personal counselling and guidance, together with leadership in biblical and doctrinal studies and in worship. The Chaplains maintain close liaison with student religious societies.

The chaplains are located in Hut E15a at the foot of Basser steps, which also contains the temporary chapel.

Deputy Registrar (Student Services)

The Deputy Registrar (Student Services), Mr Peter O'Brien, and his Administrative Assistant, Mrs Anne Beaumont, are located on the first floor of the Chancellery.

They will help those students who have problems and need advice but who do not seem to be provided for by the other organizations and services mentioned. As well as dealing with general enquiries they are especially concerned with the problems of physically handicapped and disabled students.

All enquiries should be made either at room 148E or by telephoning extension 2482 (general enquiries).

Sport and Recreation Section

The Sport and Recreation Section seeks ways to encourage students and staff to include exercise as an essential part of their daily lives. It does this through Sports Clubs on a competitive basis and by offering physical recreation on a more casual basis to the University community.

The Section serves the Sports Association and its 38 constituent clubs and is responsible for the continuing management of the Physical Education and Recreation Centre at which recreational programs are available for both students and staff.

It makes bookings for use of sporting facilities including tennis courts and playing fields. The section is located in Hut E15c at the foot of Basser Steps. The various services may be contacted by phone on the following extensions: Recreation Program 3271; Grounds Bookings 2235; Sports Association 2673.

Physical Education and Recreation Centre

The Sport and Recreation Section provides a recreational program for students and staff at the Physical Education and Recreation Centre. The Centre consists of eight squash courts, a main building, and a 50-metre indoor heated swimming pool. The main building has a large gymnasium and practice rooms for fencing, table tennis, judo, weight-lifting, karate and jazz ballet, also a physical fitness testing room. The recreational program includes intramurals, teaching/coaching, camping. The Centre is located on the lower campus adjacent to High Street. The Supervisor at PERC may be contacted on extension 3271.
Student Counselling and Research Unit

The Student Counselling and Research Unit provides counselling services to students, prospective students, parents and other concerned persons.

The unit is located in the huts near the foot of Basser Steps (access from College Road or Engineering Road).

Appointments are offered throughout the academic year and during recesses between 8 am to 5 pm on week days (up to 7 pm on some evenings). A 'walk-in' service for short interviews is available between 9 am and 5 pm. Appointments may be made by phoning extension 3685 or 3681 between 8.30 am and 5.30 pm.

Counsellors offer assistance in planning, decision-making, problem solving, social and emotional development, and dealing with grievances. Group programs on such topics as study, tutorial and examination skills, stress management, communicating, and self-confidence are offered each session. Brochures are available from the receptionist.

Careers and Employment Section

The Careers and Employment Section provides careers advice and assistance in finding employment.

Assistance with careers and permanent employment opportunities includes: the regular mailing of a Job Vacancy Bulletin to registered students and graduates, a Library, and a Campus Interview Program in which final year students have the opportunity to speak to employers regarding employment prospects.

Assistance is also provided in obtaining course-related employment during long vacations as required by undergraduates in Engineering and Applied Science.

The Section is located in Undercroft Room LG05 in the Chancellery.

For further information, telephone as follows: careers and employment assistance 3259 or 3630; long vacation industrial training 2086.

Student Health Unit

A student health clinic and first aid centre is situated within the University. The medical service although therapeutic is not intended to replace private or community health services. Thus, where chronic or continuing conditions are revealed or suspected the student may be referred to a private practitioner or to an appropriate hospital. The health service is not responsible for fees incurred in these instances. The service is confidential and students are encouraged to attend for advice on matters pertaining to health.

The service is available to all enrolled students by appointment, free of charge, between 9 am and 5 pm Mondays to Fridays. For staff members, immunizations are available, and first aid service in the case of injury or illness on the campus.

The centre is located in Hut E15b on the northern side of the campus in College Road at the foot of the Basser Steps.

Appointments may be made by calling at the centre or by telephoning extension 2679, 2678 or 2677 during the above hours.

The Family Planning Association of NSW conducts clinics at the Student Health Unit and at the adjacent Prince of Wales Hospital which are available for both staff and students. Appointments may be made for the Student Health Unit clinic by telephoning 586 2833 or for the Prince of Wales Hospital clinics by telephoning 399 0111.

The Students' Union

The Students' Union was formed in 1952 as an organization, duly recognized by the University Council, to represent the student body and to provide a central organization for the administration of student activities. In the words of its constitution 'The Students' Union is formed for the purpose of advancing the interests of University men and women, facilitating their general scientific and technical education, and fostering a University spirit among them'.

The Students' Union affords a recognized means of communication between the student body and the University administration, and represents its members in all matters affecting their interests. It aims to promote the cultural, educational and recreational life of the University and to encourage a permanent interest among graduates in the life and progress of student activities within the University. The Students' Union also makes representations to government and other bodies outside the University on behalf of its members.

Membership of the Students' Union is compulsory for all registered students of the University and the annual subscription is $17* for full-time students and $13* for part-time students. All Alumni of the University are eligible for Life Membership.

The Students' Union is governed by a Council consisting in the main of elected student representatives from the various faculties of the University. There are also representatives of the University Council, Life Members, the Staff Association and the Sports Association. The Council is elected annually.

*These fees are at 1981 levels; they are subject to increase in 1982.
A full-time President, elected each year by popular ballot, directs the entire administration of the Students' Union and its activities, assisted by a Secretary-Treasurer.

Other officers are the Education Vice-President who works towards the implementation of Students' Union education policy; the Welfare-Research Officer concerned with helping students with problems they may encounter in the University; the Electronic Media Officer; and the Director of Overseas Students who deals with specific problems these students may encounter while in Australia.

The activities in which the Students' Union is involved include:

1. A casual employment service.
2. Organization of orientation for new students.
3. Organization of Foundation Day.
4. The University's two child care centres.
5. Publication of the student paper Tharunka.
6. A free legal service run by a qualified lawyer employed by the Students' Union Council.
7. SU Record Shop which offers discount records and tapes.
8. The Nuthouse which deals in bulk and health foods.
9. Secondhand Bookshop for cheap texts.
10. CASOC (Clubs and Societies on Campus) which provides money from the SU for affiliated clubs and societies on campus.
11. The sale of electronic calculators and accessories at discount rates.

The SU office is located on the Second Floor, Stage III, the Union.

The University Union

The University Union provides the facilities students, staff and graduates require in their daily University life and thus an opportunity for them to know and understand one another through associations outside the lecture room, the library and other places of work.

The Union is housed in three buildings near the entrance to the Kensington Campus from Anzac Parade. These are the Roundhouse, the Blockhouse and the Squarehouse. Membership of the Union is compulsory at $65* per year for all registered students and is open to all members of staff and graduates of the University.

The control of the Union is vested in the Board of Management whose Chief Executive Officer is the Warden.

The full range of facilities provided by the Union includes a cafeteria service and other dining facilities, a large shopping centre (including clothing shop and delicatessen); cloakroom; travel service; banking, pharmaceutical, optometrical and hairdressing facilities; showers; a graduates' lounge; common, games, reading, meeting, music, practice, craft and dark rooms. The Union also has shops on Campus which cater for student needs, including art materials and calculators. Photocopying, sign printing, and stencil cutting services are also available. The Union also sponsors special concerts (including lunchtime concerts) and conducts courses in many facets of the arts including weaving, photography, creative dance and yoga. Full information concerning courses is contained in a booklet obtainable from the Union's program department.

The University Union should not be confused with the Students' Union or Students' Representative Council as it is known in some other universities. This latter body has a representative function and is the instrument whereby student attitudes and opinions are crystallized and presented to the University and the community.

*This fee is at 1981 level; it is subject to increase in 1982.
Financial Assistance to Students

Tertiary Education Assistance Scheme
Under this scheme, which is financed by the Commonwealth Government, assistance is available for full-time study in approved courses, to students who are not bonded and who are permanent residents of Australia, subject to a means test on a non-competitive basis. The allowances paid are unlikely to be sufficient, even at the maximum rate, for all the living expenses of a student. Family help and/or incomes from vacation or spare-time work would also be needed.

Students in the following types of university courses are eligible for assistance:
- Undergraduate and graduate bachelor degree courses
- Graduate diplomas
- Approved combined bachelor degree courses
- Master's qualifying courses (one year)

The rates of allowance and conditions for eligibility are set out in a booklet obtainable from the Commonwealth Department of Education.

Tertiary students receiving an allowance, and prospective tertiary students, will be sent application forms in January 1982. Forms will also be available from the Admissions Section or the Careers and Employment Section, or from the Director, Department of Education, 59 Goulburn Street, Sydney, NSW 2000 (telephone 218 6800). Continuing students should submit applications as soon as examination results are available. New students should do so as soon as they are enrolled. All students should apply by 31 March 1982, otherwise benefits will not be paid for the earlier months of the year.

It is most important that students advise the TEAS office if at any time they change or discontinue their study programs, as their eligibility for benefits might be affected.

Other Financial Assistance
In addition to the Tertiary Education Assistance Scheme financed by the Australian Government the following forms of assistance are available:

1. Deferment of Payment of Fees: Deferments may be granted for a short period, usually one month, without the imposition of a late fee penalty, provided the deferment is requested prior to the due date for fee payments.

2. Short Term Cash Loans: Donations from various sources have made funds available for urgent cash loans not exceeding $100. These loans are normally repayable within one month.

3. Early in 1973 the Commonwealth Government made funds available to the University to provide loans to students in financial difficulty. The loans are to provide for living allowances and other approved expenses associated with attendance at university. Repayment usually commences after graduation or upon withdrawal from the course. Students are required to enter into a formal agreement with the University to repay the loan. The University is unable to provide from the fund amounts large enough for all or even a major part of the living expenses of a student.

From the same source students who are in extremely difficult financial circumstances may apply for assistance by way of a non-repayable grant. In order to qualify for a grant a student must generally show that the financial difficulty has arisen from exceptional misfortune. Grants are rarely made.

The University has also been the recipient of generous donations from the Arthur T. George Foundation, started by Sir Arthur George and his family, for the endowment of a student loan fund.

In all cases assistance is limited to students with reasonable academic records and whose financial circumstances warrant assistance.

Enquiries about all forms of financial assistance should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.

Financial Assistance to Aboriginal Students
Financial assistance is available to help Aboriginal students from the Commonwealth Government's Aboriginal Study Grant Scheme. Furthermore, the University may assist Aboriginal students with loans to meet some essential living expenses.

The University has also received a generous bequest from the estate of the late Alice Brooks Gange for the education of Australian aborigines within the University. The University is engaged in consultations with groups and individuals for advice on the most effective ways of using the funds.

All enquiries relating to these matters should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.

Fund for Physically Handicapped and Disabled Students
The University has a small fund (started by a generous gift from a member of staff who wishes to remain anonymous) available for projects of benefit to handicapped and disabled students. Enquiries should be made at the office of the Deputy Registrar (Student Services), Room 148E, in the Chancellery.

Rules and Procedures
The University, in common with other large organizations, has established rules and procedures which are designed for the benefit of all members of the University. In some
cases there are penalties (eg fines or exclusion from examinations) for non-compliance. Any student, who after reading the rules carefully, requires further information on their application should contact the office of the Admissions Section or the Registrar.

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**General Conduct**

The University has not considered it necessary to formulate a detailed code of rules relating to the general conduct of students. Enrolment as a student of the University, however, involves an undertaking to observe the regulations, by-laws and rules of the University, and to pay due regard to any instructions given by any officer of the University.

**Appeals**

Section 5(c) of Chapter III of the By-laws provides that 'Any person affected by a decision of any member of the Professorial Board (other than the Vice-Chancellor) in respect of breach of discipline or misconduct may appeal to the Vice-Chancellor, and in the case of disciplinary action by the Vice-Chancellor, whether on appeal or otherwise, to the Council'.

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**Admission and Enrolment**

The office of the Admissions Section, located in the Chancellery on the upper campus, provides information for students on admission requirements, undergraduate and graduate courses and enrolment procedures. Faculty handbooks and the Calendar may be purchased here. The office of the Admissions Section is open from 9 am to 5 pm Monday to Friday. During enrolment the office is also open for some part of the evening.

The office provides information about special admission, admission with advanced standing and admission on overseas qualifications. The office also receives applications from students who wish to transfer from one course to another, resume their studies after an absence of twelve months or more, or seek any concession in relation to a course in which they are enrolled. It is essential that the closing dates for lodgement of applications are adhered to. For further details see the section on Undergraduate and Graduate Enrolment Procedures and Fees.

Applications for admission to undergraduate courses from students who do not satisfy the requirements for admission (see section on Requirements for Admission) are referred by the Admissions Section to the Admissions Committee of the Professorial Board.

Students seeking to register as higher degree candidates should first consult the Head of the School in which they wish to register. An application is then lodged on a standard form and the Student Records—Postgraduate Section, after obtaining a recommendation from the Head of School, refers the application to the appropriate Faculty or Board of Studies Higher Degree Committee.

Details of the procedure to be followed by students seeking entry to first year undergraduate degree courses at the University may be obtained from the Admissions Office or the Universities and Colleges Admissions Centre.

An Adviser for Prospective Students, Mrs Fay Lindsay, is located in the Chancellery, and is available for personal interview with those who require additional information about the University.

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**First Year Entry**

Those seeking entry to first year courses in one or more of twenty-one tertiary institutions in the state including the three universities in the Sydney Metropolitan area (Macquarie University, the University of New South Wales and the University of Sydney) are required to lodge a single application form with the Universities and Colleges Admissions Centre, Challis House, 10 Martin Place, Sydney 2000 (GPO Box 7049, Sydney 2001). On the application form provision is made for applicants to indicate preferences for courses available in any one of the three universities and eighteen other tertiary institutions. Students are notified individually of the result of their applications and provided with information regarding the procedures to be followed in order to accept the offer of a place at this University.

Enrolment is completed at the Enrolment Bureau, University House, 221 Anzac Parade, Kensington.

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**Deferment of First Year Enrolment**

Students proceeding directly from school to University who have received an offer of a place may request deferment of enrolment for one year and will usually receive permission providing they do not enrol at another tertiary institution in that year.

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**Enrolment Procedures and Fees Schedules 1982**

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**1. Introduction**

All students, except those enrolling in graduate research degree courses (see sections 5. and 6. below), must lodge an authorized enrolment form with the Cashier either on the day the enrolling officer signs the form or on the day any required General Studies electives are approved.

All students, except those enrolling in graduate research degree courses and those exempted as set out in section 17. below, should on that day also either pay the required fees or lodge an enrolment voucher or other appropriate authority.

Such vouchers and authorities are generally issued by the NSW Department of Education and the NSW Public
Service. They are not always issued in time and students who expect to receive an enrolment voucher or other appropriate authority but have not done so must pay the fees and arrange a refund later. Such vouchers and authorities are not the responsibility of the University and their late receipt is not to be assumed as automatically exempting a student from the requirements of enrolling and paying fees.

If a student is unable to pay the fees the enrolment form must still be lodged with the Cashier and the student will be issued with a 'nil' receipt. The student is then indebted to the University and must pay the fees by the end of the second week of the session for which enrolment is being effected. Penalties apply if fees are paid after that time (see section 16. below) unless the student has obtained an extension of time in which to pay fees from the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellary). Such an application must be made before the fee is due. Payment may be made through the mail, in which case it is important that the student registration number be given accurately. Cash should not be sent through the mail.

2. New Undergraduate Enrolments

Persons who are applying for entry in 1982 must lodge an application for selection with the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1981.

Those who are selected will be required to complete enrolment at a specified time before the start of Session 1. Compulsory fees should be paid on the day.

In special circumstances, however, and provided class places are still available, students may be allowed to complete enrolment after the prescribed time.

Application forms and details of the application procedures may be obtained from the office of the Admissions Section.

3. Re-enrolment

See also sections 4., 6. and 7. below.

Students who are continuing courses (or returning after approved leave of absence) should enrol through the appropriate school in accordance with the procedures set out in the current Enrolment Procedures booklet, available from the Admissions Section and from School offices. Those who have completed part of a course and have been absent without leave need to apply for entry through the Universities and Colleges Admissions Centre, GPO Box 7049, Sydney 2001, by 1 October 1981.

4. Restrictions Upon Re-enrolling

Students who in 1981 have infringed the rules governing re-enrolment should not attempt to re-enrol in 1982 but should follow the written instructions they will receive from the Registrar.

5. New Research Students

Students enrolling for the first time in graduate research degree courses will receive an enrolment form by post. They have two weeks from the date of offer of registration in which to lodge the enrolment form with the Cashier and pay the appropriate fees. Completion of enrolment after this time will incur a penalty (see section 16. below).

6. Re-enrolling Research Students

Students enrolled in purely research degree programs will be re-enrolled each year and sent an account for any fees due, unless they have lodged a thesis or their registration has been cancelled or suspended.

7. Submission of Graduate Thesis or Project Report

Graduate students who at the commencement of Session 1 have completed all the work for a degree or diploma except for the submission of the relevant thesis or project report are required to re-enrol by the end of the second week of Session 1. Completion of enrolment after then will incur a penalty (see section 16. below) but students enrolled in purely research degree programs will be re-enrolled automatically (see section 6. above).

Information about possible fees exemption is set out in section 17. (10) below.

8. Enrolments by Miscellaneous Students

Enrolments by miscellaneous students are governed by the following rules:

1) Enrolment in a particular subject or subjects as a miscellaneous student – ie as a student not proceeding to a degree or diploma – may be permitted provided that in every case the Head of School offering the subject considers that the student will benefit from the enrolment and provided also that accommodation is available and that the enrolment does not prevent a place in that subject being available to a student proceeding to a degree or diploma.

2) A student who is under exclusion from any subject in the University may not be permitted to be enrolled as a miscellaneous student in that subject.

3) A student who is under exclusion from any course in the University may not be permitted to enrol in any subject which forms a compulsory component of the course from which the student is excluded.

4) A student who is subsequently admitted to a course of the University for which any subjects completed as a miscellaneous student form a part may receive standing for those subjects.
9. Final Dates for Completion of Enrolment

No enrolments for courses extending over the whole year or for Session 1 only will be accepted from new students after the end of the second week of Session 1 (12 March 1982) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned; no later year enrolments for courses extending over the whole year or for Session 1 only will be accepted after the end of the fourth week of Session 1 (25 March 1982) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned. No enrolments for courses in Session 2 only will be accepted after the end of the second week of Session 2 (30 July 1982) except with the express approval of the Deputy Registrar (Student Services) and the Heads of the Schools concerned.

10. University of New South Wales and University Union Membership Card

All students enrolled in degree or diploma courses or as miscellaneous students, except those exempt from fees under provisions of section 17, below, are issued with a University of New South Wales and University Union Membership Card. This card must be carried during attendance at the University and shown on official request.

The number appearing on the front of the card above the student's name is the student registration number used in the University's records. This number should be quoted in all correspondence.

The card must be presented when borrowing from the University libraries, when applying for travel concessions, and when notifying a change of address. It must also be presented when paying fees on re-enrolment each year when it will be made valid for the year and returned. Failure to present the card could result in inconvenience in completing re-enrolment.

Life members of the University Union and those exempt from payment of University Union fees, if enrolled in degree or diploma courses or miscellaneous students use the University's fees receipt in place of the card when applying for travel concessions and when notifying a change of address. The University Library issues a library borrowing card on production of the fees receipt.

A student who loses a card must notify the University Union as soon as possible.

New students are issued with cards on enrolment if eligible.

11. Payment of Fees

There are no fees for tuition but other fees and charges are payable. These include those charges raised to finance the expenses incurred in operating activities such as the University Union, the Students' Union, the Sports Association, and the Physical Education and Recreation Centre. Penalty payments are also incurred if a student fails to complete procedures as required. Charges may also be payable, sometimes in the form of a deposit, for the hiring of kits of equipment in certain subjects. Accommodation charges, costs of subsistence on excursions, field work, etc, and for hospital residence (medical students) are payable in appropriate circumstances.

12. Assisted Students

Scholarship holders and sponsored students who have not received an enrolment voucher or appropriate letter of authority from their sponsor at the time when they are enrolling should complete their enrolment by paying their own fees.

A refund of fees will be made when the enrolment voucher or letter of authority is subsequently lodged with the Cashier.

Those unable to pay their own fees in these circumstances can apply to the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellery) for an extension of time in which to pay. Such an application must be made before the fees are due.

13. Extension of Time

Any student who is unable to pay fees by the due date may apply to the office of the Deputy Registrar (Student Services) (Room 148E, the Chancellery) for an extension of time, which may be granted in extenuating circumstances. Such applications must be made before the due date.

14. Failure to Pay Fees and Other Debts

Any student who fails to pay prescribed fees or charges or is otherwise indebted to the University and who fails either to make a satisfactory settlement of his indebtedness upon receipt of due notice or to receive a special exemption ceases to be entitled to the use of University facilities. Such a student is not permitted to register for a further session, to attend classes or examinations, or to be granted any official credentials. In the case of a student enrolled for Session 1 only or for both Sessions 1 and 2 this disbarment applies if any portion of fees is outstanding after the end of the eighth week of Session 1 (23 April 1982). In the case of a student enrolled for Session 2 only this disbarment applies if any portion of fees is outstanding after the end of the sixth week of Session 2 (27 August 1982).

In special cases the Registrar may grant exemption from the disqualification referred to in the preceding paragraph upon receipt of a written statement setting out all relevant circumstances.

15. Fees

Tuition Fees

As a result of a decision of the Australian Government tuition fees have been re-introduced for some categories of students commencing second or higher degrees in 1982 and subsequent years. Details can be obtained from the office of the Admissions Section, telephone Mr J. Beauchamp on extension 3319.
16. Penalties

(1) Failure to lodge enrolment form according to enrolment procedure $20

(2) Payment of fees after end of second week of session $20

(3) Payment of fees after end of fourth week of session $40

Penalties (1) and (2) or (1) and (3) may accumulate.

17. Exemptions – Fees

Students often seek exemption from the fees for reasons other than those set out below. It is stressed that the fees charged are a contribution by students towards services and amenities for the University community (both now and in the future) and exemption from them cannot be claimed because a student is unable or unwilling to make use of some of those services or amenities.

(1) Life members of the University Union, the Sports Association, and Students' Union are exempt from the relevant fee or fees.

(2) Students enrolled in courses classified as External are exempt from all Student Activities Fees and the University Union Entrance Fee.

(3) Students enrolled in courses at the W. S. and L. B. Robinson University College and in the Faculty of Military Studies are exempt from the fees in section 15. above but shall pay such other fees and charges as the Council may from time to time determine.

(4) University Union fees and subscriptions may be waived by the Deputy Registrar (Student Services) for students enrolled in graduate courses in which the formal academic requirements are undertaken at a part of the University away from the Kensington campus.

(5) Students who while enrolled at and attending another university (or other tertiary institution as approved by the Vice-Chancellor) in a degree or diploma course are given approval to enrol at the University of New South Wales but only as miscellaneous students for subjects to be credited towards the degrees or diplomas for which they are enrolled elsewhere are exempt from all Student Activities Fees and the University Union Entrance Fee**.

(6) Undergraduate students of a recognized university outside Australia who attend the University of New South

*These fees are at 1981 levels; they are subject to increase in 1982.

†Students who consider themselves eligible for life membership of the University Union, the Sports Association, or the Students' Union, should make enquiries about the matter at the offices of those bodies, not at the office of the Deputy Registrar (Student Services) or at the Cashier's office.

**Institutions approved are: New South Wales Institute of Technology, Sydney College of Chiropractic and Alexander Mackie College of Advanced Education.
Wales with the permission of the Dean of the appropriate faculty and of the Head of the appropriate school or department to take part as miscellaneous students in an academic program relevant to their regular studies and approved by the authorities of their own institution are exempt from all Student Activities Fees and the University Union Entrance Fee.

(7) Graduate students not in attendance at the University and who are enrolling in a project only other than for the first time, are exempt from all Student Activities Fees.

(8) Graduate students resubmitting a thesis or project only are exempt from all Student Activities Fees.

(9) All Student Activities Fees, for one or more sessions, may be waived by the Deputy Registrar (Student Services) for students who are given formal permission to pursue their studies at another institution for one or more sessions.

(10) Graduate students who have completed all the work for a qualification at the commencement of Session 1, except for the submission of the relevant thesis or project report, may be exempted from the payment of Student Activities Fees by the Deputy Registrar (Student Services) on production of an appropriate statement signed by the relevant Supervisor or Head of School.

(11) Students enrolled in a session or sessions devoted entirely to training or experience away from the campus and its associated laboratories, hospitals, centres, institutes, and field stations are exempt from all Student Activities Fees for that session or sessions.

(12) Students whose registration is cancelled or suspended by the University shall receive refunds of fees paid in accordance with the provisions of section 18 (5) below except that a refund of one half of the fees shall be made if such cancellation or suspension takes place between the end of the fourth week of Session 1 and the end of the fourth week of Session 2.

18. Variations in Enrolment (including Withdrawal)

(1) Students wishing to vary an enrolment program must make application on the form available from the appropriate Course Authority.

(2) Students withdrawing from courses (and see also information about withdrawal from subjects below) are required to notify the Registrar in writing. In some cases such students will be entitled to fee refunds (see below).

(3) Enrolment in additional subjects

Applications for enrolment in additional subjects must be submitted by:

26 March 1982 for Session 1 only and whole year subjects;

13 August 1982 for Session 2 only subjects.

(4) Withdrawal from subjects

Applications to withdraw from subjects may be submitted throughout the year but applications lodged after the following dates will result in students being regarded as having failed the subjects concerned, except in special circumstances:

(a) for one session subjects, the end of the seventh week of that session (16 April or 3 September)

(b) for whole year subjects, the end of the second week of Session 2 (30 July).

(5) Withdrawal from Course – Refunds

Whether or not a student’s withdrawal entails academic penalties (covered in item (4) above) there are rules governing possible fee refunds in the case of complete withdrawal from a course, as follows:

(a) If notice of withdrawal from a course is received by the Registrar before the first day of Session 1, a refund of all fees paid will be made.

(b) If notice of withdrawal is received on or after the first day of Session 1:

(i) a partial refund of the University Union Entrance Fee will be made on the following bases: any person who has paid the entrance fee in any year and who withdraws from membership of the University Union after the commencement of Session 1 in the same year, or who does not renew his membership in the immediately succeeding year, may on written application to the Warden receive a refund of half the entrance fee paid.

(ii) if the notice of withdrawal is given before the end of the fourth week of Session 1 (26 March 1982) a full refund of other Student Activities Fees paid will be made; if notice is given before the end of the eighth week of Session 1 (23 April 1982) a refund of one half of the other Student Activities Fees paid will be made; thereafter no refund will be made except that provided for in (iii) below.

(iii) if a student’s enrolment in any year is for Session 2 only and the student gives notice of withdrawal prior to the end of the fourth week of Session 2 (13 August 1982) a full refund of Student Activities Fees paid (other than the University Union Entrance Fee for which see item (i) above) will be made; if notice is given before the end of the eighth week of Session 2 (10 September 1982) a refund of one half of the other Student Activities Fees paid will be made; thereafter no refund will be made.

(iv) The refunds mentioned in (ii) and (iii) above may be granted by the Deputy Registrar (Student Services) to a student unable to notify the Registrar in writing by the times required provided evidence is supplied that the student had ceased attendance by those times.

(6) Acknowledgements

The Registrar will acknowledge each application for a variation in enrolment (including withdrawals from subjects) as follows:
(a) variations lodged before the Friday of the seventh week of each session (16 April or 3 September) will be incorporated in the Confirmation of Enrolment Program notice forwarded to students on 26 April or 13 September as appropriate

(b) variations lodged after those dates will be acknowledged by letter

(c) withdrawals from a course are acknowledged individually whenever they are lodged.

(7) It is emphasized that failure to attend for any assessment procedure, or to lodge any material stipulated as part of an assessment procedure, in any subject in which a student is enrolled will be regarded as failure in that assessment procedure unless written approval to withdraw from the subject without failure has been obtained from the Registrar.

19. Exemption - Membership

The Registrar is empowered to grant exemption from membership of any or all of the University Union, the Students' Union and the Sports Association to students who have a genuine conscientious objection to such membership, subject to payment of the prescribed fees to the Miscellaneous Fund.

Private Overseas Students

Private overseas students should visit the Commonwealth Department of Education immediately on first arrival in Australia. The address is Sydney Plaza Building, 59 Goulburn Street, Sydney.

Private overseas students continuing their studies should confirm their enrolment with the Commonwealth Department of Education as early as possible each year in order to ensure that arrangements for the extension of their temporary entry permits can be made.

All private overseas students must advise the Department if they change their term residential address during the year. Telephone enquiries should be directed to (02) 218 8979, and country students may reverse the charge for the call.

Leave of Absence

Leave of absence from an undergraduate course of study may be granted to students other than those in the first year of a course. Leave of absence has generally been restricted to one year but in special circumstances two years have been granted.

To apply for such leave of absence, a letter should be submitted to the Registrar immediately following the release of annual examination results and must include the student's full name, registration number, the course and stage in which enrolled in the previous year and, most important, the reason why leave is being sought. The letter advising the result of the application will provide details about how to re-enrol.

Students who withdraw from the first year of their course are not granted leave of absence and must again apply for a place through the Universities and Colleges Admissions Centre.

Course Transfers

Students wishing to transfer from one course to another must complete and submit an application form, obtainable from the office of the Admissions Section, the Chancellery, by Friday 8 January 1982.

Students whose applications to transfer are successful, and who are transferring from one school to another are required to comply with the enrolment procedure laid down for new students with advanced standing. Students transferring from one course to another within the same school are required to attend the appropriate enrolment session for the course to which they have approval to transfer.

Students must present the approval to transfer to the enrolling officer, and those who have not received advice regarding their application to transfer before the date on which they are required to enrol should check with the office of the Admissions Section.

Students should also advise the enrolling officer in the school in which they were enrolled in 1981 of their intention to transfer.

Admission with Advanced Standing

Any person who makes application to register as a candidate for any degree or other award granted by the University may be admitted to the course of study leading to such degree or award with such standing on the basis of previous attainments as may be determined by the Professorial Board provided that:

1. the Board shall not grant such standing under these rules as is inconsistent with the rules governing progression to such degree or award as are operative at the time the application is determined;

2. where a student transfers from another university such student shall not in general be granted standing in this University which is superior to what he has in the University from which he transfers;
3. the standing granted by the Board in the case of any application based on any degree/s or other awards already held by the applicant, shall not be such as will permit the applicant to qualify for the degree or award for which he seeks to register without completing the courses of instruction and passing the examinations in at least those subjects comprising the latter half of the course, save that where such a program of studies would involve the applicant repeating courses of instruction in which the Board deems the applicant to have already qualified, the Board may prescribe an alternative program of studies in lieu thereof;

4. the standing granted by the Board in the case of any application based on partial completion of the requirements for any degree or other award of another institution shall not be such as will permit the applicant to qualify for the degree or award for which he seeks to register by satisfactory completion of a program of study deemed by the Board to be less than that required of a student in full-time attendance in the final year of the course in which the applicant seeks to register;

5. the standing granted by the Board in the case of any application based on the partial completion of the requirements for any degree or other award of the University may be such as to give full credit in the course to which the applicant seeks to transfer for work done in the course from which the student transfers.

Where the identity between the requirements for any award of the University already held and that of any other award of the University is such that the requirements outstanding for the second award are less than half the requirements of that award, then a student who merely completes such outstanding requirements shall not thereby be entitled to receive the second award but shall be entitled to receive a statement over the hand of the Registrar in appropriate terms.

Resumption of Courses

Students who have had a leave of absence for twelve months and wish to resume their course should follow the instructions about re-enrolling given in the letter granting leave of absence. If these instructions are not fully understood or have been lost, students should contact the office of the Admissions Section before November in the year preceding the one in which they wish to resume their course.

If students have not obtained leave of absence from their course and have not been enrolled in the course over the past twelve months or more, they should apply for admission to the course through the Universities and Colleges Admissions Centre before 1 October in the year preceding that in which they wish to resume studies.

Examinations

Examinations are held in June/July and in November/December.

Provisional timetables indicating the dates and times of examinations are posted on the University noticeboards.

Students must advise the Examinations Section (the Chancellery) of any clash in examinations. Final timetables indicating the dates, times, locations, and authorized aids are available for students two weeks before the end of each session.

Misreading of the timetable is not an acceptable excuse for failure to attend an examination.

Assessment of Course Progress

In the assessment of a student's progress in a course, consideration may be given to work in laboratory and class exercises and to any term or other tests given throughout the year as well as to the results of written examinations.

Examination Results

Grading of Passes

Passes will be graded as follows:

- **High Distinction**: an outstanding performance
- **Distinction**: a superior performance
- **Credit**: a good performance
- **Pass**: an acceptable level of performance
- **Satisfactory**: satisfactory completion of a subject for which graded passes are not available

Pass Conceded

A pass conceded may be granted to a student whose overall performance warrants consideration in a subject where the mark obtained is slightly below the standard required for a pass.

A pass conceded in a subject will normally allow progression to another subject for which the former subject is a prerequisite. In a particular subject, however, a subject authority may specify that a pass conceded is insufficient to meet a particular subject prerequisite. Such information is recorded in the appropriate faculty handbooks.

Availability of Results

Final examination results will be posted to a student's term address, or vacation address if requested. Forms requesting that results be posted to a vacation address are included in the examination timetable and change of address forms are obtainable at the Student Enquiry Counter, the Chancellery. Both forms can be accepted up to Friday 25 June for Session 1 results and Friday 26
November for Session 2 and whole year results. Results are also posted on School noticeboards and in the University Library. Results on noticeboards are listed by Student Registration Number.

No examination results are given by telephone.

Review of Results
A student may make application to the Registrar for the review of a result. The application form, accompanied by an appropriate fee, must be submitted not later than fifteen working days after the date of issue of the Notification of Result of Assessment form.

In reviewing a result, the subject authorities shall ensure that all components of the assessment have been assessed and a mark assigned.

A review of a result is not a detailed reassessment of a student’s standard of knowledge and understanding of, and skills in, the subject. It is rather a search for arithmetic error in arriving at the composite mark and for gross and obvious error in assignment of marks in components of the final composite mark.

When a change in grade is recommended, the application fee will be refunded by the Registrar.

Use of Linguistic Dictionaries
Students who believe that their performance in a subject, either during session or in an examination, has been adversely affected by sickness or any other reason should inform the Registrar and ask for special consideration in the determination of their standing.

Such requests should be made as soon as practicable after the occurrence. Applications made more than seven days after the final examination in a subject will only be considered in exceptional circumstances.

When submitting a request for special consideration students should provide all possible supporting evidence (e.g. medical certificates) together with their registration number and enrolment details.

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

1. Candidates are required to obey any instruction given by an examination supervisor for the proper conduct of the examination.

2. Candidates are required to be in their places in the examination room not less than fifteen minutes before the time for commencement.

3. No bag, writing paper, blotting paper, manuscript or book, other than a specified aid, is to be brought into the examination room.

4. Candidates shall not be admitted to an examination after thirty minutes from the time of commencement of the examination.

5. Candidates shall not be permitted to leave the examination room before the expiry of thirty minutes from the time the examination commences.

Physical Disabilities
Students suffering from a physical disability which puts them at a disadvantage in written examinations should advise Student Records (Ground Floor, the Chancellery) immediately their disability is known. If necessary, special arrangements will be made to meet the student's requirements.

Students who are permanently disabled and need the Examinations Section to make special arrangements for their examinations, should contact Student Records as soon as the final timetable becomes available.

Examinations Held Away from the Campus
Except in the case of students enrolled in external courses, examinations will not be permitted away from the campus unless the candidate is engaged on compulsory industrial training. Candidates must advise the Officer-in-charge, Examinations Section, immediately the details of the industrial training are known. Special forms for this purpose are available at the Student Enquiry Counter in the north wing of the Chancellery.

Arrival at Examinations
Examination Rooms will be open to students twenty-five minutes before the commencement of the examination. Candidates are requested to be in their places at least fifteen minutes before the commencement to hear announcements. The examination paper will be available for reading ten minutes before commencement.

Use of Electronic Calculators
Where the use of electronic calculators has been approved by a faculty or school, examiners may permit their use in examinations. Authorized electronic calculators are battery operated with the minimum operations of addition, subtraction, multiplication and division and are of a type in common use by university students. They are not provided by the University, although some schools may make them available in special circumstances.

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6. Candidates shall not be re-admitted to the examination room after they have left it unless, during the full period of their absence, they have been under approved supervision.

7. Candidates shall not by any improper means obtain, or endeavour to obtain, assistance in their work, give, or endeavour to give, assistance to any other candidate, or commit any breach of good order.

8. All answers must be in English unless otherwise stated. Foreign students who have the written approval of the Registrar may use standard linguistic dictionaries.

9. Smoking is not permitted during the course of examinations.

10. A candidate who commits any infringement of the rules governing examinations is liable to disqualification at the particular examination, to immediate expulsion from the examination room and to such further penalty as may be determined in accordance with the By-Laws.

Acknowledgement of Sources

Students are expected to acknowledge the source of ideas and expressions used in submitted work. To provide adequate documentation is not only an indication of academic honesty but also a courtesy enabling the marker to consult sources with ease. Failure to do so may constitute plagiarism, which is subject to a charge of academic misconduct.

Further Assessment

In special circumstances further assessment including assessment or further assessment on medical or compassionate grounds may be granted.

Further assessment may be given by the subject authority at his or her discretion at any time prior to the meeting of the relevant faculty assessment committee (normally the fourth week of the Mid-year Recess and the second week of December). Further assessment may also be awarded at the faculty assessment committee and students affected may need to be free to undertake that further assessment in the last week in the Mid-year Recess and in the period up to the end of the second week in January; students should consult their subject authority for details of further assessment immediately their results are known.

Restrictions upon Students Re-enrolling

The University Council has adopted the following rules governing re-enrolment with the object of requiring students with a record of failure to show cause why they should be allowed to re-enrol and retain valuable class places.

First Year Rule

1. Students enrolled in the first year of any undergraduate course of study in the University shall be required to show cause why they should be allowed to continue the course if they do not pass the minimum number of subjects, units or credits prescribed for this purpose by the relevant faculty or board of studies.

The prescribed minimum for each undergraduate course may be found in Schedule A* below; the schedule may be varied from time to time by the Professorial Board.

Repeated Failure Rule

2. Students shall be required to show cause why they should be allowed to repeat a subject which they have failed more than once. Where the subject is prescribed as part of the course they shall also be required to show cause why they should be allowed to continue that course.

General Rule

3. (1) Students shall be required to show cause why they should be allowed to repeat a subject they have failed more than once. Where the subject is prescribed as part of the course they shall also be required to show cause why they should be allowed to continue their course.

(2) Students shall be required to show cause why they should be allowed to continue their course if the assessment committee of the faculty or board of studies so decides on the basis of previous failures in that subject or in a related subject. Where the subject is prescribed as part of the course they shall also be required to show cause why they should be allowed to continue their course.

The Session-Unit System

4. (1) Students who infringe the provisions of Rules 1. or 2. at the end of Session 1 of any year will be allowed to repeat the subject(s) (if offered) and/or continue the course in Session 2 of that year, subject to the rules of progression in the course.

(2) Such students will be required to show cause at the end of the year, except that students who infringe Rule 2. at the end of Session 1, and repeat the subjects in question in Session 2, and pass them, will not be required to show cause on account of any such subjects.

Exemption from Rules by Faculties

5. (1) A faculty or board of studies examinations committee may, in special circumstances, exempt students from some or all of the provisions of Rules 1. and 2.

(2) Such students will not be required to show cause under such provisions and will be notified accordingly by the Registrar.

Showing Cause

6. (1) Students wishing to show cause must apply for special permission to re-enrol. Application should be made on the form available from the Registrar and must be

*See Schedule A immediately below.
lodged with the Registrar by the dates published annually by the Registrar. A late application may be accepted at the discretion of the University.

(2) Each application shall be considered by the Admissions and Re-enrolment Committee of the relevant faculty or board of studies which shall determine whether the cause shown is adequate to justify the granting of permission to re-enrol.

Appeal

7. (1) Students who are excluded by the Admissions and Re-enrolment Committee from a course and/or subject under the provisions of the Rules will have their applications to re-enrol reconsidered automatically by the Re-enrolment Committee of the Professorial Board.

(2) Students whose exclusion is upheld by the Re-enrolment Committee may appeal to an Appeal Committee constituted by Council for this purpose with the following membership:

A Pro-Vice-Chancellor, nominated by the Vice-Chancellor who shall be Chairman.

The Chairman of the Professorial Board, or if its chairman is unable to serve, a member of the Professorial Board, nominated by the Chairman of the Professorial Board, or when the Chairman of the Professorial Board is unable to make a nomination, nominated by the Vice-Chairman.

One of the category of members of the Council elected by the graduates of the University, nominated by the Vice-Chancellor.

The decision of the Committee shall be final.

(3) The notification to students of a decision which has been upheld by the Re-enrolment Committee of the Professorial Board to exclude them from re-enrolling in a course and/or subject shall indicate that they may appeal against that decision to the Appeal Committee. The appeal must be lodged with the Registrar within fourteen days of the date of notification of exclusion; in special circumstances a late appeal may be accepted at the discretion of the Chairman of the Appeal Committee. In lodging such an appeal with the Registrar students should provide a complete statement of all grounds on which the appeal is based.

(4) The Appeal Committee shall determine appeals after consideration of each appellant's academic record, application for special permission to re-enrol, and stated grounds of appeal. In particular circumstances, the Appeal Committee may require students to appear in person.

Exclusion

8. (1) Students who are required to show cause under the provisions of Rules 1, or 3, and either do not attempt to show cause or do not receive special permission to re-enrol from the Admissions and Re-enrolment Committee (or the Re-enrolment Committee on appeal) shall be excluded, for a period not in excess of two years, from re-enrolling in the subjects and courses on account of which they were required to show cause. Where the subjects failed are prescribed as part of any other course (or courses) they shall not be allowed to enrol in any such course.

(2) Students required to show cause under the provisions of Rule 2, who either do not attempt to show cause or do not receive special permission to re-enrol from the Admissions and Re-enrolment Committee (or the Re-enrolment Committee on appeal) shall be excluded, for a period not in excess of two years, from re-enrolling in any subject they have failed twice. Where the subjects failed are prescribed as part of a course they shall also be excluded from that course. Where the subjects failed are prescribed as part of any other course (or courses) they shall not be allowed to enrol in any such course.

Re-admission after Exclusion

9. (1) Excluded students may apply for re-admission after the period of exclusion has expired.

(2) (a) Applications for re-admission to a course should be made to the Universities and Colleges Admissions Centre before the closing date for normal applications in the year prior to that in which re-admission is sought. Such applications will be considered by the Admissions and Re-enrolment Committee of the relevant faculty or board of studies.

(b) Applications for re-admission to a subject should be made to the Registrar before 30 November in the year prior to that in which re-admission is sought. Such applications will be considered by the relevant subject authority.

(3) Applications should include evidence that the circumstances which were deemed to operate against satisfactory performance at the time of exclusion are no longer operative or are reduced in intensity and/or evidence of action taken (including enrolment in course/s) to improve capacity to resume studies.

(4) Applications for re-admission to a course or subject that are unsuccessful (see 9. (2) (a), (b) respectively) will be reconsidered automatically by the Re-enrolment Committee of the Professorial Board. The decision of the Re-enrolment Committee will be final.

10. Students who fail a subject at the examinations in any year or session and re-enrol in the same course in the following year or session must include in their programs of studies for that year or session the subject which they failed. This requirement will not be applicable if the subject is not offered the following year or session, is not a compulsory component of a particular course, or if there is some other cause which is acceptable to the Professorial Board for not immediately repeating the failed subject.

Restrictions and Definitions

11. (1) These rules do not apply to students enrolled in programs leading to a higher degree or graduate diploma.
(2) A subject is defined as a unit of instruction identified by a distinctive subject number.

**Schedule A**

(See First Year Rule 1, above)

Where the minimum requirement is half the program, this is defined as half the sum of the unit values of all the subjects in the program where the unit value for each subject in a course is defined as follows:

<table>
<thead>
<tr>
<th>Faculty/Board of Studies</th>
<th>Minimum Requirement</th>
<th>Course</th>
<th>Unit Values (UV)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Science</td>
<td>Half the program</td>
<td>3000-3220 One-session subjects: UV 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4190-4220 Two-session subjects: UV 2</td>
<td></td>
</tr>
<tr>
<td>Architecture</td>
<td>Half the program</td>
<td>3270, 3330 Elective subjects: UV 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3310-3320 All other subjects: appropriate UV corresponding to credit points*</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3360-3380 Elective subjects: UV 0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>All other subjects: UV equal to the allocated hours*</td>
<td></td>
</tr>
<tr>
<td>Arts</td>
<td>18 first level credit points</td>
<td>3400, 3410</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>2 subjects</td>
<td>3430 (or their Science unit or Arts credit-point equivalent)</td>
<td></td>
</tr>
<tr>
<td>Commerce</td>
<td>Three subjects</td>
<td>3490-3595 FT in both sessions</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3490-3595 PT in either session</td>
<td></td>
</tr>
<tr>
<td>Engineering</td>
<td>Half the program</td>
<td>3600-3750 One-session subjects: UV 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3600-3750 Two-session subjects: UV 2</td>
<td></td>
</tr>
<tr>
<td>Law</td>
<td>Half the program</td>
<td>4710-4790 One-section subjects: UV 1</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4710-4790 Two-session subjects: UV 2</td>
<td></td>
</tr>
</tbody>
</table>

**Admission to Degree or Diploma**

Students whose current program will enable them to complete all requirements for the degree or diploma, including industrial training where necessary, should lodge with the Registrar the form Application for Admission to Degree/Diploma and return it to the Registrar by the second Monday in May for the October ceremonies, and the first Tuesday in October for all other ceremonies. The forms are available from the Student Enquiry Counter in the north wing of the Chancellery.

Students who have indicated on their enrolment form that they are potential graduands are forwarded an application form with their Enrolment Details form in September (or, in the case of students who expect to satisfy requirements at

*For details see the appropriate Faculty Handbooks.*
Attendance at Classes

Students are expected to be regular and punctual in attendance at all classes in the subjects in which they are enrolled. All applications for exemption from attendance at classes of any kind must be made in writing to the Registrar.

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

Absence from Classes

Explanations of absences from classes, or requests for permission to be absent from forthcoming classes, should be addressed to the Registrar and, where applicable, should be accompanied by a medical certificate. If examinations or other forms of assessment have been missed, this should be stated in the application.

If students attend less than eighty per cent of their possible classes they may be refused final assessment.

Release of Information to Third Parties

The University treats results of assessment and information it receives from a student as confidential and will not reveal such information to third parties without the permission of the student except at the discretion of senior officers in circumstances considered of benefit to the student and when it is either impossible or impracticable to gain the student's prior permission. This happens rarely. This policy is considered so important that it often involves officers of the University in very difficult situations, for example, when they must refuse to reveal the address of a student to parents or other relatives.

In spite of the policy, all students should be aware that students' addresses are eagerly sought by various commercial agents and that subterfuges of various kinds can be used to obtain them. From time to time, for example, people claiming to be from the University telephone students or their families and ask for information (usually another student's address) which is often given, unsuspectingly. There is evidence that this is a technique used by some commercial agents.

It would be generally helpful if students (and their families and friends) are cautious in revealing information, making it a practice to ask the name, position, and telephone extension of any caller claiming to be from the University and, if suspicious, returning the call to the extension given.

Change of Address

The Student Records and Scholarships Office of the Registrar's Division should be notified as soon as possible of any change of address. Failure to do this could lead to important correspondence (including results of assessment) going astray. The University cannot accept responsibility if official communications fail to reach students who have not given notice of their change of address.

Student Records

Confirmation of Enrolment Program notices are sent to all students on 26 April and 13 September. It is not necessary to return these forms unless any of the information recorded is incorrect. Amended forms must be returned to the Student Records and Scholarships Office within fourteen days. Amendments notified after the closing date will not be accepted unless exceptional circumstances exist and approval is obtained from the Registrar. Amended forms returned to the Registrar will be acknowledged in writing within fourteen days.

Change of Address
Address Advice Forms are available at Faculty and School offices and from the Student Enquiry Counter in the north wing of the Chancellery.

All communications from the University will be sent to the Session or Term address except when arrangements are made otherwise in the case of results of assessment (see Examinations: Availability of Results, earlier in this section). Change of Address Advice forms will be accepted up to Friday 26 November, except for final-year students wishing to change their Application for Admission for Degree/Diploma form. Changes to this form will be accepted up to a date four weeks before the student's graduation ceremony.

Ownership of Students' Work

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

Further Information

Lost Property

All enquiries concerning lost property should be made to the Superintendent on extension 3892 or to the Lost Property Office at the Union.

The Calendar

Please consult the Calendar for a more detailed account of the information contained in this section.

Vice-Chancellor's Official Welcome to New Students

All students initially enrolling in the University are officially welcomed by the Vice-Chancellor and Principal at the following times:

Full-time Students
In the Faculties of Architecture, Arts, Biological Sciences, Commerce, Law:
Thursday 25 February 1982
11 am in the Clancy Auditorium

In the Faculties of Applied Science, Engineering, Medicine, Professional Studies, Science, and the Board of Studies in Science and Mathematics:
Friday 26 February 1982
11 am in the Clancy Auditorium

Part-time Students
All courses:
Thursday 25 February 1982
6.30 pm in the Clancy Auditorium

Meeting for Parents of New Students

Friday 26 February 1982
7.30 pm in the Clancy Auditorium

Academic Dress

Information about the University's academic dress requirements may be obtained from the Alumni and Ceremonials Section, Room 148E, the Chancellery (phone extension 2998).
Foreword

This handbook aims to provide information concerning the requirements for admission, enrolment and conditions for the award of degrees and diplomas in the Faculty together with descriptions of the subjects available. It is important that each student in the Faculty becomes well acquainted with the information presented here. In addition to this Handbook, pamphlets and brochures issued in conjunction with the enrolment period and Orientation Week are available. These should be consulted, together with the University Calendar, for further information on problems associated with courses.

The Faculty of Engineering Handbook

The Faculty of Science, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying and the Centre for Biomedical Engineering. In addition, the Faculty of Engineering has joined with the Faculty of Applied Science in establishing the Centre for Remote Sensing.

The Faculty of Engineering

The Faculty consists of five Schools: Civil Engineering, Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying and the Centre for Biomedical Engineering. In addition, the Faculty of Engineering has joined with the Faculty of Applied Science in establishing the Centre for Remote Sensing.

School of Civil Engineering

The School of Civil Engineering consists of five departments, Water Engineering, Civil Engineering Materials, Structural Engineering, Engineering Construction and Management and Transport Engineering. The School conducts both part-time and full-time undergraduate courses in Civil Engineering. In addition, the School conducts graduate courses and carries out graduate research programs in many fields.

The Department of Water Engineering encompasses the fields of Hydraulics, Hydrology, Water Resources and Public Health Engineering. The Public Health Engineering Laboratory is located at Kensington and there is a pilot scale laboratory at Randwick for research and teaching. The Hydrology research centre is also at Kensington, but a substantial amount of investigation is carried out in the field. The Water Research Laboratory is located at Manly Vale and is the centre for instruction and research in hydraulics.

The Department of Civil Engineering Materials includes the fields of Soil Mechanics, Rock Mechanics, Concrete Technology, Plastics and Timber, Metals and Welding Technology, Pavement Engineering, and Continuum and Statistical Mechanics. The Materials Laboratories are located at Kensington.

The Department of Structural Engineering covers the fields of Structural Analysis, Structural Design, Stress Analysis and Solid Mechanics. The Model Structures, Experimental Stress Analysis and Structural Dynamics Laboratories are at Kensington. The Structural Testing Laboratory is at King Street, Randwick.

The Department of Engineering Construction and Management is responsible for the fields of Civil Engineering Systems, Engineering Economy, Project Planning and Management and Civil Engineering Construction.

The Department of Transport Engineering is concerned with the planning, design, construction and operation of transport systems by the application of engineering techniques, statistical analysis, land use and transport modelling, economic evaluations and environmental impact studies.
The School of Electrical Engineering and Computer Science comprises five departments — Communications, Computer Science, Electric Power Engineering, Solid State Electronics, and Systems and Control Engineering.

Special laboratories are equipped for work in the areas of Microelectronics, Microwaves, Digital Systems, Power Systems, Computer Control, Machines and Acoustics. A Measurements Laboratory provides a calibrating service under certificate from the National Association of Testing Authorities.

The School offers undergraduate courses leading to the award of the degree of Bachelor of Engineering (normally four years full-time) and the award of the degree of Bachelor of Science (Engineering) (normally six years part-time). Students have considerable choice of subjects in the latter half of the courses so they may concentrate, if desired, on one of the main streams of modern electrical engineering, namely electronics (including micro-electronics and communications), electric energy, or computers and systems.

A major in Computer Science is available in the three year BSc program in the Faculty of Science. There are also combined courses (normally five years full-time) which lead to the award of two degrees (BE and BSc, or BE and BA).

In addition to the supervision of programs of advanced study and research for candidates undertaking a research degree leading to the award of the degree of Master of Engineering, Master of Science or Doctor of Philosophy, the School offers formal graduate courses leading to the award of the degree of Master of Engineering Science or a graduate diploma in Engineering Developments.

Undergraduate courses leading to the award of the degree of Bachelor of Engineering are offered in Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture. These courses may be taken either on a full-time basis, normally over four years or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to approval by the Head of School.

The first two years of the degree, taken full-time, or the first three years, taken part-time, are common to all four courses within the School. Thus a final decision on the discipline to be followed need not be made until the end of Year 2 for full-time and the end of Year 3 for part-time students.

The School continues to offer the later stages of six year part-time courses leading to the award of the degree of Bachelor of Science (Engineering) in the same four fields as offered for the BE degree course, though no new enrolments into these courses are now accepted.

Formal graduate courses of study, leading to the award of the degree of Master of Engineering Science or to the award of a Graduate Diploma in Engineering Developments, are available. The areas of specialization cover the major fields of Mechanical and Industrial Engineering.


Undergraduates who are interested in working for a research degree should consult the Head of School towards the end of their final year. Advice will be given to all students during their third year so that each can select the best possible combination of final year elective subjects.

The School of Nuclear Engineering in the University of New South Wales was established in 1961. The School presently operates at the graduate level in the Faculty of Engineering. A fourth year undergraduate subject in Nuclear Power Technology is provided as an elective for other Schools (23.051 Nuclear Power Technology).
In addition to the supervision of programs of advanced study and research for candidates undertaking a research degree leading to the award of Master of Engineering, Master of Science or Doctor of Philosophy, the School offers a formal graduate course leading to the award of the degree of Master of Engineering Science. This formal course aims specifically at the education of engineers for the detailed understanding, analysis and assessment of nuclear reactors and nuclear power systems. Particular attention is given to the mathematical, numerical and computational techniques which are relevant to nuclear engineering.

Special research interests in the School include the general field of fluctuation phenomena and noise in nuclear reactors, the coupled thermomechanical, fluid dynamics and nuclear aspects of reactor fuel elements and coolant channels, and the subject of reactor utilization and reactor strategy.

Special digital and analogue equipment for the analysis and recording of random signals has been acquired for experimental noise research. Through the Australian Institute of Nuclear Science and Engineering, the special facilities of the Australian Atomic Energy Commission’s Research Establishment at Lucas Heights can be made available for research purposes. Close personal contact is maintained between members of the School and the Nuclear Technology Division at Lucas Heights.

The School of Surveying consists of three Departments: Geodesy; Photogrammetry, including land studies and cartography; and Surveying, including astronomy and computations. It offers a full-time course of four years duration leading to the degree of Bachelor of Surveying. Alternatively, the course may be taken in a sandwich form in which a student may, after completing the first year of the course on a full-time basis, alternate his or her studies with periods of employment by taking leaves of absence of up to two consecutive sessions at a time thereafter. The course taken in this form requires a maximum period of seven years. The part-time course is no longer available.

The School also offers a full-time course of four years’ duration leading to the degree of Bachelor of Surveying Science. It is designed to give an interested student the opportunity to obtain greater depth as an undergraduate in one or more of the several disciplines associated with surveying: land development, cartographic science, geodesy and geophysics, environmental studies, remote sensing and photogrammetry.

The graduate courses offered are Master of Surveying Science and the Graduate Diploma in Surveying. The research degrees available are the Master of Surveying and Doctor of Philosophy.

The Centre was established in 1976 as an interdisciplinary unit to promote and co-ordinate biomedical engineering studies and research being conducted by a number of schools within the University and teaching hospitals. Biomedical engineering involves the application of engineering techniques to biomedical problems with particular emphasis on clinical medicine.

The Centre offers graduate programs leading to the award of the degree of Master of Biomedical Engineering and the degree of Doctor of Philosophy. The Master’s degree is obtained primarily through course work but includes a research project which is supervised in one of the Centre’s associated laboratories, either on campus or in affiliated teaching hospitals. The doctorate is primarily a research degree which normally involves some formal course work.
The MBiomedE degree course is designed to cater for students with either a medical or engineering/science background and involves eighteen months of full-time study. Part-time students are also catered for. Initially, students with a medical background study basic engineering subjects such as mathematics, mechanics, electronics and computing, whilst students with a non-medical background take courses in biology, physiology, anatomy, pathology and biochemistry. At a later stage, students from both backgrounds choose electives from biomechanics, biophysics, biomaterials, medical instrumentation and mass transfer in medicine, as well as undertaking a research project.

Centre for Remote Sensing

The Centre was established in 1981 as a joint enterprise of the Faculties of Engineering and Applied Science to promote and co-ordinate remote sensing studies and research being conducted by various schools within the University. Remote sensing is the science of obtaining information about the earth’s surface (in particular) using electromagnetic imaging systems mounted on aircraft and space platforms.

The Centre offers graduate programs leading to the award of the degree of Master of Engineering Science or Master of Applied Science and supervision for the degree of Doctor of Philosophy. The Masters' programs encompass the fundamentals of remote sensing and remote sensing systems, ground investigations, concepts of data processing and pattern recognition, numerical analysis of data and information extraction leading to specific application studies. They are organized around a group of compulsory subjects, elective subjects and a project or research project which is supervised in one of the schools associated with the Centre.

Students from a wide variety of backgrounds can undertake the programs on a one year full-time or two year part-time basis and these may include engineering, geography, geology, surveying, planning, biology and agricultural or environmental sciences.

Faculty of Applied Science

Courses in Chemical Engineering, Ceramic Engineering, Metallurgy, Metallurgical Process Engineering, Mining Engineering and Textile Engineering are taught by the Faculty of Applied Science. For further information on these courses students should consult the Calendar and Faculty of Applied Science Handbook.
Message from the Dean and the Chairman

A great deal of discussion has taken place within the Faculty in recent years concerning the type of education appropriate for an engineer and surveyor. Central to this discussion are the basic objectives which are implicit in the various engineering and surveying courses. These are to impart to and foster within its students the following:

- Technical and scientific and creative skills required to solve all aspects of engineering problems.  
- An understanding of human interaction with the environment, so that the impact of engineering activity can be assessed.
- The ability to direct and manage engineering activities.
- The ability to communicate, with other members of the profession, with industrial personnel, administrators, and with members of the public.
- The desire and ability for continuing self-education and reappraisal of current practice, including the ability to innovate new ideas and practices.
- The ability to evaluate independently and to criticise constructively their own work and the work of other engineers.

We hope to do much more than merely impart a body of knowledge to our graduates. Appropriate attitudes and skills for professional engineers operating into the twenty-first century must also be developed. Technology has come under increasing criticism from other sectors of society. It is no longer accepted that advances in technology are necessarily synonymous with the betterment of society, and future engineers must be prepared not only to take account of the ramifications of their work, but also to vindicate them to an increasingly doubtful public.

It is also important for you, as a student, to join in the development of yourself as a professional engineer. Engineering is a co-operative profession where teamwork is very important. Whilst at university you should take as many opportunities as you can to join in the activities which help to develop the whole person. Student clubs and professional institutions provide many opportunities for gaining knowledge and experience which will be valuable in your work as an engineer.
The staff and students collectively create an atmosphere of scholarship and learning. Staff are involved in research as well as in teaching. This research is vital if the quality of teaching is to be kept at a high intellectual standard. In addition the interested student will find a very wide range of research activities. The common thread, however, will be the engineering method which is applied.

Students should take steps to ensure that the staff are fully aware of their problems and attitudes. There are committees in the schools which are concerned with student matters. The faculty has student representation on its education committee, the executive committee and faculty. We seek for membership of these committees articulate students who are able to assist in the development of a true university spirit of learning and enquiry.

N. L. Svensson  
Dean  
*Faculty of Engineering*

C. A. Stapleton  
Chairman  
*Faculty of Engineering*
Faculty Information

Who to Contact

If you require advice about enrolment, degree requirements, progression within courses, subject content and requirements, contact the appropriate school representative listed below:

School of Civil Engineering: Mr R. W. Prior, Room 406, School of Civil Engineering

School of Electrical Engineering and Computer Science: Associate Professor C. A. Stapleton, Room G6, or Ms R. C. Horwood, School Office, School of Electrical Engineering and Computer Science

School of Mechanical & Industrial Engineering: Associate Professor J. Y. Harrison, Room 105, or Mr G. Dusan, Room 107, School of Mechanical & Industrial Engineering

School of Nuclear Engineering: Professor J. J. Thompson, Room 324AB, Electrical Engineering Building

School of Surveying: Mr J. V. Fonseka, School Office, Room 529, Geography & Surveying Building

Centre for Biomedical Engineering: Associate Professor P. C. Farrell, 34-36 Botany Street, Randwick, NSW 2031

Centre for Remote Sensing: Dr J. A. Richards, Room 338, School of Electrical Engineering and Computer Science.

Important: As changes may be made to information provided in this handbook, students should frequently consult the noticeboards of the schools and the official noticeboards of the University.

Faculty of Engineering Enrolment Procedures

All students re-enrolling in 1982 or enrolling in graduate courses should obtain a copy of the free booklet Enrolment Procedures 1982 available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Faculty of Engineering Library Facilities

Although any of the university libraries may meet specific needs, the staff and students of the Faculty of Engineering are served mainly by the Physical Sciences Library and the Undergraduate Library.

The Physical Sciences Library

This library situated on Levels 6 and 7 of the Library tower, caters for the information needs of staff, graduate students and
senior undergraduate students in the areas of pure and applied science, engineering and architecture. The library’s collection of books, serials and microforms bears the prefix ‘P’ and details of each item are included in the central monograph and serials catalogues. In addition, there is a map collection on Level 6. Journals with the prefix ‘PJ’ may not be borrowed. Trained staff are available at all times to assist readers with their enquiries.

Physical Sciences Librarian  Marian Bate

The Undergraduate Library

This library caters for the library needs of first and second year students and other groups where large numbers require mass teaching.

The Undergraduate Library provides a reader education program and reader assistance service aimed at teaching students the basic principles of finding information. Services of particular interest to undergraduates and academic staff are:

- The Open Reserve Section, housing books and other material which are required reading.
- The Audio Visual Section, containing cassette tapes, mainly lectures and other spoken word material. The Audio Visual Section has wired study carrels and cassette players for student use.

Undergraduate Librarian  Pat Howard

Location of Laboratories outside Kensington Campus

Randwick
The Department of Transport Engineering, the Water and Pollution Control Laboratory and the Structures Laboratory of the School of Civil Engineering occupy buildings on the site of the old Tramway Depot at King Street, Randwick.

Manly Vale
The Water Research Laboratory of the School of Civil Engineering is located at King Street, Manly Vale.

Student Clubs and Societies

Students have the opportunity of joining a wide range of clubs and societies. Many of these are affiliated with the Students’ Union. There are numerous religious, social and cultural clubs and also many sporting clubs which are affiliated with the Sports Association.

Clubs and societies seeking to use the name of the University in their title, or seeking University recognition, must submit their constitutions either to the Students’ Union or the Sports Association if they wish to be affiliated with either of these bodies, or to the Registrar for approval by the University Council.

The following societies serve the interests of students in the various courses in the Faculty of Engineering: Biomedical Engineering Society (BioEng Soc); Electrical Engineering Society (ELSOC); Civil Engineering Student Society (CIVSOC); Naval Architecture Students’ Association (NASA); Surveying Society (SURVSOC); Computing Science Association (CSA); Undergraduate Society of Mechanical & Industrial Engineers (USMIE).

Students are encouraged to participate in the activities of their societies. Enquiries should be directed initially to the general offices of the respective Schools.

International Association for the Exchange of Students for Technical Experience — IAESTE

IAESTE is an organization to facilitate overseas work in technical areas in 53 different countries throughout the world for students or recent graduates. It organizes visas, work periods for as little as 6 weeks or up to 12 months; lodging and an initial welcome.

In Australia IAESTE has a National Committee in Melbourne and local committees in the capital cities including Sydney. The UNSW local committee is made up of interested students and is run in association with the Careers and Appointments Service at Sydney University.

For more information write to the local committee President, IAESTE (UNSW), Union Box 43, UNSW, PO Box 1, Kensington 2033, or contact the local committee through the Students’ Union.
The Institution of Engineers, Australia

The Professional body for engineering in Australia is the Institution of Engineers, Australia, which has as its first object 'to promote the science and practice of engineering in all its branches'.

The Institution functions through a series of divisions, the local one being the Sydney Division. Within each division are branches representing the main interests within the profession, eg civil, mechanical, electrical, chemical and transportation.

Students of an approved school of engineering may join the institution as a student member (StudIAust).

Student members receive the fortnightly publication Engineers, Australia advising of site tours, conferences, technical meetings of all branches, harbour cruises, film nights etc. They also receive The Transactions which contains articles on a particular branch of engineering for a small fee.

Student members are also free to use the comprehensive library and reference facilities maintained by the Institution. The library is a handy place to obtain a rare book or periodical.

For more information and membership application forms, write to The Secretary, The Institution of Engineers, Australia, Sydney Division, PO Box 138, Milsons Point NSW 2061.

The Rupert H. Myers Award in Materials Engineering

The University, in conjunction with the Department of Civil Engineering Materials in the School of Civil Engineering, makes an award, known as the Rupert H. Myers Award in Materials Engineering, which recognizes contributions made by individual engineers and scientists of international repute to the science of materials engineering. The selected candidate receives a silver medal and delivers the Rupert H. Myers Lecture as a key feature of a symposium concerned with the most recent developments in this field.

The Institution of Surveyors, Australia

During their years as undergraduates, students in the surveying course are encouraged to take the first steps in joining in the activities of the professional body which represents surveyors, The Institution of Surveyors. The aims of the Institution are to promote scientific, technical and educational aspects of surveying and to maintain high professional standards of practice and conduct. Student members receive the quarterly journal of the Institution, The Australian Surveyor and The NSW Surveyors' Monthly Bulletin which is published by the New South Wales Division of the Institution. Membership also entitles the student to attend all meetings of the Institution and to attend the annual Congress at a special concessional rate. Membership application forms are available at the office of the School of Surveying and from the Institution office, Third Floor, Guild House, 363 Pitt Street, Sydney.
Undergraduate Study

The Faculty of Engineering consists of five Schools — Civil Engineering, Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Nuclear Engineering, Surveying, the Centre for Biomedical Engineering and the Centre for Remote Sensing. The Schools of Civil Engineering, Electrical Engineering and Computer Science, and Mechanical and Industrial Engineering offer full-time courses leading to the degree of Bachelor of Engineering, and part-time courses leading to the degree of Bachelor of Engineering or Bachelor of Science (Engineering). The School of Surveying offers full-time courses, which may also be taken in a sandwich form, leading to the degrees of Bachelor of Surveying and Bachelor of Surveying Science. The School of Nuclear Engineering, the Centre for Biomedical Engineering and the Centre for Remote Sensing offer graduate courses only.

All the graduate activities of the Faculty are co-ordinated under the Graduate School of Engineering. For details of the graduate activities of the Faculty please see Graduate Study section later in this book.

First Year Programs

A student who has completed the First Year of an undergraduate course in one school may apply for a transfer to a course in another school of the Faculty with credit for relevant subjects completed. However, as there are considerable differences in the various Year 1 programs, students are not granted complete exemption from Year 1 of the course to which the transfer is made.

General Rules for Progression

Progression in all undergraduate courses in the Faculty of Engineering is now permitted by subject. However:

1. Course programs will continue to be stated and timetabled by year or stage and it cannot be guaranteed that non-standard programs can be completed in the minimum number of years.

2. Students must satisfy the rules governing re-enrolment: in particular, these require students enrolled in the first year of a degree program to pass in at least half that program. Students are also required to show cause why they should be allowed to repeat a subject which has been failed more than once.

3. A student must satisfy the relevant prerequisite and co-requisite requirements. This will usually necessitate a student completing or attempting all subjects of a particular year or stage before proceeding to a subject in the next part of a course. Further details are available from the appropriate school.

4. Only in exceptional circumstances will a student be permitted to enrol in subjects extending over more than two years of the course or for more than twenty-eight hours of course work per week if a full-time student or fourteen hours per week if a part-time student. Students repeating subjects are required to choose a program which limits their hours of course work to twenty-two per week if a full-time student, and to eleven per week if a part-time student, unless they have the express permission of the Head of School to exceed these hours.

5. Notwithstanding the above, before a student can enrol in any non-standard program such program must meet with the approval of the Head of School. A non-standard program is one which involves enrolment in subjects from more than one year or stage, or comprises subjects which do not normally constitute a particular year's course work.

Prerequisites and Co-requisites

- A prerequisite unit is one which must be completed prior to enrolment in the unit for which it is prescribed.

- A co-requisite unit is one which must either be completed successfully before or be studied concurrently with the unit for which it is prescribed.
Full-time Courses

Full-time courses of four-years' duration are offered in Civil, Electrical, Mechanical, Industrial, and Aeronautical Engineering, and in Naval Architecture: all of these lead to the award of the degree of Bachelor of Engineering. Four-year full-time courses in Surveying and Surveying Science are offered by the School of Surveying leading to the award of the degrees of Bachelor of Surveying and Bachelor of Surveying Science. The award of the degree of Bachelor of Engineering is recognized by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Member. Substantial or complete recognition is accorded to these courses by overseas engineering institutions.

The award of the degree of Bachelor of Surveying is recognized by the Surveyors' Board of New South Wales as giving complete exemption from written examinations of the Board.

In the case of Bachelor of Surveying Science degree the New South Wales Surveyors' Board may require additional subjects for registration.

Industrial Training Requirements

All full-time engineering courses incorporate industrial training and reference should be made to the entries under each School heading for details of the arrangements applicable. All students are strongly recommended to gain further industrial experience in those long vacations where such training is not already prescribed.

The staff of the University will, where possible, assist students to obtain this employment, but it is emphasized that the primary responsibility for obtaining suitable industrial experience rests with each student. Progression to succeeding years of the course and the award of the degree are dependent on the completion of the requisite periods of industrial employment at a standard approved by the University.

Part-time Courses

Courses leading to the award of the degrees of Bachelor of Engineering in Civil, Mechanical, Industrial and Aeronautical Engineering and Naval Architecture may be taken by part-time study over a period of six or seven years, depending upon the course, or by an approved combination of part-time and full-time study.

Part-time courses leading to the award of the degree of Bachelor of Science (Engineering) in these five fields may be taken over a period of six years, but these courses are being phased out and new enrollments in them are no longer accepted. Enrollments are being accepted in the six-year part-time BSc(Eng) course in Electrical Engineering.

The award of the degree of BSc(Eng) is recognized at present by the Institution of Engineers, Australia, as giving complete exemption from the examinations required for admission to the grade of Member.

Recognition by overseas engineering institutions varies in the different branches of engineering, and enquiries on this matter should be addressed to the Head of the appropriate School.

A student completing the BSc(Eng) degree course and wishing to qualify for the corresponding BE degree may, on the recommendation of the Head of the School, transfer to the corresponding full-time BE course provided he does not take out the BSc(Eng) degree. Further, provided he continues as a registered student on transfer from one course to the other, he may retain any concession granted in the BSc(Eng) degree course.

Holders of the BSc(Eng) degree are eligible to proceed to the degree of Master of Engineering, Master of Engineering Science or Master of Surveying Science subject to the conditions for the award of these degrees set out in the Calendar.

Courses leading to the award of the BSc(Eng) degree are basically part-time and the prescribed industrial experience should be gained concurrently with the course of study (a minimum of three years of suitable engineering experience is required). Students transferring from full-time courses must, therefore, also satisfy these industrial experience requirements before being admitted to the degree of BSc(Eng).

The BSc(Eng) degree program may in some cases be accelerated by a student attending for one or more years full-time. For example, in all courses of the Faculty it is possible to take the equivalent of the first two part-time years in the full-time first year.

Conditions for the Award of the Degree of Bachelor of Science (Engineering)

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

1. A candidate for the award of the degree of BSc(Eng) shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the appropriate school and pass the necessary examinations;
(3) complete an approved program of industrial training over such period as is prescribed concurrently with attendance in the course. In general, this training must be completed before 31 January in the year in which the degree is to be recorded.

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

3. A student may be granted advanced standing by the Professorial Board on the recommendation of the appropriate Faculty but in each case a student must follow an approved course for at least three years with such period of approved industrial training as is prescribed before being eligible for admission to the degree.

4. The degree of BSc(Eng) shall be awarded in the pass grade only but in the case of superior performance throughout the course the degree shall be conferred 'with merit'.

5. Students shall be required to conform with the general rules relating to progression in University courses.

6. In special cases Faculty may approve the variation of any of the preceding conditions.

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Conditions for the Award of the Degree of Bachelor of Engineering

1. A candidate for the award of the degree of Bachelor of Engineering shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the appropriate School, and satisfy the examiners in the necessary subjects;
   (3) complete an approved program of industrial training for such periods as are prescribed. In general, this training must be completed before 31 January in the year in which the degree is to be awarded.

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

3. A student may be granted advanced standing by the Professorial Board on the recommendation of the appropriate Faculty, but in each case must complete an adequate period of approved industrial training before being eligible for the degree. In addition to the above requirements a student coming from another institution must comply with the conditions laid down by the Professorial Board for admission with advanced standing.

4. The degree shall be awarded in the pass or honours grade. Honours may be awarded in the following categories:
   - Honours Class I
   - Honours Class II, Division I
   - Honours Class II, Division II

5. In special cases Faculty may approve the variation of any of the preceding conditions.

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Conditions for the Award of the Degrees of Bachelor of Surveying and Bachelor of Surveying Science

1. A candidate for the award of the degree of Bachelor of Surveying or Bachelor of Surveying Science shall:
   (1) comply with the requirements for admission;
   (2) follow the prescribed course of study in the School of Surveying and satisfy the examiners in the necessary subjects;

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

3. A student may be granted advanced standing by the Professorial Board on the recommendation of the Faculty of Engineering. In addition to the above requirements a student coming from another institution must comply with the conditions laid down by the Professorial Board for admission with advanced standing.

4. The degrees shall be awarded in the pass or honours grade. Honours may be awarded in the following categories:
   - Honours Class I
   - Honours Class II, Division I
   - Honours Class II, Division II

5. In special cases Faculty may approve the variation of any of the preceding conditions.
The School of Civil Engineering offers a course leading to the degree of Bachelor of Engineering (BE), at pass or honours level, which can be taken on a 4-year full-time basis, a 7-stage part-time basis or any approved combination of full-time and part-time study.

A five year full-time course leading to the award of the degrees of Bachelor of Engineering and Bachelor of Science (BE BSc) is offered.

The requirements for the award of the BE degree include a period of at least sixty working days of approved industrial training prior to enrolment in the final year.

The degree of Bachelor of Engineering may be conferred as a Pass degree or as an Honours degree. There are two classes of Honours, Class I, and Class II in two divisions, and the award and grade of Honours are made in recognition of superior performance throughout the course.

* Students are advised to attempt 1.981 Physics ICE but if timetabling difficulties arise or other exceptional circumstances prevail permission will be given to attempt 1.001 Physics I or 1.011 Higher Physics I. On successful completion of one of these latter subjects students will be exempted from one technical elective.

** Students who have only satisfied the science prerequisite for 2.981 Chemistry ICE (ie 2 unit Science including Physics or Chemistry or 4 unit Science (multisubject) in the percentile range 31-100) are advised to apply to enrol in two acceptable alternative subjects, 2.111 Introductory Chemistry and 2.121 Chemistry IA which together are equivalent to 2.981.

*** Students who have achieved a certain standard may attempt 10.011 Higher Mathematics I.
### Year 2

<table>
<thead>
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<th>Hours per week</th>
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<tbody>
<tr>
<td><strong>S1</strong></td>
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<tr>
<td>8.172 Mechanics of Solids II</td>
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<td>8.181-1 Structural Design I</td>
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<td>8.671 Engineering Construction</td>
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<td>10.022 Engineering Mathematics II</td>
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<td>29.491 Survey Camp†</td>
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<tr>
<td>Two Electives***</td>
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**See Electives on following page.
† Students are required to attend a one-week Survey Camp, which is equivalent to 1½ class contact hours per week in each session.

### Year 3

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<td><strong>S1</strong></td>
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<tr>
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<td>8.2731 Geotechnical Engineering I</td>
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<td>8.2732 Geotechnical Engineering II</td>
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<tr>
<td>8.2733 Rock engineering</td>
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<td>8.351 Engineering Mathematics</td>
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<td>8.400 Transport Engineering I</td>
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<tr>
<td>8.572 Hydraulics II</td>
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<tr>
<td>8.573 Hydraulics III</td>
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<tr>
<td>8.581 Water Resources I</td>
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<td>8.582 Water Resources II</td>
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<tr>
<td>8.672 Planning and Management I</td>
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<tr>
<td>8.362 Engineering Computations</td>
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In 1993 8.351 is deleted, the following is introduced

**See Electives on following page.
† Includes 8 hours of Saturday fieldwork

### Year 4

<table>
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<tr>
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<tr>
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<tr>
<td>8.674 Planning and Management III</td>
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**See this footnote below Year 1 (previous page).
### Course Outlines

#### Stage 4

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<td>Engineering Mathematics II</td>
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<td>29.441</td>
<td>Surveying for Engineers*</td>
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<td>29.491</td>
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Total: 15½ hours

#### Stage 5

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<tr>
<td>8.173</td>
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<td>8.1812</td>
<td>Structural Design IB</td>
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<td>Structural Design II A</td>
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<td>Engineering Mathematics</td>
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<td>Transport Engineering I</td>
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<td>8.572</td>
<td>Hydraulics I</td>
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<td>3</td>
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<td>8.672</td>
<td>Planning &amp; Management I</td>
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Executive: 3

Total: 15 hours

#### Stage 6

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<td>8.2741</td>
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Total: 10 hours

#### Stage 7

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<td>Planning &amp; Management III</td>
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Executive: 6

Total: 14½ hours

#### Electives

- Of nine required electives for the BE degree course at least four are in General Studies and at least three are technical electives. Two of the General Studies electives are taken prior to Year 4 or Stage 6.

- Approved technical electives for Year 2 are 6.851 Electronics and Instrumentation, 6.832 Industrial Electrical Machinery, 8.039 Computer Programming, 8.040 Advanced Engineering Geology, 36.411 Town Planning, 8.047 History of Civil Engineering.

- Approved technical electives for Year 3 include those listed for Year 2 and 8.015 Road Engineering, 8.018 Construction Engineering, 8.021 Environmental Aspects of Civil Engineering, 8.023 Hydrodynamics, 8.027 New Materials I, 8.029 Continuum Mechanics, 8.041 Geological Engineering, 8.081 Probability and Statistics for Civil Engineers, 15.501 Introduction to Industrial Relations.

- Approved technical electives for Year 4 include those listed for Year 2 and Year 3 and 8.011 Projects, 8.012 Elements of Architecture, 8.013 Bridge Engineering, 8.014 Computer Applications in Civil Engineering, 8.017 Transportation Engineering, 8.019 Railway Engineering, 8.020 Hydrology, 8.024 Foundation and Dam Engineering, 8.025 Structural Failures, 8.026 Systems Methods in Civil Engineering, 8.028 New Materials II, 8.030 Construction Management.

Combined Course

3730 Combined Course for BE BSc in Civil Engineering

Students may seek permission to undertake a five year full-time combined course leading to the award of the degrees of Bachelor of Engineering and Bachelor of Science (BE BSc). The course is administered by the Faculty of Engineering.

Normally, students enrolled in the BE BSc course may be awarded their degrees at the conclusion of five years' study. However, students who commence the course and do not complete the Civil Engineering component may take out a BSc degree on completion of one of the approved programs of the Science and Mathematics Course.

Similarly, students not wishing to complete the BSc degree course may revert to the Civil Engineering program (3620) with appropriate credit for subjects satisfactorily completed.

The combined course consists of the Civil Engineering program (3620), with five instead of nine electives, and at least fourteen units of the Science and Mathematics Course (3970) within an approved program.

There are six approved programs but additional ones may be approved if they are relevant.

Year 2

<table>
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<tr>
<th>2.002A, 2.042C</th>
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Year 3

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<td>29.441, 29.491</td>
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In 1983 8.351 is deleted, 8.362 and 10.381 are introduced.

Year 4

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Year 5

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<thead>
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<th>2 electives†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Choose 2 units from Table 1 in the Sciences Handbook at Level II or higher.</td>
</tr>
<tr>
<td>8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.501, 8.502, 8.503, 8.504</td>
</tr>
</tbody>
</table>

In 1983 8.401 is introduced.

Note: All material not in italics typeface refers to the BE degree component of this combined course.

* ** *** See footnotes below.

Geography and Environmental Chemistry

Year 1

<table>
<thead>
<tr>
<th>1.981*</th>
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<tbody>
<tr>
<td>2.981**</td>
</tr>
<tr>
<td>5.0102, 5.0201, 5.0301</td>
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<tr>
<td>8.170, 8.171, 8.271, 8.360, 8.670</td>
</tr>
<tr>
<td>10.001***</td>
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</table>

Year 2

<table>
<thead>
<tr>
<th>2.002A, 2.002D, 2.042C</th>
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<tr>
<td>8.172, 8.1811, 8.1812, 8.2721, 8.2722</td>
</tr>
<tr>
<td>10.022</td>
</tr>
<tr>
<td>27.801, 27.802</td>
</tr>
</tbody>
</table>
Year 3

2.043A
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.400, 8.351, 8.571
27.811, 27.813
29.441, 29.491
1 elective†
in 1983 8.351 is deleted; 8.362 and 10.381 are introduced.

Year 4

8.2731, 8.2732, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
27.103
2 electives†
Choose 2 from:
27.203, 27.413, 27.423, 27.862, 27.863

Year 5

2 electives†
Choose 2 units from Table 1 in the Sciences Handbook at
Level II or higher.
8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054
in 1983 8.401 is introduced.

Note: All material not in italic typeface refers to the BE degree component of this
combined course.
* * * * * † See footnotes below.

Physics with Mathematics

Year 1

1.001 or 1.011
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

Year 2

1.012
1.022, 1.032
8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.1113 or 10.1213,
10.1114 or 10.1214,
10.2111 or 10.2211,
10.2112 or 10.2212
2 electives†

Year 4

1.033
1.1333
8.2731, 8.2732, 8.572, 8.573, 8.581, 8.582, 8.671, 8.672
1 elective†
Choose 2 Level II or Level III Mathematics units from Table 1
in the Sciences Handbook.

Year 5

8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051, 8.052, 8.053, 8.054
2 electives†
Choose 1 or 2 units from Table 1 in the Sciences Handbook at
Level II or higher.
In 1983 8.401 is introduced.

Note: All material not in italic typeface refers to the BE degree component of this
combined course.
* * * * * † See footnotes below.

Mathematics

Year 1

1.981*
2.981**
5.0102, 5.0201, 5.0301
8.170, 8.171, 8.271, 8.360, 8.670
10.001***

Year 2

8.172, 8.1811, 8.1812, 8.2721, 8.2722
10.111A or 10.121A,
10.1113 or 10.1213,
10.1114 or 10.1214,
10.2111 or 10.2211,
10.2112 or 10.2212
1 elective†
Engineering

Choose either 1. or 2.:  
1. 10.311A or 10.321A,  
10.311B or 10.321B  
2. Choose 3 units from:  
10.411B or 10.421B,  
10.411A or 10.421A,  
10.331,  
10.2113 (or 10.2213) and 10.2114 (or 10.2214),  
10.111,  
10.1112 or 10.121C

Year 2  
8.172, 8.1812, 8.1812, 8.2721, 8.2722  
10.111A or 10.121A,  
10.1113 or 10.1213,  
10.1114 or 10.1214,  
10.2111 or 10.2211,  
10.2112 or 10.2212  
25.110, 25.120  
3 electives†  

Year 3  
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.351, 8.400,  
8.571  
29.441, 29.491  
1 elective†  
Choose 4 units from Mathematics from Table 1 of the Sciences Handbook (at least one must be Level III).  
In 1983 8.351 is deleted; 8.362 and 10.381 are introduced.

Year 4  
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,  
8.671, 8.672  
1 elective†  
Choose 3 Level iii (not level ii/iii) Mathematics units from Table 1 of the Sciences Handbook.

Year 5  
8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051,  
8.052, 8.053, 8.054  
2 electives†  
Choose 1 or 2 units from Tables 1 or 3 in the Sciences Handbook at Level ii or higher.  
In 1983 8.401 is introduced.

Note: All material not in italic typeface refers to the BE degree component of this combined course.  
** ** ** † See footnotes below

Geology with some Mathematics

Year 1  
1.981*  
2.981**  
5.0102, 5.0201, 5.0301  
8.170, 8.171, 8.271, 8.360, 8.670  
10.001***

Year 5  
8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051,  
8.052, 8.053, 8.054  
2 electives†  
Choose 1 or 2 units from Table 1 in the Sciences Handbook at Level ii or higher.  
In 1983 8.401 is introduced.

Note: All material not in italic typeface refers to the BE degree component of this combined course.  
** ** ** † See footnotes below

Computing with some Mathematics

Year 1  
1.981*  
2.981**  
5.0102, 5.0201, 5.0301  
8.170, 8.171, 8.271, 8.360, 8.670  
10.001***
Course Outlines

Year 2
6.62I, 6.63I, 6.64I
8.172, 8.181I, 8.1812, 8.2721, 8.2722
10.111A or 10.121A,
10.1113 or 10.1213,
10.1114 or 10.1214
2 electives†

Year 3
6.642, 6.643
8.173, 8.174, 8.1821, 8.1822, 8.311, 8.312, 8.351, 8.400,
8.571
10.2111 or 10.2211,
10.2112 or 10.2212
29.441, 29.491
In 1983 8.351 is deleted; 8.362 and 10.381 are introduced.
Choose 1 Level II or Level III Mathematics unit from Table 1 in the Sciences Handbook.

Year 4
6.646, 6.647
One of 6.613, 6.632, 6.633
8.2731, 8.2732, 8.2733, 8.572, 8.573, 8.581, 8.582,
8.671, 8.672
1 elective†
Choose 1 or 2 units from Table 1 in the Sciences Handbook at Level II or higher.
In 1983 8.401 is introduced.

Year 5
8.001, 8.191, 8.2741, 8.2742, 8.583, 8.673, 8.674, 8.051,
8.052, 8.053, 8.054
2 electives†
Choose 1 or 2 units from Table 1 in the Sciences Handbook at Level II or higher.
In 1983 8.401 is introduced.

Note: All material not in italic typeface refers to the BE degree component of this combined degree course.

*Students are advised to attempt 1.981 Physics 1CE but if time-tabling difficulties arise or other exceptional circumstances prevail permission will be given to attempt 1.001 Physics I or 1.011 Higher Physics I. On successful completion of one of these latter subjects students will be exempted from one technical elective.

**Students who have not satisfied the science prerequisite for 2.981 Chemistry 1CE (ie 2 unit Science including Physics or Chemistry or 4 unit Science [multistrand] in the percentile range 31-100) are advised to apply to enrol in 2.111 Introductory Chemistry and 2.121 Chemistry 1A.

***Students who have achieved a certain standard may attempt 10.011 Higher Mathematics I.

†Of the five electives, four must be in General Studies and one must be a technical elective. The technical electives are listed after Stage 7 of Course 3620. The choice of the technical elective must be approved by the Head of the School of Civil Engineering.

School of Electrical Engineering and Computer Science

Head of School
Professor N. W. Rees
Executive Assistant to Head of School
Associate Professor C. A. Stapleton
Senior Administrative Officer
Mr H. G. Phillips
Administrative Assistant
Ms R. C. Horwood

Electrical Engineering has close links with the pure sciences and mathematics. Its technology is changing rapidly, and the School's teaching and research programs are constantly under review to meet the ever changing challenges of present and future needs.

The School offers undergraduate and graduate training in all branches of the profession of electrical engineering; there are Departments of Communications, Computer Science, Electric Power, Solid State Electronics, and Systems and Control Engineering. A number of inter-departmental and specialized groups (such as Digital Systems, Acoustics, Biomedical Engineering, Measurements etc.) are also active.

Summary of Courses

<table>
<thead>
<tr>
<th>Course</th>
<th>Degree(s)</th>
<th>Usual Duration (years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3640</td>
<td>BE</td>
<td>4 full-time^Note 1</td>
</tr>
<tr>
<td>3650</td>
<td>BSc (Eng)</td>
<td>6 part-time^Note 1</td>
</tr>
<tr>
<td>3720</td>
<td>BE and BA</td>
<td>5 full-time</td>
</tr>
<tr>
<td>3725</td>
<td>BE and BSc</td>
<td>5 full-time</td>
</tr>
<tr>
<td>3970</td>
<td>BSc (pass)</td>
<td>3 full-time</td>
</tr>
<tr>
<td></td>
<td>BSc (honours)</td>
<td>4 full-time</td>
</tr>
</tbody>
</table>

Not 1 Full-time/Part-time
A student in either course may with the approval of the Head of School complete the requirements by a combination of full-time and part-time study. To ensure that prerequisites are met and the program can be timetabled, students should consult with the School as early as possible when a change in attendance pattern is envisaged. A part-time student is expected to attend classes one afternoon per week. After Year 1 of the BE, a form of sandwich pattern is possible by arrangement with the Head of School.

Note 2 Course 3970
This course is operated by the Board of Studies in Science and Mathematics and is for students wishing to major in Computer Science in a Science and Mathematics context. For more details see the Sciences Handbook. Most of the course is available in evening classes but some day attendance is essential in Year 3.

The undergraduate curriculums are being progressively revised to provide a flexible training to suit the needs of today and tomorrow. Individual student needs can be further met by quite extensive substitution provisions within the course programs.
Recognition

The degrees of Bachelor of Engineering and Bachelor of Science (Engineering) are recognized by the Institution of Engineers, Australia and the Institution of Radio and Electronics Engineers, Australia, as giving complete exemption from the examinations required for admission to Graduate or Corporate membership.

Honours

In the Bachelor of Engineering Course the same formal program is offered to both pass students and to those aiming at honours. Honours will be awarded for meritorious performance over the course; special attention is paid to a candidate's performance in the final year thesis project. A student with a creditable performance in the Bachelor of Science (Engineering) course may be awarded a degree with Merit.

The award of the BA or BSc degree at honours level requires two additional sessions of study. See the Arts and Sciences Handbooks for details.

Substitution of Subjects

To suit the special abilities or needs of individual students a limited amount of substitution is permitted within each course. Any such substitution must have prior approval of the Head of School who will ensure that:
1. The replacement subject is at least the same length and level as the prescribed subject it replaced; and,
2. The resulting overall program of study is suited to the award of the degree as applicable.

Substitution is not permitted in Year 1.

Examples
(i) Replacement of General Studies subjects by subjects approved (by the Head of the Department of General Studies) selected from areas such as Arts; Life Sciences; Earth Sciences; Accounting and Business Administration; Law; Economics; Industrial Management.

(ii) The normal Year 4 of the BE degree program includes 5 units of Electrical Engineering IV. Students may substitute for one of these units, a subject of suitable level and difficulty from an area outside the School of Electrical Engineering and Computer Science. A graduate subject of the School may also be substituted in this way.

(iii) Students proposing to concentrate on Computer Science within the BE degree program may substitute appropriate Computer Science units in Year 4 (for up to three professional electives).

Course Rules

It is the responsibility of students to meet the course requirements applicable at the date of application for the degree.

- Programs and timetables are arranged in preferred year or stage groupings. Progression is, however, by subject.

- In addition to the specific subject prerequisites a general understanding of the material in the preceding Year or Stage is assumed. Students are not normally permitted to enrol in subjects spread beyond two Years or Stages.

- Students who do not pass their full programs will be limited to 80% of a normal load in the following year.

- Previously failed subjects must be included, except that a failed elective may be replaced by another elective.

Course Revision

Following each course revision students will be assessed on the basis of the new program, but

- No student will lose credit for any subject completed, and

- No student will be liable for the increased requirements if they progress normally.

- It is the responsibility of students to enrol in a program consistent with the rules governing re-enrolment and admission to the degree.

Re-enrolment

Students must collect enrolment information from the School Office before the end of Session 2 1981. Re-enrolment forms, giving details of students' proposed 1982 programs must be lodged with the School Office by Friday 8 January 1982. Enrolment at the University will not be authorized until the re-enrolment form has been checked and the program approved. Students not intending to re-enrol should advise the School. Leave of absence for up to one year is usually granted to students in good standing.

3640

Electrical Engineering

Bachelor of Engineering
BE

Year 1

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.961</td>
<td>Physics I*</td>
<td>S1 S2</td>
</tr>
<tr>
<td>2.121</td>
<td>Chemistry</td>
<td>6 6</td>
</tr>
<tr>
<td>5.006</td>
<td>Engineering E</td>
<td>6 0</td>
</tr>
<tr>
<td>6.010</td>
<td>Electrical Engineering I</td>
<td>0 6</td>
</tr>
<tr>
<td>6.611</td>
<td>Computing I</td>
<td>0 6</td>
</tr>
<tr>
<td>10.001</td>
<td>Mathematics I*</td>
<td>6 6</td>
</tr>
<tr>
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<td>General Studies Elective</td>
<td>1½ 1½</td>
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</tbody>
</table>

*Students who have achieved a certain standard may attempt similar material at a higher level.
Year 2

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.972 Electromagnetism</td>
<td></td>
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</tr>
<tr>
<td>1.982 Solid State Physics</td>
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<td>4½</td>
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<tr>
<td>10.111A Pure Mathematics II (Linear Algebra)*</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.1113 Pure Mathematics II — Multivariable Calculus*</td>
<td></td>
<td>2½</td>
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<tr>
<td>10.1114 Pure Mathematics II — Complex Analysis*</td>
<td></td>
<td>0</td>
<td>2½</td>
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<tr>
<td>10.2111 Applied Mathematics II — Vector Calculus*</td>
<td></td>
<td>2½</td>
<td>0</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations*</td>
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<td>2½</td>
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</tr>
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<td>General Studies Elective</td>
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<td>3</td>
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Electrical Engineering II

<table>
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<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>6.021A Circuit Theory I</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.021B Power</td>
<td>0</td>
<td>4</td>
<td>0</td>
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<tr>
<td>6.021C Electronics I</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6.021D Computing**</td>
<td>4</td>
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<tr>
<td>6.021E Digital Logic and Systems</td>
<td>0</td>
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<tr>
<td></td>
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Year 3

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<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
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</thead>
<tbody>
<tr>
<td>10.033 E. E. Mathematics III</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>10.361 Statistics SE</td>
<td></td>
<td>2</td>
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</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Technical Elective†</td>
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</table>

Electrical Engineering III

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0311 Circuit Theory II</td>
<td>4</td>
<td>0</td>
<td>0</td>
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<tr>
<td>6.0312 Utilization of Electric Energy</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.0313 Electronics II</td>
<td>4</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6.0314 Systems and Control I</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6.0315 Electrical Energy</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6.0316 Electronics II</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6.0317 Communications Systems I</td>
<td>0</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>6.0318 Microprocessor Systems and Applications</td>
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<tr>
<td></td>
<td></td>
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Year 4

<table>
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<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Studies Elective</td>
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<td>0</td>
</tr>
<tr>
<td>Technical Elective†</td>
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</tbody>
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Electrical Engineering IV

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 Professional Electives*</td>
<td></td>
<td>15</td>
<td>10</td>
</tr>
<tr>
<td>6.911 Thesis**</td>
<td></td>
<td>2</td>
<td>21</td>
</tr>
<tr>
<td>6.903 Industrial Training‡</td>
<td></td>
<td>24</td>
<td>31</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*From 1982 onwards three electives are taken in Session 1 and two in Session 2. The program selected by each student must be approved by the Head of School. Not all electives are offered every session; students are advised each year which electives are available. See list of Professional Electives later this section.

**6.911 Thesis is done in the last two sessions of a student's course. In the first session, two hours per week, and in the second session, three days per week are devoted to directed laboratory and research work on an approved subject under the guidance of members of the lecturing staff. Generally, the project involves the design and construction of experimental apparatus together with laboratory tests. Each student is required to present a seminar and written thesis must be submitted on each project by the penultimate Monday in November or June.

†All students in the BE course must complete at least 60 days industrial experience, usually in the summer recess at end of Years 2 and 3.

Technical Electives available in 1982

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.012 Mechanics and Thermal Physics</td>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>6.056 Mechanical Engineering</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.641 Programming I</td>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>8.113 Civil Engineering</td>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>18.091 Industrial Management</td>
<td></td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>48.302 Fuels and Energy</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
</tbody>
</table>

A free choice may not be possible.

3650

Electrical Engineering

Bachelor of Science (Engineering) BSc(Eng)

Stage 1

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.001 Physics I</td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td></td>
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<td></td>
<td></td>
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<td>12</td>
</tr>
</tbody>
</table>

Stage 2 (from 1982)

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.121 Chemistry</td>
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<td>6</td>
</tr>
<tr>
<td>6.010 Electrical Engineering I</td>
<td></td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>6.021A Circuit Theory I</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>6.611 Computing I</td>
<td></td>
<td>6</td>
<td>0</td>
</tr>
<tr>
<td>10.2111 Applied Mathematics II — Vector Calculus</td>
<td></td>
<td>0</td>
<td>2½</td>
</tr>
<tr>
<td>10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations*</td>
<td>2½</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14½</td>
<td>12½</td>
</tr>
</tbody>
</table>

*Students who intend to major in particular disciplines should note that certain subjects are prerequisites for the professional electives they choose in Year 4. Thus, 6.641 is a prerequisite for some of the professional computing electives.
### Stage 3 (from 1983)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electromagnetism</td>
<td>1.972</td>
</tr>
<tr>
<td>Solid State Physics</td>
<td>1.982</td>
</tr>
<tr>
<td>Engineering Drawing</td>
<td>5.0301</td>
</tr>
<tr>
<td>Power</td>
<td>6.021B</td>
</tr>
<tr>
<td>Pure Mathematics II — Linear Algebra</td>
<td>10.111A</td>
</tr>
<tr>
<td>Pure Mathematics II — Multivariable Calculus</td>
<td>10.1113</td>
</tr>
<tr>
<td>Pure Mathematics II — Complex Analysis</td>
<td>10.1114</td>
</tr>
<tr>
<td>General Studies Elective</td>
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</tr>
</tbody>
</table>

### Stage 4 (from 1983)

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics I</td>
<td>6.021C</td>
</tr>
<tr>
<td>Digital Logic and Systems</td>
<td>6.021E</td>
</tr>
<tr>
<td>Circuit Theory II</td>
<td>6.0311</td>
</tr>
<tr>
<td>Utilization of Electrical Energy</td>
<td>6.0312</td>
</tr>
<tr>
<td>Electronics II</td>
<td>6.0313</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>6.041</td>
</tr>
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<td>General Studies Elective</td>
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### Stage 5

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Systems and Control I</td>
<td>6.0314</td>
</tr>
<tr>
<td>Electrical Energy</td>
<td>6.0315</td>
</tr>
<tr>
<td>Electronics III</td>
<td>6.0316</td>
</tr>
<tr>
<td>Communication Systems I</td>
<td>6.0317</td>
</tr>
<tr>
<td>Statistics SE</td>
<td>10.361</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
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### Stage 6

<table>
<thead>
<tr>
<th>Professional Electives††</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>Industrial Experience†</td>
<td>6.902</td>
</tr>
<tr>
<td>Project**</td>
<td>6.921</td>
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</table>

### 1982 Transition Programs for Stages 3 and 4

#### Stage 3

<table>
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<th>Subject</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>Electromagnetism</td>
<td>0.972</td>
</tr>
<tr>
<td>Solid State Physics</td>
<td>0.982</td>
</tr>
<tr>
<td>Power</td>
<td>6.021B</td>
</tr>
<tr>
<td>Computing</td>
<td>6.021D</td>
</tr>
<tr>
<td>Pure Mathematics II — Linear Algebra</td>
<td>10.111A</td>
</tr>
<tr>
<td>Applied Mathematics II — Vector Calculus</td>
<td>10.2111</td>
</tr>
<tr>
<td>Applied Mathematical II — Mathematical Methods for Differential Equations</td>
<td>10.2112</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
</tr>
</tbody>
</table>

#### Stage 4

<table>
<thead>
<tr>
<th>Subject</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electronics I</td>
<td>6.021C</td>
</tr>
<tr>
<td>Computing</td>
<td>6.021D</td>
</tr>
<tr>
<td>Digital Logic and Systems</td>
<td>6.021E</td>
</tr>
<tr>
<td>Utilization of Electric Energy</td>
<td>6.0312</td>
</tr>
<tr>
<td>Electronics I</td>
<td>6.0313</td>
</tr>
<tr>
<td>Technical Elective†</td>
<td>6.041</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
</tr>
</tbody>
</table>

### Electrical Engineering Professional Electives

Each elective is 5 hours per week for one session.

The list of electives is:

- 6.041 Electrical Measurements
- 6.042 Digital and Analogue Signals
- 6.044 Electrical Product Design and Reliability
- 6.045 Electrical and Electronics Engineering Materials
- 6.202 Power Engineering I
- 6.203 Power Engineering II
- 6.212 Power Engineering — Utilization
- 6.222 High Voltage and High Current Technology
- 6.303 High Frequency Circuits and Electronics I
- 6.313 High Frequency Circuits and Electronics II
- 6.322 Electronics IV
- 6.323 Communication Systems 2A
- 6.333 Communication Systems 2B
- 6.412 Systems and Control II
- 6.413 Digital Control
- 6.432 Computer Control and Instrumentation
- 6.483 Biomedical Engineering
- 6.512 Advanced Semiconductor Device Theory
- 6.522 Transistor and Integrated Circuit Design
- 6.607A Computer Hardware Architecture
- 6.607B Advanced Software Technology
- 6.612 Computer Systems Engineering
- 6.622 Computer Application and Systems

* Students who have completed the prerequisites may request substitution of up to three approved Science 3 Computing Science electives.
### Prerequisites and Co-requisites
Arranged in order of full-time Bachelor of Engineering Degree Course

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.961</td>
<td>See Matriculation and Admission Requirements</td>
<td>10.001</td>
</tr>
<tr>
<td></td>
<td>2.121</td>
<td>See Matriculation and Admission Requirements</td>
<td>10.2111, 10.2112</td>
</tr>
<tr>
<td>5.006</td>
<td></td>
<td>The Electricity &amp; Magnetism section of 1.961</td>
<td></td>
</tr>
<tr>
<td>6.010</td>
<td></td>
<td>See Matriculation and Admission Requirements</td>
<td></td>
</tr>
<tr>
<td>6.611</td>
<td></td>
<td>See Matriculation and Admission Requirements</td>
<td></td>
</tr>
<tr>
<td>10.001</td>
<td></td>
<td>See Matriculation and Admission Requirements</td>
<td></td>
</tr>
</tbody>
</table>

2

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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</thead>
<tbody>
<tr>
<td>1.972</td>
<td></td>
<td>1.961, 10.001</td>
<td>10.2111, 10.2112</td>
</tr>
<tr>
<td>1.982</td>
<td></td>
<td>1.961, 10.001</td>
<td>10.2111, 10.2112</td>
</tr>
<tr>
<td>6.021A</td>
<td></td>
<td>1.961, 6.010, 10.001</td>
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</tr>
<tr>
<td>6.021B</td>
<td></td>
<td>6.021A attempted**</td>
<td>6.0311</td>
</tr>
<tr>
<td>6.021C</td>
<td></td>
<td>6.021A, 1.982</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.021D</td>
<td></td>
<td>Computing strand of 5.030</td>
<td>6.0312</td>
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<tr>
<td>6.021E</td>
<td></td>
<td>10.001</td>
<td>6.0312</td>
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<tr>
<td>10.111A</td>
<td></td>
<td>10.001</td>
<td>6.0312</td>
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<tr>
<td>10.111B</td>
<td></td>
<td>10.001</td>
<td>6.0312</td>
</tr>
<tr>
<td>10.111C</td>
<td></td>
<td>10.001</td>
<td>6.0312</td>
</tr>
<tr>
<td>10.2111</td>
<td></td>
<td>10.001</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.821</td>
<td></td>
<td>6.811††</td>
<td>6.0312</td>
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3

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
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<tbody>
<tr>
<td>1.012</td>
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<td>10.2111, 10.2112</td>
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<td>6.056</td>
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<td>10.2111, 10.2112, 1.961</td>
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<tr>
<td>10.033</td>
<td></td>
<td>10.111A, 10.1113, 10.1114, 10.2111, 10.2112</td>
<td>6.0312</td>
</tr>
<tr>
<td>10.361</td>
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<td>10.001</td>
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<td>6.0312</td>
<td></td>
<td>6.021A, 6.021B</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.0313</td>
<td></td>
<td>6.021A, 6.021C</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.0314</td>
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<td>6.0311</td>
<td>6.0312</td>
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<tr>
<td>6.0315</td>
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<td>6.0312 attempted**</td>
<td>6.0312</td>
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<td>6.0313</td>
<td>6.0312</td>
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<tr>
<td>6.0317</td>
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<td>6.0311</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.0318</td>
<td></td>
<td>6.021D or 6.620, 6.021E or 6.631, 6.021C</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.641</td>
<td></td>
<td>6.620†† or 6.021D†† or 6.621††</td>
<td>6.0312</td>
</tr>
</tbody>
</table>

4

<table>
<thead>
<tr>
<th>Year</th>
<th>Subject</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.091</td>
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<td>10.2112, 10.361 attempted**</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.041</td>
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<td>6.0311, 6.0313</td>
<td>6.0312</td>
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<tr>
<td>6.042</td>
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<td>10.033, 10.361</td>
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<td>10.361</td>
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<tr>
<td>6.045</td>
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<td>6.0313</td>
<td>6.0312</td>
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<tr>
<td>6.202</td>
<td></td>
<td>6.0312, 6.0315</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.203</td>
<td></td>
<td>6.0312, 6.0315</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.212</td>
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<td>6.0312, 6.0315</td>
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<td>6.222</td>
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<td>6.0312</td>
</tr>
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<td>6.303</td>
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<td>6.0311, 6.0316, 6.0317</td>
<td>6.0312</td>
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<td>6.313</td>
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<td>6.0312</td>
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<td>6.0313, 6.0316</td>
<td>6.0312</td>
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<td>6.323</td>
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<td>6.0317, 10.033, 10.361</td>
<td>6.0312</td>
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<tr>
<td>6.333</td>
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<td>6.0316, 6.0317</td>
<td>6.0312</td>
</tr>
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<td>6.412</td>
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<td>6.0311, 6.0314</td>
<td>6.0312</td>
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<tr>
<td>6.413</td>
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<td>6.0314††, 10.033, 10.361</td>
<td>6.0312</td>
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<tr>
<td>6.432</td>
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<td>6.0314, 6.0316, 6.0318††</td>
<td>6.0312</td>
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<td>6.483</td>
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<td>6.0311, 6.0313, 6.0314, 6.0316</td>
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<td>6.512</td>
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<td>6.0312</td>
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<td>6.522</td>
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<td>6.0313, 6.0316</td>
<td>6.0312</td>
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<tr>
<td>6.612</td>
<td></td>
<td>6.021E or 6.631</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.622</td>
<td></td>
<td>6.620 or 6.021D or 6.621</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.632</td>
<td></td>
<td>6.021E††, 6.641††</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.633</td>
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<td>6.0312</td>
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<tr>
<td>6.643</td>
<td></td>
<td>6.641††</td>
<td>6.0312</td>
</tr>
<tr>
<td>6.911</td>
<td></td>
<td>(in graduating program only)</td>
<td>6.0312</td>
</tr>
</tbody>
</table>

*Two of 10.1113, 10.1114, 10.2111, or 10.2112 may be taken as co-requisites

**At an acceptable level

††One of 6.021B or 6.021C may be taken as a co-requisite.

††Pass Conceeded not acceptable as prerequisite.
Combined Courses

Students in Electrical Engineering who maintain a creditable performance may qualify for the award of two degrees in five years of combined full-time study in which the requirements of the degrees have been merged. Students wishing to enrol in a combined course may do so only on the recommendation of the Head of School of Electrical Engineering and Computer Science and with the approval of the Faculty of Engineering and either the Faculty of Arts or the Board of Studies in Science and Mathematics, as appropriate. Students wishing to enrol in, transfer into, or continue in a combined course shall have complied with all the requirements for prerequisite study, sequencing and academic attainment (a creditable performance i.e. 65%) of both the Course Authorities concerned.

Students who commence a course but subsequently do not wish to proceed with both areas of study, or who fail to maintain a creditable performance, revert to a single degree program with appropriate credit for subjects completed. Tertiary Education Assistance Scheme (TEAS) support is available for the five years of the combined degree programs.

Students may transfer into a combined course after partially completing the requirements for either degree provided suitable subjects have been studied. However, the choice of subjects and the time taken to complete the program can be seriously affected by this. Thus, students considering course 3725 or course 3720 should contact the Electrical Engineering School before completing their Year 2 enrolment. Application for transfer to a combined course must be made in writing to the Head of School by 8 January 1982.

3725
BE BSc in Electrical Engineering

Having completed Years 1 and 2 of course 3640 students in their third year complete a specific course of study consisting of four Level 3 Science units chosen from related disciplines, the appropriate General Studies electives and no less than four other Level 2 or Level 3 units, and otherwise accord with the rules of course 3970 leading to a major in Computer Science, Mathematics or Physics.

Students may open up a wider choice of subjects in their Science Year by including additional Computer Science (viz 6.641), Physics (viz 1.012) or Mathematics in their Year 2 Electrical Engineering program. Any subject omitted may be required to be taken later in the course. The extra subject in Year 2 may be credited towards either the BE or BSc requirements, but not both.

In their fourth and fifth years the students do Year 3 and Year 4 of course 3640. Depending on the program followed in their year in Science they may have already completed parts of the normal third and fourth year programs of the Electrical Engineering course, and they will be required to omit these from their program and to include an equivalent amount of other courses chosen with the approval of the Head of School. Thus students who choose to omit the General Studies elective from their Year 3 BE program on this ground must still do a full year’s work: that is, they would be expected to include some 3 session-hours of other material in lieu of the General Studies elective omitted.

3720
BE BA in Electrical Engineering

The combined program should include:

- the requirements of a normal BE program in Electrical Engineering less the General Studies subjects and two other subjects approved by the Head of the School.
- subjects equivalent to 10 subject credits in accordance with the regulations of the Faculty of Arts provided that this includes a major sequence of subjects available within the Faculty of Arts in addition to the studies in the School of Mathematics and the Department of Computer Science. These include the subjects in Table A or their equivalents.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Credit Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.001</td>
<td>Mathematics I</td>
</tr>
<tr>
<td>10.111</td>
<td>Pure Mathematics I</td>
</tr>
<tr>
<td>10.113</td>
<td>Pure Mathematics II</td>
</tr>
<tr>
<td>10.114</td>
<td>Pure Mathematics II</td>
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<tr>
<td>10.2111</td>
<td>Applied Mathematics I</td>
</tr>
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<td>10.2112</td>
<td>Applied Mathematics II</td>
</tr>
<tr>
<td>1.961</td>
<td>Physics I</td>
</tr>
<tr>
<td>1.972</td>
<td>Electromagnetism</td>
</tr>
<tr>
<td>1.982</td>
<td>Solid-State Physics</td>
</tr>
</tbody>
</table>

Guidance should be sought from the School of Electrical Engineering and Computer Science, the relevant schools in the Faculty of Arts and the Arts Faculty office. After four years of study a student will normally have completed the BA requirements of study, together with subjects selected from course 3640 (in accord with an acceptable program loading) and in the fifth year will complete requirements for a BE.

It is necessary for each individual student entering the course to lodge for approval a complete program of study: changes in detail are usual from year to year. Students should choose their Arts Major early so as to start the sequence in Year 1 if possible.
Studies in Computer Science other than in BE Course 3640, BE BA 3720 and BE BSc 3725

Course 3400

For further details of major studies in Computer Science within the Bachelor of Arts degree course, please see the Arts Faculty Handbook.

Course 3970

Year 1 students in course 3970 enrol in program 6806; enrolment in Year 2 of a Computer Science program is based on academic performance in Year 1. A total of 23 units is required for graduation at the pass level. Year 1 must include 6.611 and 10.001 (or 10.011) and 5 other Level 1 units. Year 2 must include 6.621, 6.631, 6.641 and 5 other Level 2 units plus one General Studies elective. Year 3 must include 4 Computer Science Level 3 units and 3 other Level 2 or Level 3 units, plus two General Studies electives. Students intending to proceed to Honours should choose 8 Level 3 units including 6.613, 6.632, 6.642 and 6.643. Year 4 is 6.606. For further details see the Sciences handbook.

Computer Science Electives offered by the School

<table>
<thead>
<tr>
<th>No.</th>
<th>Name</th>
<th>Level</th>
<th>Prerequisites</th>
<th>Co-requisites</th>
<th>Excluded</th>
</tr>
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<tbody>
<tr>
<td>6.611</td>
<td>Computing</td>
<td>I</td>
<td>As for 10.001</td>
<td>10.001 or 10.011</td>
<td>6.600</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.620</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>6.021D</td>
</tr>
<tr>
<td>6.621</td>
<td>Computing II</td>
<td>II</td>
<td>6.611* and 10.001 or 10.011</td>
<td></td>
<td>6.620</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6.021D</td>
</tr>
<tr>
<td>6.631</td>
<td>Assembler Programming</td>
<td>II</td>
<td>6.620† or 6.021D or 6.621*</td>
<td></td>
<td>6.021E</td>
</tr>
<tr>
<td></td>
<td>and Digital Logic Programming II</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.613</td>
<td>Computer Organization</td>
<td>III</td>
<td>6.631* or 6.021E or 6.621*</td>
<td></td>
<td>6.0318</td>
</tr>
<tr>
<td></td>
<td>and Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.632</td>
<td>Operating Systems</td>
<td>III</td>
<td>6.631* or 6.021E or 6.641*</td>
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<td></td>
</tr>
<tr>
<td>6.642</td>
<td>Programming II</td>
<td>III</td>
<td>6.641*</td>
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<tr>
<td>6.643</td>
<td>Compiling Techniques</td>
<td>III</td>
<td>6.641*</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>and Programming Languages</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>6.646</td>
<td>Computer Applications</td>
<td>III</td>
<td>6.621† or 6.021D or 6.621, one of 10.311A, 10.321A, 10.301, 10.331, 45.101 or equivalent†</td>
<td>6.622</td>
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<td>Systems</td>
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<td></td>
<td></td>
<td></td>
<td>14.605</td>
</tr>
</tbody>
</table>

*Pass Conceded not acceptable as prerequisite
† Students who have completed 6.600 at a grade of Credit or better, may be enabled to undertake this subject with permission.
‡ May be taken as a co-requisite in 1982
§ Can only be accounted with at least 3 other Computer Science Level III subjects
** From 1983.

School of Mechanical and Industrial Engineering

Head of School
Associate Professor G. de Vahl Davis

Executive Assistant to Head of School
Associate Professor J. Y. Harrison

Senior Administrative Officer
Mr G. Dusan

The courses in the School are planned to provide the appropriate academic training for the professional engineer in the fields of aeronautical, industrial and mechanical engineering, and for the naval architect. They may be taken either on a full-time basis, normally over four years, or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to the approval of the Head of School.

The courses lead to the award of the degree of Bachelor of Engineering (BE).


The courses of Mechanical, Industrial and Aeronautical Engineering and of Naval Architecture have common subjects for the first two years if taken full-time, and for the first three years if taken part-time. The latter halves of these four courses contain a number of common core subjects together with specific departmental requirements. In the final years, in addition to core subjects and departmental requirements, provision is made for a limited degree of specialization in one or more elective subjects. Students in the Mechanical Engineering Course may, subject to the approval of the Head of School, up to six credits of graduate subjects per session offered by the School in lieu of an equivalent quantity of final year undergraduate electives. Each student is required to present a thesis at the end of his final year and to deliver a short paper on the subject of his thesis. General Studies form a regular part of all courses. In certain instances and with permission from the Head of the School students may substitute an Arts subject in lieu of two General Studies subjects.

Industrial experience is an integral part of the courses. All students enrolled in the School must complete forty working days of approved industrial training between Years 2 and 3, also between Years 3 and 4 if taking the course on a full-time basis, and irrespective of their specialization, are strongly recommended to gain as much industrial training as possible between Years 1 and 2.

Students taking the course on a part-time basis must complete a total of eighty working days of approved industrial training in the period following the end of Year 3 up to the beginning of Year 6.

All students will be considered for the award of Honours which will be granted for meritorious performance in the course with particular emphasis on the later years.

Part-time courses of six years’ duration leading to the award of the degree of Bachelor of Science (Engineering) continue to be offered in the same four fields as the full-time courses, though no new enrolments are now accepted for these courses.

Students proceeding to the award of the BSc(Eng) degree whether by a combination of part-time and of full-time study, or by part-time study alone, are required to undergo a minimum period of three years approved concurrent industrial training. (See also Conditions for the Award of the Degree of Bachelor of Science (Engineering) earlier in this Handbook.)

Students should enrol in the subject 5.042 Industrial Experience in the year in which they expect to satisfy the requirement and, upon completion, submit to the School evidence from their employers of such industrial training.

The BSc(Eng) degree may be awarded ‘With Merit’ to students whose performance in the course is superior.

Students currently enrolled in the BSc(Eng) degree course may transfer, should they wish, to the corresponding BE degree course. Such students are given full credit for subjects they have already passed.

The award of the degree BE or BSc(Eng) in Mechanical Engineering is recognized by the Institution of Mechanical Engineers, London, as giving exemption from Parts I and II of the examinations required for admission to the grade of Member. Exemption from Part III (The Engineer in Society) of the examinations may also be granted, depending on the particular General Studies subjects taken. Exemption from Part III is considered on a case by case basis, and is not automatic. Specific enquiries on this matter should be addressed to the Head of the School.

The award of the degree of BE or BSc(Eng) in Industrial Engineering is similarly recognized by the Institution of Production Engineers, London.

The Institution of Engineers, Australia, grants full exemption from examinations for admission to the grade of Member to holders of the degree of BE or BSc(Eng) in any of the undergraduate courses offered by the School.
Year 1

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<table>
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<td>Chemistry I (ME)</td>
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<tr>
<td>Statics</td>
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<tr>
<td>Technical Orientation</td>
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</tr>
<tr>
<td>Mechanics of Solids I</td>
</tr>
<tr>
<td>Mathematics I or</td>
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<td>Higher Mathematics I</td>
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An alternative 'science compatible' course which can be undertaken is as follows:

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<tr>
<td>10.001</td>
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<tr>
<td>10.011</td>
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<thead>
<tr>
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<td>Higher Physics I</td>
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<td>Engineering A</td>
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<td>Engineering B</td>
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<td>Engineering C</td>
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<td>Engineering D</td>
</tr>
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<td>Engineering C (Production Technology Option)</td>
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<td>Mathematics I or</td>
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<td>Higher Mathematics I</td>
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Year 2

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<th>Course Title</th>
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<td>Statistics/Computing</td>
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<td>Mechanical Engineering Design II</td>
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<tr>
<td>Engineering Dynamics I</td>
</tr>
<tr>
<td>Mechanics of Solids II/ Materials</td>
</tr>
<tr>
<td>Fluid Mechanics/Thermodynamics</td>
</tr>
<tr>
<td>Engineering Mathematics II</td>
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<tr>
<td>Industrial Orientation</td>
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<tr>
<td>General Studies Elective</td>
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Note 1: At least six hours per week of Technical Electives must be taken from the Mechanical Engineering Technical Elective list. The remaining Technical Electives may be taken from the Industrial Engineering Technical Elective List or from other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

Year 3

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<table>
<thead>
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<th>Course Title</th>
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<tbody>
<tr>
<td>Engineering Experimentation</td>
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<tr>
<td>Industrial Training II</td>
</tr>
<tr>
<td>Numerical Analysis/Mathematics</td>
</tr>
<tr>
<td>Mechanical Engineering Design III</td>
</tr>
<tr>
<td>Dynamics of Machines</td>
</tr>
<tr>
<td>Linear Systems Analysis</td>
</tr>
<tr>
<td>Mechanics of Solids III</td>
</tr>
<tr>
<td>Two Fluid Mechanics/Thermodynamics Technical Electives</td>
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<tr>
<td>Electrical Engineering</td>
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<tr>
<td>Management/Economics</td>
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<td>Two General Studies Electives</td>
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<table>
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Note to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

Year 4

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<td>5.044</td>
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<td>5.051</td>
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<table>
<thead>
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<th>Course Title</th>
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<td>Industrial Training II</td>
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<tr>
<td>Communications</td>
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<tr>
<td>Feedback Control</td>
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<tr>
<td>Technical Electives</td>
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<table>
<thead>
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<th>Hours per week</th>
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<td>2</td>
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Note 1: At least six hours per week of Technical Electives must be taken from the Mechanical Engineering Technical Elective list. The remaining Technical Electives may be taken from the Industrial Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.
### Bachelor of Engineering

#### Year 1

<table>
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<tr>
<th>Course Code</th>
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<tr>
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<td>10.001</td>
<td>Mathematics I or Higher Mathematics I</td>
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#### Year 2

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<td>Mechanical Engineering Design I</td>
<td>S1 2, S2 4</td>
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<td>5.330</td>
<td>Engineering Dynamics</td>
<td>S1 2, S2 2</td>
</tr>
<tr>
<td>5.411</td>
<td>Mechanics of Solids II</td>
<td>S1 2, S2 2</td>
</tr>
<tr>
<td>5.611</td>
<td>Fluid Mechanics/Thermodynamics</td>
<td>S1 4, S2 4</td>
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<td>6.801</td>
<td>Electrical Engineering</td>
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<td>Properties of Materials</td>
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<td>Industrial Orientation</td>
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#### Year 3

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<tr>
<td>5.033</td>
<td>Experimental Engineering III</td>
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<td>5.071</td>
<td>Engineering Analysis</td>
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<td>5.112</td>
<td>Mechanical Engineering Design II</td>
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<td>Dynamics of Machines I</td>
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<td>Mechanics of Solids III</td>
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<td>5.612</td>
<td>Fluid Mechanics/Thermodynamics II</td>
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<td>6.853</td>
<td>Analogue &amp; Digital Instrumentation*</td>
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<td>Industrial Engineering IA or IB</td>
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#### Year 4

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<td>S1 6, S2 6</td>
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<tr>
<td>5.324</td>
<td>Automatic Control Engineering</td>
<td>S1 3, S2 3</td>
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Note: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

*Not offered in 1982
### Year 5

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<td>Mathematics I</td>
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<td>Management/Economics</td>
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<td>Industrial Orientation</td>
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<tr>
<td>Two Fluid Mechanics/Thermodynamics Technical Electives</td>
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### Year 6*

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*Not offered in 1982

**Note 1:** By the end of Year Six the equivalent of 10½ hours per week for a year of Technical Electives must have been completed. The equivalent of at least six hours per week of Technical Electives must be taken from the Mechanical Engineering Technical Elective list. The remaining Technical Electives may be taken from the Industrial Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

**Note 2:** Only a limited number of Technical Electives are offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

---

**3680**

**Mechanical Engineering — Part-time**

*(New Course)*

W.S. & L.B. Robinson College

Broken Hill

**Bachelor of Engineering**

**BE**

**Year 1**

<table>
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<tr>
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<th>Hours per week</th>
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<th>S2</th>
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**Year 5**

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<tr>
<td>Dynamics of Machines</td>
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<td>Dynamics of Machines</td>
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<tr>
<td>Operational Management</td>
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<tr>
<td>Fluid Dynamics/Thermodynamics Electives</td>
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<td>General Studies Elective</td>
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---

53
## Engineering

### Year 6

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<th>S2</th>
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<tbody>
<tr>
<td>5.044 Industrial Training II</td>
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<tr>
<td>5.051 Thesis</td>
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<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.062 Communications</td>
<td></td>
<td>6</td>
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<tr>
<td>5.343 Linear Systems Analysis</td>
<td></td>
<td>2</td>
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</tr>
<tr>
<td>5.344 Feedback Control</td>
<td></td>
<td>3</td>
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</table>

Note 1: By the end of Year 6 the equivalent of 7 1/2 hours per week for a year of Technical Electives must have been completed. The list of electives is shown below. A counselling service will be available to assist students in their choice.

Note 2: Only a limited number of Technical Electives is offered each year, dependent on staff availability and student demand. Students will be advised in September each year of the choices available for each year.

| Mechanics of Solids Technical Electives          |                |    |    |
| 5.424 General Mechanics of Solids                |                | 5  | 4 |
| 5.444 Theory of Elasticity                        |                | 5  | 4 |

| Mechanical Design Technical Electives             |                |    |    |
| 5.1241 Creative Design Project                    |                | 5  | 4 |
| 5.1243 Machinery Design Project                   |                | 5  | 4 |

| Fluid Mechanics/Thermodynamics Technical Electives|                |    |    |
| 5.623 Heat Transfer                               |                | 5  | 4 |
| 5.624 Refrigeration and Air Conditioning          |                | 5  | 4 |
| 5.633 Turbomachines                              |                | 5  | 4 |

| Technical Electives                               |                |    |    |
| 5.424 Materials Science                           |                | 5  | 4 |
| 5.434 Plates and Shells                           |                | 5  | 4 |
| 5.444 Theory of Plasticity                        |                | 5  | 4 |

### Stage 2*

<table>
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<tr>
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<th>Hours per week</th>
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<tbody>
<tr>
<td>2.951 Chemistry I (ME)</td>
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<td>6</td>
<td>6</td>
</tr>
<tr>
<td>5.010 Engineering A</td>
<td></td>
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<tr>
<td>5.030 Engineering C</td>
<td></td>
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<tr>
<td>5.040 Engineering D</td>
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*Not offered in 1982.

### Stage 3*

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<th>Hours per week</th>
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<tbody>
<tr>
<td>5.330 Engineering Dynamics</td>
<td></td>
<td>2</td>
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<tr>
<td>5.411 Mechanics of Solids II</td>
<td></td>
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<tr>
<td>8.259 Properties of Materials</td>
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<tr>
<td>10.022 Engineering Mathematics II</td>
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*Not offered in 1982.

### Stage 4

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<th>Hours per week</th>
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<tr>
<td>5.032 Experimental Engineering II</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.111 Mechanical Engineering Design I</td>
<td></td>
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<tr>
<td>5.611 Fluid Mechanics/Thermodynamics I</td>
<td></td>
<td>4</td>
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<td>6.801 Electrical Engineering</td>
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### Stage 5

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<tbody>
<tr>
<td>5.071 Engineering Analysis</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.112 Mechanical Engineering Design II</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.331 Dynamics of Machines I</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.412 Mechanics of Solids III</td>
<td></td>
<td>2</td>
<td>2</td>
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<tr>
<td>5.612 Fluid Mechanics/Thermodynamics II</td>
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### Stage 6

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<tr>
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<tbody>
<tr>
<td>5.042 Industrial Experience*</td>
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<td>0</td>
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<tr>
<td>5.113 Mechanical Engineering Design III</td>
<td></td>
<td>6</td>
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<tr>
<td>5.324 Automatic Control Engineering</td>
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### 3690 Mechanical Engineering — Part-time (Old Course)

#### Bachelor of Science (Engineering)
BSc(Eng)

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering).

### Stage 1*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
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<th>S2</th>
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<tbody>
<tr>
<td>1.001 Physics I or</td>
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<tr>
<td>1.011 Higher Physics I</td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>10.001 Mathematics I or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.011 Higher Mathematics I</td>
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</table>

*Not offered in 1982.

### Plus one of the following technical electives:

<table>
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<th>Course</th>
<th>Hours per week</th>
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<th>S2</th>
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</thead>
<tbody>
<tr>
<td>4.913 Materials Science or</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.332 Dynamics of Machines II or</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>5.413 Mechanics of Solids IV</td>
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<td></td>
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</table>

*See the introduction of School of Mechanical and Industrial Engineering.
Course Outlines

Mechanical Engineering Technical Electives

**Applied Mechanics**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.332</td>
<td>Dynamics of Machines II</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.334</td>
<td>Engineering Dynamics II</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.345G</td>
<td>Analogue Control Systems</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.3541</td>
<td>Engineering Noise I</td>
<td>S2: 0</td>
</tr>
<tr>
<td>5.3542</td>
<td>Engineering Noise II</td>
<td>S2: 3</td>
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</tbody>
</table>

**Mechanics of Solids**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.413</td>
<td>Mechanics of Solids IV</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.417G</td>
<td>Mechanics of Fracture and Fatigue</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.424</td>
<td>General Mechanics of Solids</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.434</td>
<td>Plates and Shells</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.444</td>
<td>Theory of Elasticity</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.454</td>
<td>Theory of Plasticity</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.464</td>
<td>Structural Instability</td>
<td>S2: 0</td>
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**Mechanical Design**

<table>
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<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.113</td>
<td>Mechanical Engineering Design III</td>
<td>S1: 6</td>
</tr>
<tr>
<td>5.124</td>
<td>Mechanical Engineering Design IV</td>
<td>S1: 6</td>
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<tr>
<td>5.1241</td>
<td>Creative Design Project</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.1242</td>
<td>Design Technology</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.1243</td>
<td>Machinery Design Project</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.1244</td>
<td>Design Management</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.1245</td>
<td>Computer-Based Engineering Design</td>
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**Fluid Mechanics/Thermodynamics**

<table>
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<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.623</td>
<td>Heat Transfer</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.624</td>
<td>Refrigeration and Air Conditioning</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.633</td>
<td>Turbomachines</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.6341</td>
<td>Viscous Flow Theory</td>
<td>S1/2: 1½</td>
</tr>
<tr>
<td>5.6342</td>
<td>Lubrication</td>
<td>S1/2: 1½</td>
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<tr>
<td>5.635</td>
<td>Convection Heat Transfer</td>
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<tr>
<td>5.643</td>
<td>Classical Thermodynamics and Combustion</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.644</td>
<td>Solar Energy</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.653</td>
<td>Compressible Flow</td>
<td>S2: 3</td>
</tr>
<tr>
<td>5.654</td>
<td>Hydraulic Transients</td>
<td>S2: 3</td>
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<td>5.663</td>
<td>Potential Flow Theory</td>
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<tr>
<td>5.664</td>
<td>Multiphase Flow</td>
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<tr>
<td>5.673</td>
<td>Special Fluid Mechanics Elective</td>
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<tr>
<td>5.674</td>
<td>Special Thermodynamics</td>
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**Industrial Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>18.004</td>
<td>Manufacturing Management</td>
<td>S1: 2</td>
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<tr>
<td>18.224</td>
<td>Numerical Control of Machine Tools</td>
<td>S2: 3</td>
</tr>
<tr>
<td>18.303</td>
<td>Methods Engineering</td>
<td>S2: 2</td>
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**Other Technical Electives**

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<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>4.913</td>
<td>Materials Science</td>
<td>S1: 3</td>
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<td>5.074</td>
<td>Computing Science for Mechanical Engineers</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.811</td>
<td>Aerodynamics I</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.831</td>
<td>Aircraft Propulsion</td>
<td>S1: 2</td>
</tr>
<tr>
<td>23.051</td>
<td>Nuclear Power Technology</td>
<td>S1: 3</td>
</tr>
</tbody>
</table>

Note: The graduate subjects listed are of particular interest to undergraduate students; with approval, other graduate subjects from this and other Schools may be taken.

**3610 Aeronautical Engineering — Full-time (New Course)**

**Bachelor of Engineering BE**

The first and second years of this course are identical with the first two years of the full-time new course in Mechanical Engineering. Subject to the Head of the School of Mechanical and Industrial Engineering being satisfied that the present extent of equivalences is maintained, and on his recommendation, Faculty has approved an arrangement by which students who satisfy the requirements of the first two years of the Mechanical Engineering full-time degree course at any other Australian tertiary institution may be admitted to a two-year program leading to the Bachelor of Engineering degree in Aeronautical Engineering.

**Year 3**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>5.034</td>
<td>Engineering Experimentation</td>
<td>S1/2: 1½</td>
</tr>
<tr>
<td>5.043</td>
<td>Industrial Training †</td>
<td>S1: 0</td>
</tr>
<tr>
<td>5.073</td>
<td>Numerical Analysis/Mathematics</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.303</td>
<td>Mechanical Vibrations</td>
<td>S1: 1½</td>
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<tr>
<td>5.343</td>
<td>Linear Systems Analysis</td>
<td>S1: 3</td>
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<tr>
<td>5.423</td>
<td>Mechanics of Solids III</td>
<td>S1: 2</td>
</tr>
<tr>
<td>5.800</td>
<td>Aircraft Design I</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.811</td>
<td>Aerodynamics I</td>
<td>S1: 3</td>
</tr>
<tr>
<td>5.822</td>
<td>Analysis of Aerospace Structures I</td>
<td>S1: 2</td>
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<tr>
<td>6.854</td>
<td>Electrical Engineering</td>
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<tr>
<td>18.603</td>
<td>Management/Economics</td>
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Two General Studies Electives 3

<table>
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<th>Course Code</th>
<th>Course Name</th>
<th>Hours per week</th>
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<tbody>
<tr>
<td>†Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.</td>
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55
Year 4

5.044 Industrial Training II 0 0
5.051 Thesis 6 6
5.062 Communications 2 2
5.801 Aircraft Design II 3 3
5.812 Aerodynamics II 3 3
5.823 Analysis of Aerospace Structures II 2 2
5.831 Aircraft Propulsion 2 2

General Studies Elective 1½ 1½

Total 22½ 22½

Note 1: The Technical Electives may be taken from the Mechanical Engineering or Industrial Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School (5.344 Feedback Control from Year 4 of the Mechanical Engineering degree course is recommended in this respect). Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.

Plus one of the following technical electives:

4.913 Materials Science or
5.324 Automatic Control Engineering or
8.026 Systems Methods in Civil Engineering or
18.022 Industrial Engineering II or
18.551 Operations Research

Total 23½ 23½

*Not offered in 1982.

3610 Aeronautical Engineering — Full-time (Old Course)

Bachelor of Engineering BE

The first and second years of this course are identical with the first two years of the full-time old course in Mechanical Engineering.

Year 3**

<table>
<thead>
<tr>
<th>Course</th>
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<tbody>
<tr>
<td>5.033 Experimental Engineering III</td>
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<tr>
<td>5.043 Industrial Training I†</td>
<td>0 0</td>
</tr>
<tr>
<td>5.071 Mechanical Engineering</td>
<td>3½ 3½</td>
</tr>
<tr>
<td>5.303 Mechanical Vibrations</td>
<td>1½ 0</td>
</tr>
<tr>
<td>5.412 Mechanics of Solids III</td>
<td>2 2</td>
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<tr>
<td>5.800 Aircraft Design I</td>
<td>0 2½</td>
</tr>
<tr>
<td>5.811 Aerodynamics I</td>
<td>3 3</td>
</tr>
<tr>
<td>5.822 Analysis of Aerospace Structures I</td>
<td>2 2</td>
</tr>
<tr>
<td>6.853 Analogue &amp; Digital Instrumentation*</td>
<td>3 or 3</td>
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<tr>
<td>18.011 Industrial Engineering IA or IIB</td>
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<tr>
<td>18.021 General Studies Elective</td>
<td>3 3</td>
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</table>

*One session only: Students take this subject in either Session 1 or Session 2.
†Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.
**Not offered in 1982.

3610 Aeronautical Engineering — Part-time (New Course)

Bachelor of Engineering BE

The first three years of this course are identical with the first three years of the part-time new course in Mechanical Engineering.

Year 4

<table>
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<th>Course</th>
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<tbody>
<tr>
<td>5.073 Numerical Analysis/Mathematics</td>
<td>3 3</td>
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<tr>
<td>5.303 Mechanical Vibrations</td>
<td>0 1½</td>
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<tr>
<td>5.343 Linear Systems Analysis</td>
<td>3 0</td>
</tr>
<tr>
<td>5.423 Mechanics of Solids III</td>
<td>2 2</td>
</tr>
<tr>
<td>5.811 Aerodynamics I</td>
<td>3 3</td>
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<tr>
<td>6.854 Electrical Engineering</td>
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<td>General Studies Elective</td>
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Total 12½ 15
**Year 5**

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<th>S2</th>
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<tbody>
<tr>
<td>5.034 Engineering Experimentation</td>
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<td>1½</td>
<td>1½</td>
</tr>
<tr>
<td>5.043 Industrial Training I</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.800 Aircraft Design I</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.822 Analysis of Aerospace Structures I</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.831 Aircraft Propulsion</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>18.603 Management/Economics</td>
<td></td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Technical Electives</td>
<td></td>
<td>3</td>
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</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
<td>0</td>
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</tr>
</tbody>
</table>

Total Hours: 15½ + 14½

**Stage 6**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.042 Industrial Experience*</td>
<td></td>
<td>0</td>
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</tr>
<tr>
<td>5.801 Aircraft Design II</td>
<td></td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>5.812 Aerodynamics II</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.823 Analysis of Aerospace Structures II</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.831 Aircraft Propulsion</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>General Studies Elective</td>
<td></td>
<td>1½</td>
<td>1½</td>
</tr>
</tbody>
</table>

Total Hours: 12½ + 12½

*See the introduction to School of Mechanical and Industrial Engineering

---

**Year 6**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.044 Industrial Training II</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.051 Thesis</td>
<td></td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>5.062 Communications</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.801 Aircraft Design II</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.812 Aerodynamics II</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.823 Analysis of Aerospace Structures II</td>
<td></td>
<td>2</td>
<td>2</td>
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</tbody>
</table>

Total Hours: 16 + 16

---

**3700 Naval Architecture — Full-time (New Course)**

**Bachelor of Engineering BE**

The first and second years of this course are identical with the first two years of the full-time new course in Mechanical Engineering. Subject to the Head of the School of Mechanical and Industrial Engineering being satisfied that the present extent of equivalences is maintained, and on his recommendation, Faculty has approved an arrangement by which students who satisfy the requirements of the first two years of the Mechanical Engineering full-time degree course at any other Australian tertiary institution may be admitted to a two-year program leading to the Bachelor of Engineering degree in Naval Architecture.

---

**Year 3**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.034 Engineering Experimentation</td>
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<td>1½</td>
<td>1½</td>
</tr>
<tr>
<td>5.043 Industrial Training I†</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>5.073 Numerical Analysis/Mathematics</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.303 Mechanical Vibrations</td>
<td></td>
<td>0</td>
<td>1½</td>
</tr>
<tr>
<td>5.423 Mechanics of Solids III</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.901 Introduction to Mathematical Modelling and Decision Making</td>
<td></td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>5.902 Ship Management Economics</td>
<td></td>
<td>1½</td>
<td>0</td>
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<tr>
<td>5.911 Ship Hydrostatics</td>
<td></td>
<td>2½</td>
<td>2½</td>
</tr>
<tr>
<td>5.921 Ship Structures I</td>
<td></td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>5.931 Principles of Ship Design I</td>
<td></td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>5.953 Ship Hydrodynamics</td>
<td></td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>6.854 Electrical Engineering</td>
<td></td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>Two General Studies Electives</td>
<td></td>
<td>3</td>
<td>3</td>
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</tbody>
</table>

Total Hours: 21½ + 24½

*Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

---

**3600 Aeronautical Engineering — Part-time (Old Course)**

**Bachelor of Science (Engineering) BSc(Eng)**

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering). The first four stages are identical with the Mechanical Engineering part-time old course.

**Stage 5**

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.071 Engineering Analysis</td>
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<td>3½</td>
<td>3½</td>
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<tr>
<td>5.412 Mechanics of Solids III</td>
<td></td>
<td>2</td>
<td>2</td>
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<tr>
<td>5.811 Aerodynamics I</td>
<td></td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>5.822 Analysis of Aerospace Structures I</td>
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<td>2</td>
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</tr>
<tr>
<td>5.303 Mechanical Vibrations</td>
<td></td>
<td>0</td>
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</table>

Total Hours: 10½ + 12
### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hours</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.044 Industrial Training II</td>
<td></td>
<td>5.062</td>
<td></td>
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<tr>
<td>5.051 Thesis</td>
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<td>5.933</td>
<td></td>
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<tr>
<td>5.052 Communications</td>
<td></td>
<td>5.934</td>
<td></td>
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<tr>
<td>5.222 Ship Structures II</td>
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<td>5.941</td>
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<td>5.9211 Principles of Ship Design II</td>
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<td>General Studies Elective</td>
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<tr>
<td>5.937 Ship Design Project</td>
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<td>4.913</td>
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<td>5.941 Ship Propulsion and Systems</td>
<td></td>
<td>8.026</td>
<td></td>
<td></td>
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<tr>
<td>General Studies Elective</td>
<td></td>
<td>18.022</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>18.551</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>26 1/2</td>
<td></td>
<td></td>
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<tr>
<td>Plus one of the following technical electives:</td>
<td></td>
<td>24</td>
<td></td>
<td></td>
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<tr>
<td>4.913 Materials Science or</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.026 Systems Methods in</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Civil Engineering or</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18.022 Industrial Engineering II B or</td>
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<tr>
<td>18.551 Operations Research</td>
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</tbody>
</table>

*Not offered in 1982.

### 3700

**Naval Architecture — Full-time (Old Course)**

**Bachelor of Engineering BE**

The first and second years of this course are identical with the first two years of the full-time old course in Mechanical Engineering. Subject to the Head of the School of Mechanical and Industrial Engineering being satisfied that the present extent of equivalences is maintained, and on his recommendation, Faculty has approved an arrangement by which students who satisfy the requirements of the first two years of the Mechanical Engineering full-time degree course at any other Australian tertiary institution may be admitted to a two-year program leading to the Bachelor of Engineering degree in Naval Architecture.

### Year 3*

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hours</th>
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<th>S2</th>
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<td>5.073</td>
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<tr>
<td>5.043 Industrial Training II</td>
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<td>5.423</td>
<td></td>
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<tr>
<td>5.071 Engineering Analysis</td>
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<td>5.911</td>
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<td>5.303 Mechanical Vibrations</td>
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<tr>
<td>5.412 Mechanics of Solids III</td>
<td></td>
<td>2/3</td>
<td></td>
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<tr>
<td>5.911 Naval Architecture</td>
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<td>2/3</td>
<td></td>
<td></td>
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<td>5.921 Ship Structures I</td>
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<td>2/3</td>
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<td></td>
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<tr>
<td>5.931 Principles of Ship Design IA</td>
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<td>2/3</td>
<td></td>
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<tr>
<td>5.932 Principles of Ship Design II A</td>
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<td>2/3</td>
<td></td>
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<tr>
<td>5.951 Hydrodynamics</td>
<td></td>
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<td>18.021 Industrial Engineering IB</td>
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</table>

*Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

*Not offered in 1982.

### Year 4*

<table>
<thead>
<tr>
<th>Course</th>
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<th>Hours</th>
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<th>S2</th>
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<tr>
<td>5.044 Industrial Training II</td>
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<td>General Studies Elective</td>
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<tr>
<td></td>
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<td>15</td>
<td></td>
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</tr>
</tbody>
</table>

*Not offered in 1982.

### 3700

**Naval Architecture — Part-time (New Course)**

**Bachelor of Engineering BE**

The first three years of this course are identical with the first three years of the part-time new course in Mechanical Engineering.

### Year 4

<table>
<thead>
<tr>
<th>Course</th>
<th>Hours per week</th>
<th>Hours</th>
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<th>S2</th>
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</thead>
<tbody>
<tr>
<td>5.034 Engineering Experimentation</td>
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<td></td>
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<tr>
<td>5.043 Industrial Training</td>
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<td></td>
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<tr>
<td>5.901 Introduction to Mathematical</td>
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<td>5.901</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Modelling and Decision Making</td>
<td></td>
<td>5.902</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.902 Ship Management Economics</td>
<td></td>
<td>2/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.922 Ship Structures II</td>
<td></td>
<td>2/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.931 Principles of Ship Design I</td>
<td></td>
<td>2/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.941 Ship Propulsion and Systems</td>
<td></td>
<td>2/3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.854 Electrical Engineering</td>
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<td>2/3</td>
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<tr>
<td>General Studies Elective</td>
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<tr>
<td></td>
<td></td>
<td>15</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Not offered in 1982.
Department of Industrial Engineering

The Department of Industrial Engineering offers a course in Industrial Engineering leading to the award of the degree of Bachelor of Engineering. This course is designed for students with engineering ability whose interests lie in the planning, developing and control of manufacturing or service operations. It may be taken either on a full-time basis, normally over four years or on a part-time basis, normally over six years, or on a combined full-time/part-time basis, subject to the approval of the Head of School.

The first two years of the degree course, taken full-time, or the first three years taken part-time provide the student with a sound foundation in the basic science and engineering subjects, and this knowledge is used and extended in the later years in the study of the industrial subjects. Finally, the problems associated with the practical economics of manufacturing operations are studied. These three fields of study provide the student with the training necessary to carry out an industrial job and to examine it critically in the light of economic efficiency.

Traditionally engineering courses do not embrace the problems which are characteristic of Industrial Engineering. These problems include the analysis of a product to ensure satisfactory functioning with regard to methods and sequence of manufacturing operations; the disposition of buildings and of equipment in relation to buildings to permit efficient handling of materials; the avoidance or elimination of bottlenecks; the related problems of quality and cost control, testing and inspection; labour and personnel relations; and, finally, the problem of distribution and sales.

The financial and economic aspects are studied as the problem in manufacturing has not been solved until the final translation of the product into money has been accomplished successfully. While it is not intended to develop an expert in accounting practice or economics, it is intended to produce an engineer with an appreciation of the problems of cost and one who can apply considerations of ultimate economy to all industrial problems. The techniques of operations research may be applied here, where mathematical models of real life situations are constructed and manipulated to yield optimal solutions as guides to management.

The Work of the Industrial Engineer

The industrial engineer may initially be employed in any of the following major areas of industrial activity:

1. Industrial Economic Analysis

One of the principal functions of industrial engineering is to analyse a product, project or process from the economic point of view to ensure than an adequate profit can be obtained from it. A general working knowledge of economics and management
skill has to be directed towards the making of decisions on how to operate an enterprise most efficiently. The basis for such decisions is furnished largely by the logical application of mathematics and statistics.

2. Planning and Control of Production

Manufacturing processes and operations must be planned in detail throughout an enterprise to ensure that they proceed smoothly and economically. Functions in this field include the establishment of production standards, the setting of production targets and, finally, control of quality.

The ultimate responsibility of those in charge of the planning and control of production is to ensure that the goods, as originally specified, perform satisfactorily and are produced when required at an optimum cost. Computer systems are increasingly being used to achieve this.

3. Product and Process Design

The design interest of the industrial engineer goes beyond normal mechanical design to develop a product that will not only function effectively but also have a pleasing appearance.

Further, the product has to be adapted to suit existing manufacturing equipment, or a manufacturing process has to be developed by means of which an existing product can be manufactured at the right price and of the right quality. The design work of the industrial engineer incorporates also problems of equipment selection and application for both economy and performance. Fundamental scientific studies of manufacturing processes such as metal machining, forming and casting are continually being made to improve their efficiency.

4. Methods Engineering

Methods engineering is concerned with the design of systems to properly utilize and co-ordinate personnel, materials and machines so that an enterprise will run efficiently. A sound knowledge of engineering in general, together with an understanding of human factors and economics is necessary for this work. It includes the design of plant layouts and materials handling systems, job design and the setting of standard times for work.

5. Operations Research

This is the attack of modern science on complex problems arising in the direction and management of large systems of men, machines, materials and money in industry, business, government and defence. The distinctive approach is to develop a scientific model of the system, incorporating measurements of factors such as chance and risk, with which to predict and compare the outcomes of alternative decisions, strategies or controls. The purpose is to help management determine its policy and actions scientifically.

Employment in any of these fields may well lead to a position of responsibility in industrial management if the engineer is so inclined.

3660
Industrial Engineering — Full-time
(New Course)

Bachelor of Engineering
BE

The first and second years of this course are identical with the first two years of the full-time new course in Mechanical Engineering.

Year 3

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.043</td>
<td>Industrial Training I†</td>
<td>S1: 0, S2: 0</td>
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<tr>
<td>6.854</td>
<td>Electrical Engineering</td>
<td>S1: 0, S2: 4</td>
</tr>
<tr>
<td>14.001</td>
<td>Introduction to Accounting A</td>
<td>S1: 1½, S2: 0</td>
</tr>
<tr>
<td>14.002</td>
<td>Introduction to Accounting B</td>
<td>S1: 0, S2: 1½</td>
</tr>
<tr>
<td>18.003</td>
<td>Numerical Methods/Industrial Experimentation</td>
<td>S1: 1½, S2: 2</td>
</tr>
<tr>
<td>18.303</td>
<td>Methods Engineering Technology</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>18.403</td>
<td>Production Design and Technology</td>
<td>S1: 4, S2: 4</td>
</tr>
<tr>
<td>18.413</td>
<td>Design for Industrial Engineers</td>
<td>S1: 2, S2: 3</td>
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<td>18.503</td>
<td>Operations Research A</td>
<td>S1: 3, S2: 3</td>
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<td>Management/Economics</td>
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<td>18.803</td>
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<td>Two General Studies Electives</td>
<td>S1: 3, S2: 3</td>
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</table>

| Total       |                                                       | S1: 24, S2: 22½ |

†Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

Year 4

<table>
<thead>
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<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.044</td>
<td>Industrial Training II</td>
<td>S1: 0, S2: 0</td>
</tr>
<tr>
<td>5.051</td>
<td>Thesis</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>5.062</td>
<td>Communications</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>18.004</td>
<td>Manufacturing Management</td>
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</tr>
<tr>
<td></td>
<td>Technical Electives</td>
<td>S1: 10, S2: 1½</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 1½, S2: 1½</td>
</tr>
</tbody>
</table>

| Total       |                                                       | S1: 21½, S2: 21½ |

Note 1: At least 6 hours per week of Technical Electives must be taken from the Industrial Engineering Technical Elective List. The remaining Technical Electives may be taken from the Mechanical Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counselling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

Note 2: Only a limited number of Technical Electives is offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.
### Bachelor of Engineering (BE)

The first and second years of this course are identical with the first two years of the full-time old course in Mechanical Engineering.

#### Year 3*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.033</td>
<td>Experimental Engineering III</td>
<td>S1: 1½, S2: 1½</td>
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<tr>
<td>5.043</td>
<td>Industrial Training I</td>
<td>S1: 0, S2: 0</td>
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<tr>
<td>5.071</td>
<td>Engineering Analysis</td>
<td>S1: 3½, S2: 3½</td>
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<tr>
<td>5.112</td>
<td>Mechanical Engineering Design II</td>
<td>S1: 3, S2: 3</td>
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<tr>
<td>5.331</td>
<td>Dynamics of Machines I</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>5.412</td>
<td>Mechanics of Solids III</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>14.001</td>
<td>Introduction to Accounting A</td>
<td>S1: 1½, S2: 0</td>
</tr>
<tr>
<td>14.002</td>
<td>Introduction to Accounting B</td>
<td>S1: 0, S2: 1½</td>
</tr>
<tr>
<td>18.011</td>
<td>Industrial Engineering IA</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>18.021</td>
<td>Industrial Engineering IB</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 3, S2: 3</td>
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<td></td>
<td><strong>Total</strong></td>
<td>S1: 20½, S2: 20½</td>
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*Report to be submitted in Week 1 of Session 1 detailing involvement and experience gained prior to Year 3.

*Not offered in 1982.

#### Year 4*

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Hours per week</th>
</tr>
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<tbody>
<tr>
<td>5.044</td>
<td>Industrial Training II</td>
<td>S1: 0, S2: 0</td>
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<tr>
<td>5.051</td>
<td>Thesis</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>5.062</td>
<td>Communications</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>18.012</td>
<td>Industrial Engineering IIA</td>
<td>S1: 3, S2: 3</td>
</tr>
<tr>
<td>18.022</td>
<td>Industrial Engineering IIB</td>
<td>S1: 3, S2: 3</td>
</tr>
<tr>
<td>18.431</td>
<td>Design for Production</td>
<td>S1: 3, S2: 3</td>
</tr>
<tr>
<td>18.551</td>
<td>Operations Research</td>
<td>S1: 3, S2: 3</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 1½, S2: 1½</td>
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</table>

**Plus one elective chosen from:**

- 4.913 Materials Science
- 5.324 Automatic Control Engineering
- 5.332 Dynamics of Machines II
- 5.413 Mechanics of Solids II
- 8.026 Systems Methods in Civil Engineering

<p>| | | |</p>
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<thead>
<tr>
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<td><strong>Total</strong></td>
<td>S1: 24½, S2: 24½</td>
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*Not offered in 1982.

### Year 5

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<tbody>
<tr>
<td>5.043</td>
<td>Industrial Training I</td>
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<tr>
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<td>Introduction to Accounting A</td>
<td>S1: 1½, S2: 0</td>
</tr>
<tr>
<td>14.002</td>
<td>Introduction to Accounting B</td>
<td>S1: 0, S2: 1½</td>
</tr>
<tr>
<td>18.004</td>
<td>Manufacturing Management</td>
<td>S1: 2, S2: 2</td>
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<tr>
<td>18.303</td>
<td>Methods Engineering</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td>18.603</td>
<td>Management/Economics</td>
<td>S1: 4, S2: 0</td>
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<tr>
<td></td>
<td>Technical Electives</td>
<td>S1: 5, S2: 5</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
<td>S1: 0, S2: 3</td>
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<tr>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
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### Year 6*

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<tr>
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<td>Industrial Training II</td>
<td>S1: 0, S2: 0</td>
</tr>
<tr>
<td>5.051</td>
<td>Thesis</td>
<td>S1: 6, S2: 6</td>
</tr>
<tr>
<td>5.062</td>
<td>Communications</td>
<td>S1: 2, S2: 2</td>
</tr>
<tr>
<td></td>
<td>Technical Electives</td>
<td>S1: 5, S2: 5</td>
</tr>
<tr>
<td></td>
<td>General Studies Elective</td>
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<td><strong>Total</strong></td>
<td>S1: 15½, S2: 14½</td>
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</table>

*Not offered in 1982.

**Note 1:** By the end of Year Six, the equivalent of 10 hours per week for a year of Technical Electives must have been completed. The equivalent of at least 6 hours per week for a year of Technical Electives must be taken from the Industrial Engineering Technical Elective List. The remaining Technical Electives may be taken from the Mechanical Engineering Technical Elective List or from Years 3 or 4 of other courses in the School or suitable subjects outside the School. Students with good academic records may include some graduate subjects. A counseling service is provided to assist students to choose electives. The selection of certain subjects or combinations of subjects may require the approval of the Head of School.

**Note 2:** Only a limited number of Technical Electives are offered each year. The actual Technical Electives offered each year are decided on the basis of staff availability and student demand. Students are advised in September of each year which Technical Electives will be offered in the following year.
Bachelor of Science (Engineering) BSc(Eng)

This course is of six years' duration, and leads to the degree of Bachelor of Science (Engineering). For outline of the first four stages see the Mechanical Engineering part-time old course.

Stage 5

<table>
<thead>
<tr>
<th>Hours per week</th>
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<tbody>
<tr>
<td>S1</td>
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<tr>
<td>5.071 Engineering Analysis</td>
<td>3½</td>
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<tr>
<td>5.112 Mechanical Engineering Design II</td>
<td>3</td>
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<tr>
<td>5.331 Dynamics of Machines I</td>
<td>2</td>
</tr>
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<td>14.001 Introduction to Accounting A</td>
<td>1½</td>
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<td>14.002 Introduction to Accounting B</td>
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<td>18.011 Industrial Engineering IA</td>
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Stage 6

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<tbody>
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<td>S1</td>
<td>S2</td>
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<tr>
<td>5.042 Industrial Experience*</td>
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<tr>
<td>18.022 Industrial Engineering IIB</td>
<td>3</td>
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<tr>
<td>18.432 Design of Production Systems</td>
<td>6</td>
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<tr>
<td>18.551 Operations Research</td>
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</tr>
<tr>
<td>General Studies Elective</td>
<td>1½</td>
</tr>
<tr>
<td>13½</td>
<td>13½</td>
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</tbody>
</table>

*See the introduction of School of Mechanical and Industrial Engineering.

Industrial Engineering Technical Electives

Production Engineering

<table>
<thead>
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<th></th>
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</thead>
<tbody>
<tr>
<td>S1</td>
<td>S2</td>
</tr>
<tr>
<td>5.454 Theory of Plasticity</td>
<td>3</td>
</tr>
<tr>
<td>18.224 Numerical Control of Machine Tools</td>
<td>3</td>
</tr>
<tr>
<td>18.404 Design for Production</td>
<td>2</td>
</tr>
<tr>
<td>18.371A Factory Design and Layout</td>
<td>3</td>
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</tbody>
</table>

Operations Research

<table>
<thead>
<tr>
<th>Hours per week</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>S2</td>
</tr>
<tr>
<td>5.074 Computing Science for Mechanical Engineers</td>
<td>3</td>
</tr>
<tr>
<td>18.671G Decision Theory</td>
<td>2</td>
</tr>
<tr>
<td>18.673G Energy Modelling, Optimization and Energy Accounting</td>
<td>3</td>
</tr>
<tr>
<td>18.764G Management of Distribution Systems</td>
<td>2</td>
</tr>
<tr>
<td>18.765G Optimization of Networks</td>
<td>2</td>
</tr>
<tr>
<td>18.777G Time Series and Forecasting</td>
<td>2</td>
</tr>
<tr>
<td>18.864G Applied Geometric Programming</td>
<td>2</td>
</tr>
<tr>
<td>18.874G Dynamic Programming</td>
<td>2</td>
</tr>
<tr>
<td>18.878G Industrial Application of Mathematical Programming</td>
<td>2</td>
</tr>
</tbody>
</table>

Note: The graduate subjects listed are of particular interest to undergraduate students. With approval, other graduate subjects from this and other Schools may be taken.

School of Surveying

Head of School
Professor P. V. Angus-Leppan

Administrative Officer
Mr J. V. Fonseka

The School of Surveying offers a full-time course of four years' duration leading to the award of the degree of Bachelor of Surveying. Alternatively, the course may be taken in a sandwich form in which a student may, after completing the first year of the course on a full-time basis, alternate his or her studies with periods of employment by taking leaves of absence of up to two consecutive sessions at a time thereafter. The course taken in this form requires a maximum period of seven years. The part-time course is no longer available.

The Bachelor of Surveying is a well-rounded course with a strong surveying base, aimed at preparing the graduate for a broad range of career opportunities, including land boundary surveying, engineering surveying, photogrammetry, cartography, mining surveying, hydrographic surveying, geodesy and geodetic surveying, computing and systems development, management and development of land, land information systems, resource assessment systems and remote sensing. The course recognizes the diversity of possible roles of a graduate who may be called on during his career to act as practitioner, consultant, manager, teacher or researcher.

The course has undergone comprehensive revision recently. Features of the revision include: retention of the course on a session basis for all subjects lectured within the School; integration of the sandwich course with the full-time course as
a result of the more flexible University policy towards leave of absence for students; elimination of the formally assessed professional training period in the earlier course; greater numbers of technical electives in the fourth year of study; further development of the Land Studies area; land development, inventory, law, tenure, and utilization, in continuing recognition of the growing importance of this area to surveyors; development of a formal strand to improve students' written and spoken communication skills.

Throughout the course the theoretical studies are complemented by practical exercises in the field and the laboratory. Students make use of the most modern measuring instruments and computing equipment.

The School also offers a full-time course of four years' duration leading to the award of the degree of Bachelor of Surveying Science. The course is designed to give an interested student the opportunity to obtain greater depth as an undergraduate in one or more of the several disciplines associated with surveying: land development, cartographic science, geodesy and geophysics, environmental studies, remote sensing and photogrammetry. It is so structured that:

1. All students must take a core consisting of 103 contact hours made up from some of the subjects of the Bachelor of Surveying course. These core subjects include the formal strands in Mathematics, Physics, Physical Geography, Surveying, written and spoken communication, and 12 hours of General Studies.

2. The balance, totalling 77 hours, must comprise:
   a) at least 18 hours taken from elective subjects of the final year of the Bachelor of Surveying course;
   b) the remainder made up from any subjects required as prerequisites for a) above and any combination of subjects offered by the University and approved by the Head of School for the individual program of study. Such approval would require that the student follow a particular sequence of subjects within a given subject area. Subjects offered by the University of Sydney and Macquarie University may also be taken subject to approval by the Head of School.

3. Resolution of class scheduling problems is the responsibility of the student.

Bachelor of Surveying students in their later years of study may elect to transfer to the new course if they so desire.

The Bachelor of Surveying or the Bachelor of Surveying Science degree may be awarded as a Pass degree, Honours Class I, or Honours Class II in two divisions. Honours are awarded in recognition of superior performance throughout the course.

Students wishing to become Registered Surveyors after graduation are advised to gain practical experience under a Registered Surveyor. Some reduction in the period of practical experience required before registration may be granted because of practical experience gained during the University course, provided the New South Wales Surveyors' Board is informed in the prescribed manner. Details are obtainable from the Registrar, Surveyors' Board, Department of Lands, Bridge Street, Sydney 2000. The degree of Bachelor of Surveying confers exemption from all written examinations of the Surveyors' Board. In the case of the Bachelor of Surveying Science degree, the New South Wales Surveyor's Board may require additional subjects for registration.

Students enrolled in either course are required to equip themselves with an electronic calculator. Advice on the purchase of this equipment is given to students at the commencement of their course.

3740
Surveying

Bachelor of Surveying
BSurv

Year 1

<table>
<thead>
<tr>
<th>Session 1</th>
<th>Hours per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.971 Physics I</td>
<td>6</td>
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<tr>
<td>5.0102 Introduction to Engineering Design</td>
<td>2</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>6</td>
</tr>
<tr>
<td>29.001 Surveying I</td>
<td>4½</td>
</tr>
<tr>
<td>29.800 Survey Draughting</td>
<td>3</td>
</tr>
<tr>
<td>29.700 Professional Orientation*</td>
<td>1½</td>
</tr>
<tr>
<td>29.191 Survey Camp †</td>
<td>1½</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session 2</th>
<th>Hours per week</th>
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</thead>
<tbody>
<tr>
<td>1.971 Physics I</td>
<td>6</td>
</tr>
<tr>
<td>5.030 Engineering C*</td>
<td>4</td>
</tr>
<tr>
<td>10.001 Mathematics I</td>
<td>6</td>
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<tr>
<td>29.002 Surveying II</td>
<td>5</td>
</tr>
<tr>
<td>29.150 Introduction to Computer Programming</td>
<td>2</td>
</tr>
<tr>
<td>29.191 Survey Camp †</td>
<td>1½</td>
</tr>
</tbody>
</table>

*Three half-day excursions are an essential part of this subject.
†Students are required to attend a one-week Survey Camp equivalent to 1½ class contact hours per week in each session.

*Introduction to Systems and Computers option.
†Students are required to attend a one-week Survey Camp equivalent to 1½ class contact hours per week in each session.
### Year 2
**Session 1**
- 1.962 Physics of Measurement 3
- 10.022 Engineering Mathematics II (1st part) 4
- 10.341 Statistics SU 2
- 27.235 Physical Geography for Surveyors† 4
- 29.003 Surveying III 5
- 29.151 Survey Computations I 4
- 29.192 Survey Camp II* 1½

**Total:** 23½

*Students are required to attend a one-week survey camp, which is equivalent to 1½ class contact hours per week in each session.

†One-day field tutorial is an essential part of this course.

**Session 2**
- 8.711 Engineering for Surveyors I 3
- 10.022 Engineering Mathematics II (2nd part) 4
- 10.341 Statistics SU 2
- 29.004 Surveying IV 4½
- 29.801 Cartography I 3
- 29.701 Seminar I 1
- 29.121 Electronics for Surveyors 2
- 29.192 Survey Camp II* 1½
- General Studies Elective 3

**Total:** 24

*Students are required to attend a one-week survey camp, which is equivalent to 1½ class contact hours per week in each session.

### Year 3
**Session 1**
- 29.005 Surveying V 5
- 29.152 Survey Computations II 4
- 29.631 Land Inventory I 2
- 29.651 Land Development I 3
- 29.661 Cadastral Surveying and Land Law I 2
- 36.411 Town Planning 2
- General Studies Elective 3

**Total:** 21

**Session 2**
- 8.712 Engineering for Surveyors II 3
- 29.006 Surveying VI 3
- 29.211 Geodesy I 4
- 29.311 Astronomy I 3
- 29.511 Photogrammetry I 4
- 29.652 Land Development II 3
- 29.662 Cadastral Surveying and Land Law II 3
- 29.195 Survey Camp III* 6

**Total:** 29

**See Year 4: Electives, below.**

### Year 4
**Session 1**
- 29.212 Geodesy II 3
- 29.312 Astronomy II 2
- 29.512 Photogrammetry II 3
- 29.653 Land Development III† 3
- 29.704 Management I 2
- 29.702 Seminar II 1
- Electives* 6
- 29.196 Survey Camp IV** 6

**Total:** 26

†One-day field tutorial is an essential part of this subject.

*See Year 4: Electives, below.

**Session 2**
- 29.705 Management II 2
- 29.703 Seminar III 1
- Electives* 15

**Total:** 18

*See Year 4: Electives, below.

### Year 4: Electives
Total of two General Studies Electives and five technical electives in any combination which results in 6 hours for Session 1 and 15 hours for Session 2. Technical electives (of 3 hours per week each, except 29.174) are chosen from:

- 29.031 Electronic Distance Measurement
- 29.032 Precise Surveying in Industry and Engineering
- 29.033 Characteristics of Modern Theodolites and Levels
- 29.034 Mine Surveying
- 29.035 History of Surveying
- 29.153 Adjustment of Control Surveys
- 29.161 Hydrographic Surveying I
- 29.162 Hydrographic Surveying II
- 29.173 Project
- 29.174 Major Project (6 hours per week)
- 29.213 Geodesy III
- 29.231 Geophysics for Surveyors
- 29.232 Atmospheric Effects on Geodetic Measurement
- 29.313 Astronomy III
- 29.513 Photogrammetry III
- 29.514 Remote Sensing Principles
- 27.173 Remote Sensing Applications
- 29.654 Land Development IV
- 29.632 Land Inventory II
- 29.663 Cadastral Surveying and Land Law III
- 29.664 Modern Title Concepts
- 29.802 Cartography II
- 29.803 Mapping Technology

Not all electives are offered in any one year. Subjects from other Schools and Faculties may be substituted with the approval of the Head of School.

**Students are required to attend a two-week survey camp, which is equivalent to 6 class contact hours per week.**
Course Outlines

3760  
Surveying Science  

Bachelor of Surveying Science  
BSurvSc  

The course consists of a mandatory program of 103 class contact hours including a General Studies program of 12 hours and an Elective Program of at least 77 hours. A student may undertake in any one session a load generally not exceeding 24 hours, comprising subjects from one or more of these programs, provided they are taken in sequence within each subject area and in accordance with their prerequisite and/or co-requisite requirements.

Mandatory Program

The mandatory program consists of the following subjects:

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<th>Subject</th>
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<tbody>
<tr>
<td>12</td>
<td>Physics I</td>
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<tr>
<td>12</td>
<td>Mathematics I</td>
</tr>
<tr>
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<td>Mathematics I</td>
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<tr>
<td>4½</td>
<td>Surveying I</td>
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<tr>
<td>5</td>
<td>Surveying II</td>
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<td>3</td>
<td>Survey Camp I</td>
</tr>
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<td>1½</td>
<td>Professional Orientation</td>
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<td>3</td>
<td>Physics of Measurement**</td>
</tr>
<tr>
<td>8</td>
<td>Engineering Mathematics**</td>
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<tr>
<td>4</td>
<td>Statistics SU**</td>
</tr>
<tr>
<td>4</td>
<td>Physical Geography for Surveyors**</td>
</tr>
<tr>
<td>5</td>
<td>Surveying III</td>
</tr>
<tr>
<td>2</td>
<td>Electronics for Surveyors**</td>
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<tr>
<td>4</td>
<td>Survey Computations I</td>
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<tr>
<td>1</td>
<td>Seminar I</td>
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<td>3</td>
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<td>Seminar III</td>
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<tr>
<td>5</td>
<td>Introduction to Computing</td>
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</table>

Total = 91 hours

Elective Program

This program consists of at least 18 hours (or 6 technical electives) selected from elective subjects of the final year of the BSurv course plus any subjects required as prerequisites for these electives and any combination of subjects offered by this University, the University of Sydney or Macquarie University provided that they are approved by the Head of School for the individual program of study. Such approval would require that a student follows a particular sequence of subjects within a selected area. This prescription means in effect that the elective component of the course can be varied to enable the student to choose the specialization that best suits his individual requirements so long as such specialization falls within the general disciplines associated with Surveying. Electives for such specialization may be chosen, for instance, from subject areas such as:

- Cartography and Mapping Technology
- Geography, Geographic Data Analysis, Mathematical Methods for Spatial Analysis
- Town, Urban and Neighbourhood Planning
- Geodesy, Geology, Earth Physics, Oceanography and Marine Science
- Astronomy
- Photogrammetry, Remote Sensing
- Land Law, Title Concepts, Cadastral Surveying
- Land Inventory
- Land Development and Management
- Building Economics
- Accounting and Computer Applications

Illustrative examples of programs that could be taken are available from the School.

*Offered in Year 1 of the BSurv Course (3740).
†Offered in Year 2 of the BSurv Course (3740).
‡Offered in Year 3 of the BSurv Course (3740).
§Offered in Year 4 of the BSurv Course (3740).
**May be replaced by a similar subject at least equal in coverage of the topic. Any resulting additional contact hours may be used in satisfying the Elective Program.

General Studies Program

This program consists normally of 4 General Studies subjects of 3 hours each (or their equivalent) and may be undertaken at any time during Years 2-4 of the Course, subject to the total load for a session, which, as a rule, should not exceed 24 hours.
Graduate Study

Faculty of Engineering
Enrolment Procedures

All students re-enrolling in 1982 or enrolling in graduate courses should obtain a copy of the free booklet *Enrolment Procedures 1982* available from School Offices and the Admissions Office. This booklet provides detailed information on enrolment procedures and fees, enrolment timetables by Faculty and course, enrolment in miscellaneous subjects, locations and hours of Cashiers and late enrolments.

Graduate School of Engineering

In November 1964 Council approved the establishment of the Graduate School of Engineering to co-ordinate and develop the graduate activities of the Faculty. For full details of such activities see brochures prepared by the Schools.

Research Degrees

The Faculty of Engineering provides facilities for well-qualified graduates to engage in advanced studies and research in all five schools and the Centre for Biomedical Engineering, leading to the award of the degrees of Doctor of Philosophy, Master of Engineering, Master of Science or Master of Surveying.

Course Work Degrees

The Master of Engineering Science/Master of Surveying Science are faculty-wide degrees, and allow for flexibility of choice between formal course work and research. A degree may be awarded through formal course work, a combination of formal course work and the completion of a report on a project or a research thesis, or completion of a research thesis only. The number of credits for a project report are 9, and for a research thesis 18 or 36.

Students are encouraged to develop interdisciplinary attitudes and, with the approval of the Heads of the Schools, may take subjects from other schools of the Faculty, other faculties of the University and other universities or institutions. By means of this system, a student, with approval of the Head of School, is able to select a program of studies best suited to his or her needs.

A minimum of thirty-six credits is required for the award of the Master of Engineering Science and Master of Surveying Science degrees in the Faculty.

Part-time candidates may be required to attend lectures on one half day per week in addition to the evenings.

The Master’s degree program in Remote Sensing is offered in both the Faculty of Engineering and the Faculty of Applied Science and leads to the award of the degree of Master of Engineering Science or Master of Applied Science respectively. Entry into either Faculty depends on the background of the applicant and the orientation of the proposed program.

The degree of Master of Biomedical Engineering is primarily obtained through course work but includes a research project conducted in either a hospital or other appropriate institution. The program of study, including the preparation of a thesis normally total 60 credit points. Students with advanced standing may be given limited exemption by the Higher Degree Committee of the Faculty of Engineering.

More details about the nature of the course work Master’s program can be found in the Foreword earlier in this Handbook.
Graduate Diploma
The Faculty of Engineering also offers courses leading to the award of a graduate diploma in several areas. Currently these are Graduate Diplomas in Engineering Developments; in Human Communication; in Surveying; and in Transport. Candidates must complete a program totalling 30 credits. Forty percent of the credits may consist of approved undergraduate subjects and the program may contain subjects from other schools of the Faculty, other faculties of the University, and other universities or institutions.

Before enrolment, an applicant must submit his intended program for approval by the head of the school or division which will offer the majority of the credits and ensure that he has the necessary prerequisite background for any subjects taken in other schools, faculties or institutions.

The program may be taken full-time, part-time or externally by tape correspondence or by a combination of these.

The purpose of offering these graduate diplomas is to provide engineers with the opportunity to update their professional knowledge in their own specialty, and to have access to a program of study in other areas which are relevant to their professional activities by virtue of changes and developments that are occurring. The subjects offered have been specially chosen for these purposes and many of them are available by radio and television broadcasts in the Sydney metropolitan area from year to year.

The graduate diploma courses in Engineering Developments are intended for those who wish to take a more general program in several areas of interest. They may contain subjects from the Schools in the Faculty, the Centre for Biomedical Engineering, the Division of Postgraduate Extension Studies and elsewhere. Subjects offered by tape correspondence are listed in this handbook under the Division of Postgraduate Extension Studies. (Subjects from other schools to be offered in any year by the Division of Postgraduate and Extension Studies are determined after consultation with that school and examination will be through that school.)

Graduate Subjects
The subjects which may be available for a candidate proceeding to the award of the degree of Master of Engineering Science, Master of Surveying Science, Master of Biomedical Engineering and Graduate Diploma are listed below under the various schools. Not all electives are necessarily offered in any particular year.

Under the credit system in operation in the Faculty, one credit is normally equal to one hour's attendance per week for one session. The qualification 'normally' is required because of the varying ways in which credits are distributed for course work, design, critical review or research in the different schools.

School of Civil Engineering

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.401G</td>
<td>Human Factors in Transport</td>
<td>3</td>
</tr>
<tr>
<td>8.402G</td>
<td>Transport, Environment, Community</td>
<td>6</td>
</tr>
<tr>
<td>8.403G</td>
<td>Theory of Land Use/Transport Interaction</td>
<td>3</td>
</tr>
<tr>
<td>8.404G</td>
<td>Local Area Transport Planning</td>
<td>3</td>
</tr>
<tr>
<td>8.405G</td>
<td>Urban Transport Planning Practice</td>
<td>3</td>
</tr>
<tr>
<td>8.406G</td>
<td>Regional Transport Planning</td>
<td>3</td>
</tr>
<tr>
<td>8.407G</td>
<td>Transport System Design (Non-Urban)</td>
<td>3</td>
</tr>
<tr>
<td>8.408G</td>
<td>Transport System Design (Urban)</td>
<td>3</td>
</tr>
<tr>
<td>8.409G</td>
<td>Interchange Design</td>
<td>3</td>
</tr>
<tr>
<td>8.410G</td>
<td>Highway Engineering Practice Part I</td>
<td>3</td>
</tr>
<tr>
<td>8.411G</td>
<td>Highway Engineering Practice Part II</td>
<td>3</td>
</tr>
<tr>
<td>8.412G</td>
<td>Economics for Transport Studies</td>
<td>3</td>
</tr>
<tr>
<td>8.413G</td>
<td>Transport Economics</td>
<td>3</td>
</tr>
<tr>
<td>8.414G</td>
<td>Transport Systems Part I</td>
<td>3</td>
</tr>
<tr>
<td>8.415G</td>
<td>Transport Systems Part II</td>
<td>3</td>
</tr>
<tr>
<td>8.416G</td>
<td>Traffic Engineering</td>
<td>6</td>
</tr>
<tr>
<td>8.417G</td>
<td>Transport and Traffic Flow Theory</td>
<td>6</td>
</tr>
<tr>
<td>8.418G</td>
<td>Statistics for Transport Studies Part I</td>
<td>3</td>
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<tr>
<td>8.419G</td>
<td>Statistics for Transport Studies Part II</td>
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<tr>
<td>8.420G</td>
<td>Transport Engineering Elective</td>
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<tr>
<td>8.421G</td>
<td>Constructing and Structural Planning</td>
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<tr>
<td>8.422G</td>
<td>Construction and Structural Design</td>
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<tr>
<td>8.423G</td>
<td>Construction and Structural Practice</td>
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</tr>
<tr>
<td>8.424G</td>
<td>Construction and Structural Research</td>
<td>3</td>
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</table>

These subjects were offered previously by the School of Transport and Highways with the prefix 24.001G, 24.002G, etc.
<table>
<thead>
<tr>
<th>Credits</th>
<th>Course Description</th>
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<tbody>
<tr>
<td>6</td>
<td>8.851G Unit Operations in Public Health Engineering</td>
</tr>
<tr>
<td>3</td>
<td>8.852G Water Distribution and Sewage Collection</td>
</tr>
<tr>
<td>2</td>
<td>8.854G Solid and Liquid Waste Management</td>
</tr>
<tr>
<td>3</td>
<td>8.855G Water and Wastewater Analysis and Quality Requirements</td>
</tr>
<tr>
<td>3</td>
<td>8.856G Water Treatment**</td>
</tr>
<tr>
<td>3</td>
<td>8.857G Sewage Treatment and Disposal**</td>
</tr>
<tr>
<td>3</td>
<td>8.858G Water Quality Management**</td>
</tr>
<tr>
<td>3</td>
<td>8.860G Investigation of Groundwater Resources I</td>
</tr>
<tr>
<td>3</td>
<td>8.861G Investigation of Groundwater Resources II</td>
</tr>
<tr>
<td>3</td>
<td>8.862G Fluvial Hydraulics</td>
</tr>
<tr>
<td>3</td>
<td>8.863G Estuarine Hydraulics</td>
</tr>
<tr>
<td>3</td>
<td>8.864G Arid Zone Hydrology</td>
</tr>
<tr>
<td>3</td>
<td>8.865G Arid Zone Waters Resources Management</td>
</tr>
<tr>
<td>3</td>
<td>8.901G Civil Engineering Elective I</td>
</tr>
<tr>
<td>3</td>
<td>8.902G Civil Engineering Elective II</td>
</tr>
<tr>
<td>9</td>
<td>8.909G Project</td>
</tr>
<tr>
<td>18</td>
<td>8.918G Research Project</td>
</tr>
<tr>
<td>36</td>
<td>8.936G Research Project*</td>
</tr>
</tbody>
</table>

*A 36 Credit Research Project is not normally approved in the School of Civil Engineering. The normal program includes a 9 Credit Project.

**Students specializing in Public Health Engineering normally study 42.211G Principles of Biology and 42.214G Biotechnology in the School of Biotechnology.

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## School of Electrical Engineering and Computer Science

Each subject (except 6.909G, 6.918G, 6.936G, and 6.339G) counts as three credits. (6.339G* is 6 credits.)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Course Description</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>6.050G Occasional Elective — Digital Signal Processing</td>
</tr>
<tr>
<td>3</td>
<td>6.053G Advanced Mathematics II</td>
</tr>
<tr>
<td>3</td>
<td>6.054G Numerical Computation</td>
</tr>
<tr>
<td>3</td>
<td>6.071G Electrical Measurements</td>
</tr>
<tr>
<td>3</td>
<td>6.073G Precise Electrical Measurements</td>
</tr>
<tr>
<td>3</td>
<td>6.074G Superconductivity</td>
</tr>
<tr>
<td>3</td>
<td>6.075G Electric Contacts</td>
</tr>
<tr>
<td>3</td>
<td>6.150G Communication Elective — Applied Optoelectronics</td>
</tr>
<tr>
<td>3</td>
<td>6.160G Field Theory in Electrical Engineering</td>
</tr>
<tr>
<td>3</td>
<td>6.161G Field Mapping</td>
</tr>
<tr>
<td>3</td>
<td>6.164G Microwave Antenna Theory and Applications</td>
</tr>
<tr>
<td>3</td>
<td>6.169G Microwave Circuits; Theory and Techniques</td>
</tr>
<tr>
<td>3</td>
<td>6.170G Microwave Electronics</td>
</tr>
<tr>
<td>3</td>
<td>6.224G Electrical Insulation Engineering</td>
</tr>
<tr>
<td>3</td>
<td>6.225G Electrical Discharges and their Technical Applications</td>
</tr>
<tr>
<td>Course Code</td>
<td>Course Title</td>
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<td>------------------------------------------------------------------------------</td>
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<tr>
<td>6.226G</td>
<td>Electrical Apparatus Design</td>
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<tr>
<td>6.227G</td>
<td>Assessment of Insulation Performance in Electrical Plant</td>
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<tr>
<td>6.228G</td>
<td>Power System Equipment</td>
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<tr>
<td>6.234G</td>
<td>Power System Protection</td>
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<tr>
<td>6.246G</td>
<td>Power System Operation and Control</td>
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<tr>
<td>6.247G</td>
<td>Power System Analysis</td>
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<tr>
<td>6.248G</td>
<td>Power System Planning</td>
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<tr>
<td>6.249G</td>
<td>Dynamic Performance of Power Systems</td>
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<tr>
<td>6.250G</td>
<td>Power Elective I</td>
</tr>
<tr>
<td>6.251G</td>
<td>Power Elective II</td>
</tr>
<tr>
<td>6.252G</td>
<td>Underground Systems</td>
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<tr>
<td>6.257G</td>
<td>Electric Power Distribution Systems</td>
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<tr>
<td>6.336G</td>
<td>Digital Communication Networks</td>
</tr>
<tr>
<td>6.337G</td>
<td>Sound Broadcast Systems</td>
</tr>
<tr>
<td>6.338G</td>
<td>Television Systems</td>
</tr>
<tr>
<td>6.339G</td>
<td>Electroacoustics</td>
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<tr>
<td>6.342G</td>
<td>Communication Theory</td>
</tr>
<tr>
<td>6.344G</td>
<td>Analog and Digital Filters</td>
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<tr>
<td>6.347G</td>
<td>Digital Communications</td>
</tr>
<tr>
<td>6.348G</td>
<td>Optical Communications</td>
</tr>
<tr>
<td>6.349G</td>
<td>Radar and Navigation Aids</td>
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<tr>
<td>6.350G</td>
<td>Solid State Electronics Elective</td>
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<tr>
<td>6.373G</td>
<td>Semiconductor Devices</td>
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<tr>
<td>6.375G</td>
<td>Integrated Circuit Technology</td>
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<tr>
<td>6.376G</td>
<td>Reliability Engineering</td>
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<tr>
<td>6.377G</td>
<td>Integrated Circuit Design</td>
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<tr>
<td>6.378G</td>
<td>Solar Energy Conversion</td>
</tr>
<tr>
<td>6.379G</td>
<td>Solar Cells — Operating Principles, Technology and System Applications</td>
</tr>
<tr>
<td>6.380G</td>
<td>Data Acquisition and Analysis in Remote Sensing</td>
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<tr>
<td>6.387G</td>
<td>Programming and Software in Remote Sensing</td>
</tr>
<tr>
<td>6.433G</td>
<td>Applied Microprocessor Design</td>
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<tr>
<td>6.453G</td>
<td>Computer Methods of Optimization</td>
</tr>
<tr>
<td>6.455G</td>
<td>System Identification and Modelling</td>
</tr>
<tr>
<td>6.456G</td>
<td>General Concepts in Formal System Theories</td>
</tr>
<tr>
<td>6.458G</td>
<td>Decision and Syntactic Systems for Digital Pattern Recognition</td>
</tr>
<tr>
<td>6.459G</td>
<td>Control Computing</td>
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<tr>
<td>6.462G</td>
<td>Real-Time Computing and Simulation</td>
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<tr>
<td>6.464G</td>
<td>Applied Optimal Estimation and Prediction</td>
</tr>
<tr>
<td>6.466G</td>
<td>Computer-Aided Design of Multivariable Control Systems</td>
</tr>
<tr>
<td>6.468G</td>
<td>Computer Display Systems and Interactive Instrumentation</td>
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<tr>
<td>6.470G</td>
<td>Advanced Topics in Control — Robotics, Automation and Productivity Technology</td>
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<tr>
<td>6.471G</td>
<td>Systems and Control Elective — Componental System Analysis</td>
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<tr>
<td>6.484G</td>
<td>Biological Signal Analysis</td>
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<td>6.485G</td>
<td>Medical Instrumentation</td>
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<tr>
<td>6.650G</td>
<td>Computer Science Elective — VLSI System Design</td>
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<tr>
<td>6.651G</td>
<td>Digital Electronics</td>
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<tr>
<td>6.654G</td>
<td>Digital Systems</td>
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<tr>
<td>6.655G</td>
<td>Computer Organization and Architecture</td>
</tr>
<tr>
<td>6.656G</td>
<td>Software Systems A</td>
</tr>
<tr>
<td>6.657G</td>
<td>Software Systems B</td>
</tr>
<tr>
<td>10.061G</td>
<td>Advanced Mathematics I</td>
</tr>
<tr>
<td>10.361G</td>
<td>Statistics</td>
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<tr>
<td>6.909G</td>
<td>Project</td>
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<tr>
<td>6.918G</td>
<td>Research Project</td>
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<td>6.936G</td>
<td>Research Project</td>
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**School of Mechanical and Industrial Engineering**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.045-6-7G</td>
<td>Advanced Topics in Mechanical Engineering</td>
<td>2,2,2</td>
</tr>
<tr>
<td>5.073G</td>
<td>Ordinary Differential Equations in Mechanical Engineering</td>
<td>3</td>
</tr>
<tr>
<td>5.075-6G</td>
<td>Computational Methods in Mechanical Engineering, I, II</td>
<td>2</td>
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<tr>
<td>5.077-8G</td>
<td>Analogue Computation in Mechanical Engineering, I, II</td>
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<tr>
<td>5.086G</td>
<td>Digital Logic Fundamentals for Mechanical Engineers</td>
<td>3</td>
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<tr>
<td>5.087G</td>
<td>Microprocessor Fundamentals for Mechanical Engineers</td>
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</tr>
<tr>
<td>5.088G</td>
<td>Industrial Applications of Microprocessors</td>
<td>3</td>
</tr>
<tr>
<td>5.151-2G</td>
<td>Refrigeration and Air Conditioning Design, I, II</td>
<td>3,3</td>
</tr>
<tr>
<td>5.307-8G</td>
<td>Dynamics I, II</td>
<td>3,3</td>
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<tr>
<td>5.317G</td>
<td>Industrial Robotics</td>
<td>3</td>
</tr>
<tr>
<td>5.318-9G</td>
<td>Advanced Mechanism Analysis and Synthesis, I, II</td>
<td>3,3</td>
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<tr>
<td>5.328-9G</td>
<td>Control and Modelling of Mechanical Systems, I, II</td>
<td>3,3</td>
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<tr>
<td>5.336G</td>
<td>Vibrations</td>
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<tr>
<td>5.336G</td>
<td>Random Vibrations</td>
<td>2</td>
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<tr>
<td>5.345G</td>
<td>Analogue Control Systems</td>
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<td>5.346G</td>
<td>Non-Linear Control Systems</td>
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<td>5.401G</td>
<td>Experimental Stress Analysis</td>
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<td>5.415-6G</td>
<td>Stress Analysis for Mechanical Engineering Design, I, II</td>
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<tr>
<td>5.417G</td>
<td>Mechanics of Fracture and Fatigue</td>
<td>3</td>
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<td>5.491-2G</td>
<td>Biomechanics I, II</td>
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<td>5.601G</td>
<td>Computational Fluid Dynamics</td>
<td>3</td>
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<td>5.616-7G</td>
<td>Internal Combustion Engines</td>
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<tr>
<td>5.621-2G</td>
<td>Gasdynamics I, II</td>
<td>2,2</td>
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<tr>
<td>5.631-2G</td>
<td>Lubrication Theory and Design I, II</td>
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<td>5.653-4G</td>
<td>Acoustic Noise I, II</td>
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<tr>
<td>5.655G</td>
<td>Energy Conservation and System Design</td>
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<tr>
<td>5.712-3G</td>
<td>Convection Heat Transfer I, II</td>
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<tr>
<td>5.718G</td>
<td>Conduction Heat Transfer</td>
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<tr>
<td>5.721G</td>
<td>Thermal Radiation Energy Transfer</td>
<td>3</td>
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<td>5.722G</td>
<td>Solar Thermal Energy Design</td>
<td>3</td>
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<td>5.751-2G</td>
<td>Refrigeration, Air Conditioning and Cryogenics I, II</td>
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<tr>
<td>5.756G</td>
<td>Refrigeration and Air Conditioning Applications</td>
<td>4</td>
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<td>5.909G</td>
<td>Project</td>
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<tr>
<td>5.912-3G</td>
<td>Naval Hydrodynamics I, II</td>
<td>2,2</td>
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<tr>
<td>5.918G</td>
<td>Research Project</td>
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<tr>
<td>†5.936G</td>
<td>Research Project</td>
<td>36</td>
</tr>
</tbody>
</table>

*Candidates wishing to specialize in Refrigeration and Air Conditioning should select these subjects.†A 36 credit Research Project is not normally approved in the School of Mechanical and Industrial Engineering.
Department of Industrial Engineering

18.061G Industrial Experimentation I  3
18.062G Industrial Experimentation II  3
18.073G Ergonomics  2
18.074G Industrial Management  3
18.171G Inspection and Quality Control  3
18.261G Computer Automation  3
18.262G Economics of Machining for Automation  3
18.272G Theory of Machining and Forming Processes  3
18.370G Design of Work Systems  3
18.371G Factory Design and Layout  3
18.461G Design for Production  4
18.462G Industrial Design  2
18.463G Tool Design  4
18.464G Value Analysis/Engineering  3
18.471G Design Communication  2
18.472G Engineering Design Analysis  6
18.571G Operations Research I  6
18.574G Operations Research II  3
18.579G Case Studies in Operations Research  3
18.671G Decision Theory  2
18.673G Energy Modelling, Optimization and Energy Accounting  3
18.675G Economic Decisions in Industrial Management  3
18.761G Simulation in Operations Research  3
18.763G Variational Methods in Operations Research  2
18.764G Management of Distribution Systems  2
18.765G Optimization of Networks  2
18.770G Stochastic Control  2
18.772G Information Processing Systems in Organizations  2
18.774G Applied Stochastic Processes  2
18.775G Networks and Graphs  2
18.776G Production and Inventory Control  2
18.777G Time Series and Forecasting  2
18.778G Scheduling and Sequencing  2
18.779G Game Theory  2
18.862G Linear Programming  2
18.863G Non-Linear Programming  2
18.871G Mathematics for Operations Research  2
18.874G Dynamic Programming  2
18.875G Geometric Programming  2
18.876G Advanced Mathematics for Operations Research  2
18.877G Large-scale Optimization  2
18.878G Industrial Applications of Mathematical Programming  2
18.879G Mathematical Programming Analysis  3
18.960G Production Engineering Seminar  0
18.965G Industrial Management Seminar  0
18.967G Advanced Topic in Production Engineering  2
18.968G Advanced Topic in Production Engineering  2
18.969G Advanced Topic in Production Engineering  2
18.970G Operations Research Seminar  0
18.977G Advanced Topic in Operations Research  2
18.978G Advanced Topic in Operations Research  2
18.979G Advanced Topic in Operations Research  2
18.989G Project  9
18.998G Research Project  18
18.936G Research Project  36

Note 1: Candidates taking their Project in Industrial Management are generally required to take 18.074G, 18.370G, 18.571G, 18.675G and 14.062G Accounting for Engineers. Before enrolling in the Project they must have had one year's relevant industrial experience and have access to industry for their Project topic.

Note 2: Candidates taking their Project in Research are generally required to take 18.571G, 18.574G, 18.675G and 14.062G Accounting for Engineers.

Note 3: All Master of Engineering Science candidates in the Department of Industrial Engineering must include 18.909G or 18.918G in their program.

Candidates with a Project in Production Engineering are generally required to take at least two-thirds of the formal credits from these subjects.

* A 36 credit Research Project is not normally approved in the School of Mechanical and Industrial Engineering.

School of Nuclear Engineering

Head of School
Professor J. J. Thompson

Each subject counts as three credits.

23.013G Neutron Transport and Diffusion
23.014G Few-group Reactor Theories
23.015G Multigroup Reactor Theories
23.016G Neutron Kinetics and Reactor Dynamics
23.023G Reactor Thermal Performance
23.024G Boiling and Two Phase Flow
23.025G Reactor Structural Mechanics
23.026G Reactor Systems Analysis
23.027G Boiling Reactor Dynamics
23.028G Reactor Accident and Safety Analysis
23.032G Mathematics Analysis and Computation
23.033G Matrix Theory and Computation
23.034G Random Processes and Reactor Noise
23.042G Nuclear Fuel and Energy Cycles
23.043G Nuclear Power Costing and Economics
23.044G Nuclear Engineering Optimization
23.045G Uranium Enrichment Technology
23.909G Project  9 credits
23.918G Research Project  18 credits
23.936G Research Project  36 credits
### School of Surveying

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>29.101G</td>
<td>Aspects of Electromagnetic Distance Measurement</td>
<td>3</td>
</tr>
<tr>
<td>29.102G</td>
<td>Characteristics of Optical Surveying Instrumentation</td>
<td>3</td>
</tr>
<tr>
<td>29.103G</td>
<td>Precise Engineering Surveys</td>
<td>3</td>
</tr>
<tr>
<td>29.106G</td>
<td>Special Topic in Surveying A</td>
<td>3</td>
</tr>
<tr>
<td>29.107G</td>
<td>Special Topic in Surveying B</td>
<td>3</td>
</tr>
<tr>
<td>29.151G</td>
<td>Adjustment of Observations</td>
<td>3</td>
</tr>
<tr>
<td>29.171G</td>
<td>Mathematical Methods I — Numerical Analysis</td>
<td>3</td>
</tr>
<tr>
<td>29.172G</td>
<td>Mathematical Methods II — Statistical Theory of Survey Observations</td>
<td>3</td>
</tr>
<tr>
<td>29.173G</td>
<td>Mathematical Methods III — Spherical Harmonics</td>
<td>3</td>
</tr>
<tr>
<td>29.174G</td>
<td>Mathematical Methods IV — Theory of Survey Adjustment</td>
<td>3</td>
</tr>
<tr>
<td>29.175G</td>
<td>Mathematical Methods V — Collocation</td>
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<td>29.201G</td>
<td>Geodetic Methods</td>
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<tr>
<td>29.202G</td>
<td>Earth and Ocean Dynamics</td>
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<td>29.203G</td>
<td>Gravimetric Geodesy</td>
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<td>29.204G</td>
<td>Geodetic Refraction</td>
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<td>29.205G</td>
<td>Satellite Geodesy</td>
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<td>29.206G</td>
<td>Advanced Geodetic Instrumentation</td>
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<tr>
<td>29.207G</td>
<td>Doppler Positioning</td>
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<tr>
<td>29.314G</td>
<td>Geodetic Astronomy</td>
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<tr>
<td>29.516G</td>
<td>Mathematical Model of the Imaging Process</td>
<td>3</td>
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<tr>
<td>29.517G</td>
<td>Stereophotogrammetry</td>
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<tr>
<td>29.518G</td>
<td>Analytical Photogrammetric Orientation</td>
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<tr>
<td>29.519G</td>
<td>Photogrammetric Instrumentation</td>
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<tr>
<td>29.520G</td>
<td>Photogrammetric Production Processes</td>
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<tr>
<td>29.521G</td>
<td>Control Extension A</td>
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<tr>
<td>29.522G</td>
<td>Control Extension B</td>
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<td>29.601G</td>
<td>Remote Sensing Principles and Procedures</td>
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<td>29.602G</td>
<td>Mass Appraisal Methods</td>
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<td>29.603G</td>
<td>Statutory Control of Land Development</td>
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<td>29.604G</td>
<td>Land Information Systems</td>
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<td>29.605G</td>
<td>Ground Investigations for Remote Sensing</td>
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<tr>
<td>29.706G</td>
<td>Survey Management</td>
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</tr>
<tr>
<td>29.707G</td>
<td>Quantitative Management Methods</td>
<td>3</td>
</tr>
<tr>
<td>29.909G</td>
<td>Research Project</td>
<td>9</td>
</tr>
<tr>
<td>29.918G</td>
<td>Research Project</td>
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<tr>
<td>29.936G</td>
<td>Research Project</td>
<td>36</td>
</tr>
</tbody>
</table>

### Centre for Biomedical Engineering

**Director**

Associate Professor P. C. Farrell

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>32.010G</td>
<td>Biomedical Engineering Practice</td>
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<tr>
<td>32.012G</td>
<td>Biomedical Statistics</td>
<td>4</td>
</tr>
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</table>

### Graduate Diplomas

Graduate Diploma programs in all schools of the Faculty may include subjects from the above list, subject to the approval of the Head of School responsible for the subject.

In addition the following subjects are offered specifically for Graduate Diploma students. Not all electives are necessarily offered in any particular year.

#### School of Electrical Engineering and Computer Science

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
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</thead>
<tbody>
<tr>
<td>6.060G</td>
<td>Microprocessor Systems</td>
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<tr>
<td>6.167G</td>
<td>Propagation and Transmission of Electrical Waves</td>
<td>3</td>
</tr>
<tr>
<td>6.340G</td>
<td>Communications Electronics</td>
<td>3</td>
</tr>
<tr>
<td>6.341G</td>
<td>Signal Analysis</td>
<td>3</td>
</tr>
<tr>
<td>6.343G</td>
<td>Digital and Analogue Communications</td>
<td>3</td>
</tr>
<tr>
<td>6.452G</td>
<td>Feedback Control I</td>
<td>3</td>
</tr>
<tr>
<td>6.457G</td>
<td>Cybernetic Engineering</td>
<td>3</td>
</tr>
<tr>
<td>6.472G</td>
<td>Feedback Control II</td>
<td>3</td>
</tr>
<tr>
<td>6.481G</td>
<td>Biology and Physiology for Engineers</td>
<td>3</td>
</tr>
<tr>
<td>6.55G</td>
<td>Date Bases and Networks</td>
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</tr>
<tr>
<td>6.666G</td>
<td>Programming II</td>
<td>3</td>
</tr>
<tr>
<td>6.664G</td>
<td>Business Information Systems</td>
<td>3</td>
</tr>
<tr>
<td>6.662G</td>
<td>Computing Practice</td>
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</table>

### School of Mechanical and Industrial Engineering

<table>
<thead>
<tr>
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<th>Course Title</th>
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<tbody>
<tr>
<td>18.084G</td>
<td>Industrial Applications of Probability Theory</td>
<td>4</td>
</tr>
<tr>
<td>18.380G</td>
<td>Methods Engineering</td>
<td>4</td>
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<tr>
<td>18.580G</td>
<td>Operations Research</td>
<td>6</td>
</tr>
<tr>
<td>18.681G</td>
<td>Engineering Economic Analysis</td>
<td>3</td>
</tr>
<tr>
<td>18.780G</td>
<td>Production Control</td>
<td>2</td>
</tr>
</tbody>
</table>
Projects and Research Projects

Supervision of projects and research projects will generally be available in areas of research interest in the Schools of the Faculty. Alternatively, design and other topics may be chosen by arrangement.

Civil Engineering

Engineering Construction and Management


Engineering Materials

Groundwater

Water movement in unsaturated soils.
Pollutant movement in soils.
Salinity studies.
Groundwater studies.

Hydrology

Flood estimation.
Yield and reservoir studies.
Hydrological instrumentation, data collection, and processing.
Mathematical rainfall-runoff models.
Stochastic hydrology.
Hydrometeorology.
Urban drainage.
Arid Lands Management.

Hydraulics

Two-fluid systems with small density differences.
Sediment motion.
Air entrainment in water in open channels and closed conduits.
Wave action and coastal engineering.
Flow through porous media.
Hydraulic transportation of solids.
Coastal engineering and breakwater stability.

Prestressed Concrete Structures

Partially prestressed concrete beams.
Analysis and design of end blocks for post-tensioned beams.

Public Health Engineering

Sewage sludge conditioning and filtration.
Clarifiers and sedimentation in water and waste water treatment.
Filtration.
Fluidized bed aerobic and anaerobic treatment.
Aerobic digestion.
Nutrient control.

Reinforced Concrete Structures

Torsion, bending and shear in reinforced concrete and prestressed concrete beams.
Creep and shrinkage effects in reinforced concrete structures.
Shear and torsion in reinforced concrete flat slab floors.

Structural Analysis

Development of computer methods for analysis of multistorey flat plate structures.
Development and application of finite element techniques.
Investigation of elastic stability.
Analysis of dynamic response of highway bridges and buildings.

Transport Engineering

The testing of aggregates.
The properties of pavement materials subjected to repeated loading.
The surface texture of aggregates.
The stability of bituminous mixes.
The testing of full scale pavement systems.
The effects of porosity on the properties of rocks and road making aggregates.
Investigations of the geometric shape of the road alignment on the driver’s view of the road.
Study of road alignment design in three dimensions.
Problems of land use and transport interaction.
Theories of traffic structure and flow.
Measurements, planning and control of traffic.
Transport systems analysis.
Investigation of human factors.
Economic evaluation of transport investments.
Transport planning — urban systems.
Investigations into transport economics and policy.
Design of information systems.

Water Resources Engineering

Multi-objective water resources planning.
Hydro-economic studies.
Optimization problems in water resource systems design.
Drought studies.
Flood plain management.
Arid Lands Management.

Electrical Engineering and Computer Science

Communications

Communication theory and system theory.
Digital communication systems.
Digital signal processing and filtering.
Active and adaptive circuits.
Computer modelling for system design.
Microprocessor applications.
Microwave integrated circuits.
Adaptive antenna arrays.
Optical communications, optical fibre studies and measurements.
Solid state devices including surface elastic wave devices.
Acoustics and psychoacoustics. Hearing aid development.
Electronic music.
Seismic signal processing.
Systems and Control

Analysis and design of non-linear systems. Structural problems in identification, especially feed-back problems. Numerical methods of optimization including large scale systems. Deterministic and stochastic control, self tuning regulators. Cybernetic Engineering: Robotics, pattern and image recognition and understanding; vision processing and automated assembly. Computer aided design including linear and non-linear simulations, MIMO frequency domain design. Biological signal analysis and system modelling. Application of the above ideas including: control of a cement kiln; boiler identification and control; reactor boiling channel identification; gait analysis; pattern recognition; fermentation process control; computer control and instrumentation; microprocessors; electric car control.

Electric Power


Computer Science


Solid State Electronics


Mechanical and Industrial Engineering

Agricultural Engineering

Mechanical harvesting of fruit and vegetables. Mechanical handling, grading and processing of agricultural produce. Development of shearing equipment. Metering and placement of seed and fertilizer.

Applied Mechanics


Fluid Mechanics/Thermodynamics — including Aeronautical Engineering and Naval Architecture


Industrial Engineering — including Operations Research and Production Engineering

Computer generation of timetables.
Job shop scheduling.
Least-cost tolerance.
Optimum reject allowance.
Operational simulation.
Variety reduction.
Probabilistic networks.
Optimization techniques relevant to information processing systems.
Statistical decision theory.
Production scheduling for variable demand.
Inventory and production control.
Optimum control.
Mathematical programming.
Dynamic programming.
Geometric programming.
Integer programming.
Large scale optimization.
Applications of operations research to real-world problems.
Stochastic processes.
Applications of optimization techniques.
Experimental and theoretical investigations of the following processes: machining, extrusion, indentation, compression, rolling, drawing.
Performance of single and multipoint cutting tools including tool life and economics of machining.
Properties of materials at high rates of strain.
Materials handling studies.
Factory design and location studies.
Plant layout by computer.
Ergonomics.
Social psychology in industry.
Production design studies.
Engineering design analysis and tolerance technology.
Metrology studies.
Group technology studies.

Optimization and optimal control in nuclear engineering.
Structural mechanics in reactor technology.
Laser-plasma interaction.
Risk assessment.

Surveying

Geodesy

Physical geodesy, geoid and gravimetric studies.
Satellite geodesy, precise orbit determinations, crustal motion studies using satellite laser ranging data and terrestrial techniques.
Geodynamics: applications of lunar laser ranging and very long baseline interferometry, effects of mass movements on polar motion.
Satellite altimetry analysis, sea surface topography, unification of vertical datums.
Geometric geodesy and geodetic surveying, Doppler positioning determination methods, geodetic astronomy.
Effects of atmosphere on distance, angular and levelling measurements, applications of micro-meteorology.
Adjustments and error theory: applications in geodesy and photogrammetry.
Solution of large systems of equations.
Adjustment of continental control networks.

Photogrammetry and Land Studies

Production and evaluation of orthophotos and other map products.
Cartographic enhancement of orthophoto maps.
Monocular and stereoscopic pointing to photographic images, applications to ground targets, instrument cursors, cartographic symbolization.
Geometry of image sensors, remote-sensing imaging devices, mapping from panoramic photographs.
Non-topographic applications.
Restoration of digital image data.
Accuracy limitations of analogue stereoplotters.
Aerotriangulation, computer applications, block adjustment, independent model triangulation.
Digital terrain models.
Land tenure, registration and survey systems.
Integrated survey systems.

Nuclear Engineering

Neutron transport and diffusion theory.
Thermal and thermo-mechanical analysis of reactor components.
Nuclear reactor noise theory and analysis.
Reactor channel hydrodynamics.
Boiling and two-phase flow.
Nuclear reactor dynamics, stability and control.
Numerical methods for reactor analysis and simulation.
Nuclear power planning and reactor strategy.
Engineering

Land data banks, spatial information systems.
Land development.
Residential value models, mass valuation techniques.
Remote sensing techniques and applications.

Surveying

Deformation and settlement of structures.
Industrial applications of surveying.
Electronic distance measurements: high precision applications, calibrations.
Gyrotheodolite theory and applications.
Development of instrumentation.
Modern optical instrument testing.
Computation systems for desk top computers.
Development of computer programs for the interpretation of remotely sensed imagery.
Incorporation of auxiliary data into classification procedures.
Application of Landsat data to Urban Area Studies.
Monitoring land use change using remotely sensed data.
Determining the characteristics of surface reflectance.
Analysis of image quality.
Application of satellite imagery to small scale mapping.
Development of a multidisciplinary framework for remote sensing analysis.

Biomedical Engineering

Modelling of respiratory function, cardiovascular function, nervous system, artificial kidney therapy, extracorporeal heart-lung support, endocrine system and other body systems.
Microprocessor control of medical equipment.
Limb and joint dynamics studies.
Development of implantable electrodes.
Development of rehabilitation devices.
Development and evaluation of new hospital equipment and treatment procedures.
Signal analyses of wave forms from medical diagnostic equipment.
Implants for fracture support and joint replacement.
Improved drug administration.

Remote Sensing

Development of majority vote and related classifier algorithms for use with multitemporal data.
Application of label relaxation techniques to remotely sensed data.
Graduate Study

Conditions for the Award of Higher Degrees

Rules, regulations and conditions for the award of first degrees are set out in the appropriate Faculty Handbooks.

For the list of undergraduate courses and degrees offered see Disciplines of the University: Faculty Table (Undergraduate Study) in the Calendar.

The following is the list of higher degrees and graduate diplomas of the University, together with the publication in which the conditions for the award appear.

For the list of graduate degrees by research and course work, arranged in faculty order, see Disciplines of the University: Table of Courses (by faculty): Graduate Study in the Calendar.

For the statements Preparations and Submissions of Project Reports and Theses for Higher Degrees and Policy with respect to the Use of Higher Degree Theses see the Calendar.

<table>
<thead>
<tr>
<th>Title</th>
<th>Abbreviation</th>
<th>Calendar/Handbook</th>
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</thead>
<tbody>
<tr>
<td>Doctor of Science</td>
<td>DSc</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Letters</td>
<td>DLitt</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Laws</td>
<td>LLD</td>
<td>Calendar</td>
</tr>
<tr>
<td>Doctor of Medicine</td>
<td>MD</td>
<td>Calendar and Medicine</td>
</tr>
<tr>
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<td>PhD</td>
<td>Calendar and all handbooks</td>
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<td>Architecture</td>
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<tr>
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<tr>
<td>Master of Archives Administration</td>
<td>MArchivAdmin</td>
<td>Professional Studies</td>
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<tr>
<td>Title</td>
<td>Abbreviation</td>
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<tr>
<td>Master of Arts</td>
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<td></td>
<td>MA</td>
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<td>Engineering</td>
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<td>Architecture</td>
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<tr>
<td>Master of the Built Environment (Building Conservation)</td>
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<td>Master of Business Administration</td>
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<td>AGSM</td>
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<tr>
<td>Master of Chemistry</td>
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<td>Master of Engineering Science</td>
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<td>Master of Health Personnel Education</td>
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<td>Master of Health Planning</td>
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<td>Master of Landscape Architecture</td>
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<td>Master of Laws by Research</td>
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<td>Master of Optometry</td>
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<td>Master of Psychology</td>
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<td>Sciences;‡</td>
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<td>Master of Science (Acoustics)</td>
<td>MSc(Acoustics)</td>
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<tr>
<td>Master of Science and Society</td>
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<td>Sciences;‡</td>
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<tr>
<td>Master of Science (Biotechnology)</td>
<td>MSc(Biotech)</td>
<td>Architecture</td>
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<tr>
<td>Master of Science (Building)</td>
<td>MSc(Building)</td>
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<td>Master of Social Work</td>
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<tr>
<td>Master of Statistics</td>
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<td>Master of Surgery</td>
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<td>Master of Surveying</td>
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<td>Engineering</td>
</tr>
<tr>
<td>Master of Surveying without supervision</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

† Additional information or notes related to the specific program or discipline.
1. The degree of Doctor of Philosophy may be granted by the Council on the recommendation of the Professorial Board to a candidate who has made an original and significant contribution to knowledge and who has satisfied the following requirements:

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

(1) hold an honours degree from the University of New South Wales; or

(2) hold an honours degree of equivalent standing from another approved university; or

(3) if the candidate holds a degree without honours from the University of New South Wales or other approved university, have achieved by subsequent work and study a standard recognized by the higher degree committee of the appropriate faculty or board of studies (hereinafter referred to as the Committee) as equivalent to honours; or

(4) in exceptional cases, submit such other evidence of general and professional qualifications as may be approved by the Professorial Board on the recommendation of the Committee.

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

4. A candidate for registration for a course of study leading to the degree of Doctor of Philosophy shall apply to the Registrar on the prescribed form at least one calendar month before the commencement of the session in which registration is to begin.

5. Subsequent to registration the candidate shall pursue a program of advanced study and research for at least six academic sessions, save that:

(1) a candidate fully engaged in advanced study and research for the degree, who before registration was engaged upon research to the satisfaction of the Committee, may be exempted from not more than two academic sessions;

(2) in special circumstances the Committee may grant permission for the candidate to spend not more than one calendar year of the program in advanced study and research at another institution provided that the work can be supervised in a manner satisfactory to the Committee;

(3) in exceptional cases, the Professorial Board on the recommendation of the Committee may grant permission for a candidate to be exempted from not more than two academic sessions.
6. A candidate who is fully engaged in research for the degree shall present for examination not later than ten academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

7. The candidate shall be fully engaged in advanced study and research, save that:
(1) the Committee may permit a candidate to undertake a limited amount of University teaching or outside work which in its judgement will not interfere with the continuous pursuit of the proposed course of advanced study and research;
(2) a member of the full-time staff of the University may be accepted as a part-time candidate for the degree, in which case the Committee shall prescribe a minimum period for the duration of the program;
(3) in special circumstances, the Committee may, with the concurrence of the Professorial Board, accept as a part-time candidate for the degree a person who is not a member of the full-time staff of the University and is engaged in an occupation which, in its opinion, leaves the candidate substantially free to pursue a program in a school* of the University. In such a case the Committee shall prescribe for the duration of the program a minimum period which, in its opinion, having regard to the proportion of the time which the candidate is able to devote to the program in the appropriate University school* is equivalent to the six sessions ordinarily required.

8. Every candidate shall pursue a program under the direction of a supervisor appointed by the Committee from the full-time members of the University staff. The work, other than field work, shall be carried out in a school* of the University save that in special cases the Committee may permit a candidate to conduct the work at other places where special facilities not possessed by the University may be available. Such permission will be granted only if the direction of the work remains wholly under the control of the supervisor.

9. Not later than two academic sessions after registration the candidate shall submit the topic of research for approval by the Committee. After the topic has been approved it may not be changed except with the permission of the Committee.

10. A candidate may be required by the Committee to attend a formal course of appropriate study.

11. On completing the course of study every candidate must submit a thesis which complies with the following requirements:
(1) the greater proportion of the work described must have been completed subsequent to registration for the PhD degree;
(2) it must be an original and significant contribution to the knowledge of the subject;
(3) it must be written in English except that a candidate in the Faculty of Arts may be required by the Faculty on the recommendation of the supervisor to write the thesis in an appropriate foreign language;
(4) it must reach a satisfactory standard of expression and presentation.

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

13. Every candidate shall be required to submit with the thesis a short abstract of the thesis comprising not more than 350 words.
The abstract shall indicate:
(1) the problem investigated;
(2) the procedures followed;
(3) the general results obtained;
(4) the major conclusions reached;
but shall not contain any illustrative matter, such as tables, graphs or charts.

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

*Or department where a department is not within a school.
15. The candidate shall give in writing two months' notice of intention to submit the thesis.

16. Four copies of the thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work previously published whether or not such work is related to the thesis.

17. It shall be understood that the University retains the four copies of the thesis submitted for examination, and is free to allow the thesis to be consulted or borrowed. Subject to the provisions of the Copyright Act, 1968, the University may issue the thesis in whole or in part, in photostat or microfilm or other copying medium.

18. There shall normally be three examiners of the thesis, appointed by the Professorial Board on the recommendation of the Committee, at least two of whom shall be external to the University.

19. At the conclusion of the examination each examiner shall submit to the Committee a concise report on the merits of the thesis and shall recommend to the Committee that:
   (1) The candidate be awarded the degree without further examination; or
   (2) the candidate be awarded the degree without further examination subject to minor corrections as listed being made to the satisfaction of the head of the school*; or
   (3) the candidate be awarded the degree subject to a further examination on questions posed in the report, performance in this further examination being to the satisfaction of the Committee; or
   (4) the candidate be not awarded the degree but be permitted to resubmit the thesis in a revised form after a further period of study and/or research; or
   (5) the candidate be not awarded the degree and be not permitted to resubmit the thesis.

20. If the performance at the further examination recommended under Rule 19. (3) is not to the satisfaction of the Committee the Committee may permit the candidate to re-present the same thesis and submit to a further oral, practical or written examination within a period specified by them but not exceeding eighteen months.

21. The Committee shall, after consideration of the examiners' reports and the reports of any oral or written or practical examination, recommend whether or not the candidate may be admitted to the degree.

22. A candidate shall be required to pay such fees as may be determined from time to time by the Council.

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1. The degree of Master of Biomedical Engineering may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

2. (1) An applicant for registration for the degree shall have been admitted to an appropriate Bachelor degree in the University of New South Wales or other university or tertiary institution at a standard acceptable to the Committee.
   (2) In exceptional cases an applicant may be registered as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Committee.
   (3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by completing a qualifying program as determined by the Committee.

*Or department where a department is not within a School.
Registration

3. (1) An application to register as a candidate for the degree shall be made on the prescribed form which shall be lodged with the Registrar two months before commencement of the session in which the candidate desires to commence.

(2) An approved candidate shall register in one of the following categories:

(a) student in full-time attendance at the University;

(b) student in part-time attendance at the University.

(3) A candidate for the degree shall be required to undertake such formal courses of study and pass such examinations as may be prescribed by the Committee and shall undertake a specified thesis, the satisfactory completion of which shall be regarded as part of the examination.

(4) The progress of a candidate shall be reviewed at least once annually by the Committee and as a result of its review the Committee may terminate candidature or take such other action as it considers appropriate.

(5) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of two full-time sessions after registration, or the equivalent in part-time study.

(6) The program of advanced study, including the preparation of a thesis, shall normally total 60 credits. The number of credits allocated to each subject shall be determined by the Committee on the recommendation of the Director of the Centre. Students with advanced standing may be given limited exemption by the Committee on the recommendation of the Director of the Centre.

(7) The thesis will normally carry 18 credits weighting except in special cases, approved by the Director of the Centre, where a more detailed thesis may carry a weighting of 30 credits towards the award of the degree.

Thesis

4. (1) The project forming the basis of the thesis shall be conducted under a supervisor(s) approved by the Committee on the recommendation of the Director of the Centre for Biomedical Engineering.

(2) Every candidate who submits a thesis as provided in paragraph 3. (3) shall submit three copies in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work he has published whether or not such work is related to the thesis.

(3) For each candidate who submits a thesis as provided in paragraph 3. (3) there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of whom shall be an external examiner.

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

Recommendation for Admission to Degree

5. Having considered the examiners’ reports and the candidate’s other results in the prescribed course of study, the Committee shall recommend whether the candidate may be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.
1. The degree of Master of Engineering may be awarded by the Council on the recommendation of the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to undertake research by the submission of a thesis embodying the results of an investigation, or design or engineering development, which in each case is original.

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor in the University of New South Wales, or other approved university, in an appropriate school whose record is at a standard acceptable to the Committee.

(2) In exceptional cases a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainment as may be approved by the Professorial Board on the recommendation of the appropriate Committee.

(3) Notwithstanding any other provisions of these conditions, the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.

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

(2) In every case, before permitting an applicant to register as a candidate, the Committee shall be satisfied that adequate supervision* and facilities are available.

(3) An approved applicant shall register in one of the following categories:
   (a) student in full-time attendance at the University
   (b) student in part-time attendance at the University
   (c) student working externally to the University

(4) Every candidate for the degree shall be required to carry out a program of advanced study to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine. At least once a year and at any other time that the Committee sees fit, the candidate’s supervisor shall present to the head of the school in which the candidate is registered, a report on the progress of the candidate. The Committee shall review the report and as a result of its review may cancel registration or take such other action as it considers appropriate.

(5) No candidate shall be considered for the award of the degree until the lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may, with the approval of the Committee be reduced by up to two sessions.

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit any work the candidate has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee one of whom shall, if possible, be an external examiner.

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

5. Having considered the examiners’ reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

*Attention is drawn to the conditions for the award of the Degree of Master of Science, Master of Engineering or Master of Surveying without Supervision which appears elsewhere in this section.
Master of Engineering Science (MEngSc) and Master of Surveying Science (MSurvSc)

1. The degrees of Master of Engineering Science and Master of Surveying Science may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has satisfactorily completed an approved program of advanced study.

Qualifications

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor with Honours in the University of New South Wales or other approved university or tertiary education institution of acceptable standing in an appropriate school or department.

(2) The Committee may also admit a graduate with a pass degree of good standing from an appropriate degree course whose record is at a standard acceptable to the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree if he submits evidence of such academic and professional attainments as may be approved by the Committee.

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

Registration

3. (1) An application to register for the degree shall be made on the prescribed form which shall be lodged with the Registrar at least two full calendar months before the commencement of the course.

(2) An approved candidate shall register in one of the following categories:

(a) student in full-time attendance at the University

(b) student in part-time attendance at the University

(3) A candidate for the degree shall

(a) complete a program of advanced study which may include the submission of a report on a project based upon a design or a critical review; or

(b) demonstrate ability to carry out research by the submission of a thesis embodying the results of an original investigation; or

(c) complete an approved combination of the above.

(4) An applicant for registration shall indicate the proposed project area or major field of study in order that the responsibility for the supervision of the program may be determined.

(5) The approval of the appropriate Head of School for the proposed program must be obtained by the candidate prior to enrolment. For the purpose of this regulation the Head of School will normally be the Head of the School providing supervision of the project or research or if there is no project the major field of study. Should the appropriate school be the School of Surveying the degree awarded will be Master of Surveying Science.

(6) The program of advanced study including the preparation of a thesis or report on a project to be completed by each candidate shall total a minimum of 36 credits, the number of credits allocated for each subject being determined by the Committee on the recommendation of Heads of Schools. Where the formal course work comprises no more than 50% of the total study, the candidate will be required to submit a research thesis and where the formal work comprises 50% or more but less than 100% the candidate will be required to submit a report on a project. With the approval of the Head of School, candidates may take subjects from other Schools of the Faculty, other Faculties of the University and other universities or institutions.

(7) The project forming the basis for the thesis shall be conducted under a supervisor appointed by the Committee or under such conditions as the Committee may determine, to the satisfaction of the Head of School.

(8) No full-time candidate shall be considered for the award of the degree until the lapse of two sessions from the date from which registration becomes effective. No part-time candidate shall be considered for the award of the degree until the lapse of four sessions from the date from which registration becomes effective.
4. (1) Every candidate who submits a thesis (18 or more credits) as provided in paragraph 3. (3) (b) shall submit three copies in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may also submit any work he has published whether or not such work is related to the thesis. The formal of the report on a project as provided in paragraph 3. (3) (a) shall comply with the requirements of the Faculty for the preparation and submission of project reports.

(2) For each candidate who submits a thesis as provided in paragraph 3. (3) (b) there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of whom shall, if possible, be an external examiner.

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

(4) The report on the project (9 credits) provided in paragraph 3. (3) (a) shall be under the supervision of a member of the academic staff and shall be examined by two examiners. The satisfactory completion of the project shall be regarded as part of the annual examinations.

5. Having considered the examiners' reports and the candidate's other work in the prescribed course of study the Committee shall recommend whether or not the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.
(5) At least once a year and at any other time that the Committee sees fit, the candidate's supervisor shall present to the Head of School in which the candidate is registered a report on the progress of the candidate. The Committee shall review the report and as a result of its review may cancel registration or take such other action as it considers appropriate.

(6) Unless otherwise recommended by the Committee, no candidate shall be awarded the degree until the lapse of four complete sessions from the date of registration, save that the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may be reduced by up to two sessions with the approval of the Committee. A candidate who is fully engaged in research for the degree shall present for examination not later than six academic sessions from the date of registration. A candidate not fully engaged in research shall present for examination not later than twelve academic sessions from the date of registration. In special cases an extension of these times may be granted by the Committee.

Thesis

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3.(4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit also for examination any work the candidate has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners, appointed by the Professorial Board on the recommendation of the Committee, one of whom, if possible shall be external to the University.

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

Recommendation for Admission to Degree

5. Having considered the examiners' reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Master of Science (MSc)
Master of Engineering (ME)
Master of Surveying (MSurv) without supervision

Qualifications

1. Where it is not possible for candidates to register under the normal conditions for the degree of Master of Science, Master of Engineering or Master of Surveying by reason of their location at centres which are distant from University Schools or where effective supervision is not practicable registration may be granted in these categories under the following conditions:

2. An applicant for registration shall have been admitted to a degree of Bachelor in the University of New South Wales at a standard acceptable to the Committee.
3. (1) An application to register as an external candidate for the degree of Master of Science, Master of Engineering or Master of Surveying without supervision shall be lodged with the Registrar for recommendation by the Head of School and consideration by the Higher Degree Committee of the appropriate Faculty (hereinafter referred to as the Committee) not less than six months before the intended date of submission of the thesis. A graduate who intends to apply in this way should in his own interest at an early stage, seek the advice of the appropriate School with regard to the adequacy of the subject matter for the degree. A synopsis of the work should be enclosed.

(2) A candidate shall not be considered for the award of the degree until the lapse of six sessions in the case of honours graduates and eight sessions in the case of pass graduates from the date of graduation.

4. (1) (a) Every candidate for the degree shall be required to submit three copies of a thesis embodying the results of an investigation or design or engineering development which in each case is original. The thesis shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. A candidate may submit also for examination any work the candidate has published, whether or not such work is related to the thesis.

(b) Every candidate shall submit with the thesis a statutory declaration that the material contained therein is the candidate's own work, except where otherwise stated in the thesis.

(2) For each candidate there shall be at least two examiners appointed by the Professorial Board on the recommendation of the Committee, one of who shall be an internal examiner.

(3) If the thesis reaches the required standard, the candidate shall be required to attend for an oral examination at a time and place nominated by the Committee. The examiners may also arrange at their discretion for the examination of the candidate by written and/or practical examinations on the subject of the thesis and/or subjects related thereto.

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

5. Having considered the examiners' reports the Committee shall recommend whether the candidate should be admitted to the degree.

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

1. The degree of Master of Surveying may be awarded by the Council on the recommendation of the Higher Degree Committee of the Faculty of Engineering (hereinafter referred to as the Committee) to a candidate who has demonstrated ability to carry out research by the submission of a thesis embodying the results of an original investigation.

2. (1) An applicant for registration for the degree shall have been admitted to the degree of Bachelor with Honours in the University of New South Wales or other approved university or tertiary education institution of acceptable standing in an appropriate school or department.

(2) The Committee may also admit a graduate with a pass degree of good standing from an appropriate degree course whose record is at a standard acceptable to the Committee.

(3) In special circumstances a person may be permitted to register as a candidate for the degree if the person submits evidence of such academic and professional attainments as may be approved by the Committee.

(4) Notwithstanding any other provisions of these conditions the Committee may require an applicant to demonstrate fitness for registration by carrying out such work and sitting for such examinations as the Committee may determine.
Registration

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

(2) In every case before permitting an applicant to register as a candidate the Committee shall be satisfied that adequate supervision and facilities are available.

(3) An approved applicant shall register in one of the following categories:

(a) student in full-time attendance at the University;
(b) student in part-time attendance at the University;
(c) student working externally to the University.

(4) Every candidate for the degree shall be required to carry out a program of advanced study, to take such examinations and perform such other work as may be prescribed by the Committee which shall include the preparation and submission of a thesis embodying the results of an original investigation. The work shall be carried out under the direction of a supervisor appointed by the Committee or under such conditions as the Committee may determine.

(5) No candidate shall be considered for the award of the degree until a lapse of four complete sessions from the date from which registration becomes effective save that, in the case of a candidate who obtained the degree of Bachelor with Honours or who has had previous research experience, this period may with the approval of the Committee be reduced by up to two sessions.

Thesis

4. (1) A candidate for the degree shall be required to submit three copies of the thesis referred to in paragraph 3. (4) which shall be presented in a form which complies with the requirements of the University for the preparation and submission of higher degree theses. The candidate may submit any work the candidate has published whether or not such work is related to the thesis.

(2) For each candidate there shall be at least two examiners appointed by the Professorial Board, on the recommendation of the Committee, one of whom shall, if possible, be an external examiner.

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

Recommendation for Admission to Degree

5. Having considered the examiners’ reports the Committee shall recommend whether or not the candidate should be admitted to the degree.

Fees

6. An approved candidate shall pay such fees as may be determined from time to time by the Council.

Graduate Diploma (GradDip)

1. An application for admission to a graduate diploma course shall be made on the prescribed form which shall be lodged with the Registrar at least two full calendar months before the commencement of the course.

2. An applicant for admission to a graduate diploma course shall be:

(1) a graduate of the University of New South Wales or other approved university.
(2) a person with other qualifications as may be approved by Faculty.
3. Notwithstanding clause 2. above, Faculty may require an applicant to take such other prerequisite or concurrent studies and/or examinations as it may prescribe.

4. Every candidate for a graduate diploma shall be required to undertake the appropriate course of study, to pass any prescribed examinations, and if so laid down in the course, to complete a project or assignment specified by the Head of the School. The format of the report on such project or assignment shall accord with the instructions laid down by the Head of the School.

5. An approved applicant shall be required to pay the fee for the course in which the applicant desires to register. Fees shall be paid in advance.
Subject Descriptions

Identification of Subjects by Numbers

Servicing Subjects are those taught by a School or Department outside its own faculty and are listed at the end of Undergraduate Study and Graduate Study of the relevant subject. Their subject descriptions are published in the handbook of the faculty in which the subject is taught.

The identifying numerical prefixes for each subject authority are set out below.

For General Studies subjects see the Board of Studies in General Education Handbook, which is available free of charge.

Information Key

The following is the key to the information supplied about each subject listed below: S1 (Session 1); S2 (Session 2); F (Session 1 plus Session 2, i.e. full year); S1 or S2 (Session 1 or Session 2, i.e. choice of either session); SS (single session, i.e. which session taught not known at time of publication); L (Lecture, followed by hours per week); T (Laboratory/Tutorial, followed by hours per week); C (Credit units); CR (Credit Level); R (after subject number) Broken Hill syllabus.

HSC Exam Prerequisites

Subjects which require prerequisites for enrolment in terms of the HSC Examination percentile range refer to the 1978 and subsequent Examinations.

Candidates for enrolment who obtained the HSC in previous years or hold other high school matriculation should check with the appropriate School on what matriculation status is required for admission to a subject.
<table>
<thead>
<tr>
<th>School, Department etc</th>
<th>Faculty</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Physics*</td>
<td>Science</td>
<td>92</td>
</tr>
<tr>
<td>School of Chemistry*</td>
<td>Science</td>
<td>93</td>
</tr>
<tr>
<td>School of Metallurgy*</td>
<td>Applied Science</td>
<td>94</td>
</tr>
<tr>
<td>School of Mechanical and Industrial Engineering</td>
<td>Engineering</td>
<td>94</td>
</tr>
<tr>
<td>School of Electrical Engineering and Computer Science</td>
<td>Engineering</td>
<td>106</td>
</tr>
<tr>
<td>School of Mining Engineering</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>School of Civil Engineering*</td>
<td>Engineering</td>
<td>119</td>
</tr>
<tr>
<td>School of Wool and Pastoral Sciences</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>School of Mathematics*</td>
<td>Science</td>
<td>132</td>
</tr>
<tr>
<td>School of Architecture</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>School of Psychology</td>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>School of Textile Technology</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>School of Accountancy*</td>
<td>Commerce</td>
<td>134</td>
</tr>
<tr>
<td>School of Economics*</td>
<td>Commerce</td>
<td>134</td>
</tr>
<tr>
<td>School of Health Administration</td>
<td>Professional Studies</td>
<td></td>
</tr>
<tr>
<td>Biological Sciences</td>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>School of Mechanical and Industrial Engineering (Industrial Engineering)</td>
<td>Engineering</td>
<td>135</td>
</tr>
<tr>
<td>Department of Industrial Arts</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>School of Nuclear Engineering</td>
<td>Engineering</td>
<td>141</td>
</tr>
<tr>
<td>School of Applied Geology</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>Department of General Studies</td>
<td>Board of Studies in General Education</td>
<td></td>
</tr>
<tr>
<td>School of Geography*</td>
<td>Applied Science</td>
<td>143</td>
</tr>
<tr>
<td>School of Marketing</td>
<td>Commerce</td>
<td></td>
</tr>
<tr>
<td>School of Surveying</td>
<td>Engineering</td>
<td>143</td>
</tr>
<tr>
<td>Department of Organizational Behaviour</td>
<td>Commerce</td>
<td></td>
</tr>
<tr>
<td>School of Optometry</td>
<td>Science</td>
<td></td>
</tr>
<tr>
<td>Centre for Biomedical Engineering</td>
<td>Engineering</td>
<td>160</td>
</tr>
<tr>
<td>School of Building</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>School of Town Planning*</td>
<td>Architecture</td>
<td>151</td>
</tr>
<tr>
<td>School of Landscape Architecture</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>School of Food Technology</td>
<td>Applied Science</td>
<td></td>
</tr>
<tr>
<td>Graduate School of the Built Environment</td>
<td>Architecture</td>
<td></td>
</tr>
<tr>
<td>Professorial Board</td>
<td>Biological Sciences</td>
<td></td>
</tr>
<tr>
<td>School of Biochemistry</td>
<td>Biological Sciences</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>School, Department etc</th>
<th>Faculty</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>School of Biotechnology*</td>
<td>Biological Sciences</td>
<td>152</td>
</tr>
<tr>
<td>School of Botany</td>
<td>Biological Sciences</td>
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<td>School of Chemical Engineering and Industrial Chemistry*</td>
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<td>Division of Postgraduate Extension Studies*</td>
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*Offers subjects for courses outlined in this handbook.
Physics

Undergraduate Study

The School of Physics has introduced the specialized units 1.951, 1.961, 1.971, 1.981, 1.962 and 1.982 for students in the Faculty of Engineering. The first-year units 1.951, 1.961, 1.971 and 1.981 are not available at night. Part-time students will be catered for by the Science Course unit 1.001.

All first year full-time students, including repeat students, should enrol in 1.951, 1.961, 1.971, 1.981 according to their schools. However, full-time Electrical Engineering students may substitute 1.011 for 1.961, subject to the approval of the School of Physics.

All first year part-time students, including repeats, should enrol in 1.001.

Physics Level I Units

1.001 Physics I F L3T3

Prerequisites:

HSC Exam Percentile
Range Required
2 unit Mathematics
71-100
3 unit Mathematics
or
21-100
4 unit Mathematics
or
1-100
10.021B (for 1.001 or equivalent)
and
2 unit
Science (incl. Physics and/or Chem.)
31-100
or
4 unit Science (multistrand)
31-100

Co-requisite: 10.021C or 10.001 or 10.011.

Aims and nature of physics and the study of motion of particles under the influence of mechanical, electrical, magnetic and gravitational forces. Concepts of force, inertial mass, energy, momentum, charge, potential, fields. Application of the conservation principles to solution of problems involving charge, energy and momentum. Electrical circuit theory, application of Kirchoff's Laws to AC and DC circuits. Uniform circular motion, Kepler's Laws and rotational mechanics. Properties of matter: solids, liquids, gases. The wave theories of physics, transfer of energy by waves, properties of waves. Application of wave theories to optical and acoustical phenomena such as interference, diffraction and polarization.

1.011 Higher Physics I F L3T3

Prerequisite: As for 1.001. Co-requisite: 10.001 or 10.011.

For students of all Faculties except Medicine, Engineering and Architecture who have a good secondary school record and who wish to do a more challenging course. Full-time Electrical Engineering students may be admitted after consultation with the School of Physics.

Vector algebra, kinematics, uniform circular motion, Coriolis acceleration, dynamics of particles, motion in a resistive medium, work and energy, gravitation, rotational motion of rigid bodies about fixed axis, rotational motion about a fixed point, Lagrange and Hamilton equations, harmonic motions, waves in elastic media, sound waves, physical optics, polarization and double refraction.

Electric charge, electric intensity, electric flux, Gauss' law, electric potential, capacity, dielectric materials, electric current and resistance, DC circuits, magnetic field, field due to a current, electromagnetic induction, inductance, magnetic materials, transients, AC circuits, electronics, diode, rectifier circuit, simple power supplies, electronic amplifier systems, single loop feedback systems, signal processing circuits using operational amplifiers.

1.951 Physics I (Mechanical Engineering) F L2T2

Prerequisites: As for 1.001 Physics I.

A basic course on physics for students in the School of Mechanical Engineering.


1.961 Physics I (Electrical Engineering) F L3T3

Prerequisite: As for 1.001 Physics I.

For students in the School of Electrical Engineering.

Electrostatics in vacuum, electrostatics in dielectrics, steady state currents, magnetostatics in vacuum, ferromagnetism, electromagnetic induction, transient currents. Vectors, motion in one dimension, motion in a plane, particle dynamics, work and energy, the conservation of energy, conservation of linear momentum, collisions, rotational kinematics, rotational dynamics, simple harmonic motion, gravitation. Temperature, heat and the first law of thermodynamics, kinetic theory of gases. Waves in elastic media, sound waves, geometrical optics, interference, diffraction, gratings and spectra, polarization.

1.971 Physics I (Surveying) F L3T3

Prerequisite: As for 1.001 Physics I.

Aims and nature of physics, linear and rotational mechanics, hydrostatics, elasticity, gravitation, temperature, electricity and magnetism, wave motion, optical instruments, interference and diffraction, lasers and atomic clocks. The importance in surveying of precise frequency, time, speed and distance measurements.

1.981 Physics I (Civil Engineering) S1 L2T3 and S2 L2T1

Prerequisite: As for 1.001 Physics I.

Aims of physics and its relation to civil engineering. Simple harmonic motion and its relation to wave motion. Electrical and magnetic forces,
Electromagnetism DC and AC circuits, bridges. Application of waves to physical optics to explain such phenomena as diffraction, interference and polarization. Holography. Acoustic and mechanical waves, attenuation, velocity of propagation. Elastic moduli. Non-destructive testing, instrumentation, techniques and theory. Emphasis on the physics involved in non-destructive testing and the aspects of vibration important to civil engineering.

**Physics Level II Units**

1.012 Mechanics and Thermal

Prerequisites: 1.961 or 1.001 or 1.011. Co-requisite: 10.2111. Excluded: 10.411B, 10.421B.

Properties of solids and liquids, elasticity, hydrostatics, hydrodynamics, damped and forced vibrations, resonance, coupled systems, normal modes. Fourier analysis, waves, group velocity, reflection and transmission at a boundary.

Kinetic theory, Maxwell velocity distribution, transport coefficients, first and second laws of thermodynamics, thermodynamic functions, simple applications, microscopic approach to thermodynamics, Boltzmann probability.

1.962 Physics of Measurement (Surveying)

Prerequisite: 1.971.


1.972 Electromagnetism (Electrical Engineering)

Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112.

Electrostatics in vacuum. Electrostatics in Dielectrics, electric currents, magnetostatics in vacuum, magnetic scalar potential, magnetostatics in magnetic media, time varying fields, Maxwell’s equations.

1.982 Solid State Physics (Electrical Engineering)

Prerequisite: 1.961 or 1.001 or 1.011, 10.001. Co-requisites: 10.2111, 10.2112.

The concepts of waves and particles, introductory quantum mechanics, atomic structure, optical spectra and atomic structure, structural properties of solids, band theory and its applications, uniform electronic semiconductors in equilibrium, excess carriers in semiconductors.

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**Chemistry**

**Undergraduate Study**

2.111 Introductory Chemistry

Prerequisite: Nil.

Classification of matter and the language of chemistry. The gas laws and the ideal Gas Equation, gas mixtures and partial pressure. The structure of atoms, cations and anions, chemical bonding, properties of ionic and covalent compounds. The Periodic classification of elements, oxides, hydrides, halides of selected elements. Acids, bases, salts, neutralization. Stoichiometry, the mole concept. Electron transfer reaction. Qualitative treatment of reversibility and chemical equilibrium, the pH scale. Introduction to the diversity of carbon compounds.

2.121 Chemistry IA†

Prerequisites:

- 2 unit Mathematics
- 3 unit Mathematics
- 4 unit Mathematics
- 2 unit Science (Physics or Chemistry)
- 4 unit Science (multistrand)
- 2 unit Science (other than Physics or Chemistry)
- 2.111

Stoichiometry and solution stoichiometry. Structure of matter, solids, liquids, gases. Thermochemistry. Equilibria and equilibrium constants, entropy changes, free energy changes, the relationship between equilibrium and standard free energy changes. Ideal solutions, colligative properties. Equilibrium in electrolyte solutions, acid-base equilibria, solubility equilibria and redox equilibria. The rate of a chemical change and chemical kinetics.

2.951 Chemistry IME

Prerequisite: Nil.

A treatment of chemistry which illustrates the application of the principles of chemistry to problems of concern to mechanical engineers. Topics: Chemistry of materials, thermochemistry, chemical kinetics and equilibrium, radioactivity and nuclear power, electrochemistry and corrosion of metals. Introduction to organic chemistry, structure and properties of polymers, fuels and lubricants. Surface chemistry.

† Students who have passed 2.121 may not subsequently enrol in 2.111 or 2.141.

Students meeting the 2.121 or 2.141 prerequisites are not permitted to enrol in 2.111 without the permission of the Head of the School of Chemistry. Students who enrol in 2.111 must pass 2.111 before they can proceed to 2.121 or 2.131 or 2.141.
Mechanical and Industrial Engineering

Undergraduate Study

5.006 Engineering E

Prerequisites: As for 5.010.


Introduction to Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

5.010 Engineering A**

Prerequisite:

HSC Exam Percentile Range Required

Either
2 unit Science (Physics) 31-100
or
4 unit Science (multistrand) 11-100
or
2 unit Industrial Arts or 31-100
3 unit Industrial Arts 11-100


Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

Introduction to Materials Science: The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

*Students may also meet the prerequisites for this subject by taking 2.111 introductory Chemistry as part of their first year program.
**Students who wish to enrol in this subject in courses other than the full-time courses in Aeronautical Engineering, Civil Engineering, Industrial Engineering, Mechanical Engineering and Naval Architecture can make up for the lack of the prerequisite by work taken in Physics in the first half of the first year.
5.0101 Statics
Prerequisites: As for 5.010.

5.0102 Introduction to Engineering Design
Introduction to Engineering Design SS L1T1
Engineering method, problem identification, creative thinking, mathematical modelling, computer-aided design, materials and processes, communication of ideas, the place of engineering in society.

5.020 Engineering B
Prerequisite: 5.010.
Engineering Dynamics: Kinetics of the plane motion of a particle; equations of motion, dynamic equilibrium, work and energy. Kinetics of systems of particles; impulse and momentum. Rotation of rigid bodies about a fixed axis. Belt, rope and chain drives, gear trains.

5.0201 Engineering Dynamics
Prerequisite: 8.170
Kinetics of the plane motion of a particle; equations of motion, dynamic equilibrium, work and energy. Kinetics of systems of particles; impulse and momentum. Rotation of rigid bodies about a fixed axis. Belt, rope and chain drives, gear trains.

5.030 Engineering C
Prerequisite: 5.030
Engineering Drawing: Graphic communication. First and third angle orthographic projection and isometric projection. Descriptive geometry fundamentals and their application to engineering problems with special emphasis on visualization of problems and development of methods for their solution. Australian standard engineering drawing practice. Applications involving detail and assembly drawings, functional dimensioning and tolerancing, and, one of the following options (determined by the course of study):
1. Production Technology
(Mechanical, Industrial and Aeronautical Engineering and Naval Architecture students must take this option.) Description and appraisal of the processes classified as: forming from liquid or solid, material removal, material joining. Machines Analysis of the primary functions of the machine tools and an appraisal of their limitations. Principles of operation of common machine tools and illustrations of their use.
2. Introduction to Chemical Industry
(Chemical Engineering and Industrial Chemistry students must take this option.) The chemical industry in Australia. The role of professional societies. Special topics on the engineering and chemical aspects of the industry e pollution control, energy sources, food and biochemicals and polymers, mineral processing, safety, etc. A visit to a factory in the Sydney area and the preparation of a short report after an introduction to information retrieval by university librarians.

3. Introduction to Metallurgical Engineering
(Metallurgy students must take this option.) History and significance of the exploitation of metals. Ores, mineral econmics, mineral processing, and metal extraction and processing methods illustrated by reference to the Australian mineral and metal industries. Properties, uses and applications of metallic materials. The role of the metallurgist in industry and in processing and materials research, and in relation to conservation and the environment.

4. Introduction to Mining Engineering
(Mining Engineering students must take this option.) Mineral deposits; metallic, non-metallic and fuels. Elements of prospecting and exploration. Basic mining techniques. Mining phases; development, exploitation, beneficiation and withdrawal. Mining and the environment. Mining services. Relevance of basic science and engineering subjects to mining design and operations.

5. Introduction to Computing
(Only available to Electrical Engineering BSc(Eng) and Surveying students who must take this option.) Introduction to computer program design with emphasis on the design of correct, reliable programs. The subject is organized on a tutorial basis and a number of simple fundamental programming tasks are illustrated. Programs are written in a high level language which provides facilities for the specifications of algorithms and data structures.

6. Introduction to Ceramic Engineering
(Ceramic Engineering students take this option.) The classification of materials. The nature of ceramics. The materials science approach. The scope of the ceramic industry. The origin, classification, physical properties and uses of clay minerals and other non-clay raw materials. Principal unit operations used in the ceramic industry. Drying and firing of ceramics, melt forming, pot forming and other forming procedures.

7. Introduction to Textile Technology

5.0301 Engineering Drawing
Prerequisites: As for 5.030.
Fundamental concepts of descriptive geometry, including reference systems, representation of point, line and plane; fundamental problems of position and measurement. Application of descriptive geometry to certain problems arising in engineering practice. Special emphasis on ability to visualize problems and processes involved in their solution. Instruction in the correct use of drawing instruments and the application of drawing standards. Measurements and dimensioning. Orthographic and isometric projections.

5.032 Experimental Engineering II
Prerequisites: 1.001 or 1.951, 5.040, 10.001. Co-requisites: 5.331 or 5.330, 6.801, 5.111, 5.611.
A series of lectures, demonstrations and experiments designed to show the theory and techniques of instrumentation in Mechanical Engineering.
5.034 Engineering Experimentation
Prerequisites: 5.072 (Statistics Strand).

5.042 Industrial Experience
A minimum of three years of satisfactory industrial experience must be obtained concurrently with attendance in all BSc(Eng) courses. Students are required to submit to the School evidence from their employers confirming completion of the prescribed period of industrial training.

5.043 Industrial Training I
Practical work in industry at the process or shop floor level to gain experience of people, industrial problems and relations, and process equipment. (Report submitted in Week 1 of session detailing involvement and experience gained prior to Year 3).
For details contact Mr G. Crawford, Industrial Training Officer.

5.044 Industrial Training II
Practical work in industry at the professional level to gain experience in design, development, investigation or management control systems areas in collaboration with professional engineers. (Report submitted in Week 1 of session detailing responsibilities and experience gained in vacation period between years 3 and 4.)
For details contact Mr G. Crawford, Industrial Training Officer.

5.051 Thesis
To be taken in year of completion of course.
For students in the full-time and part-time BE degree courses in the School of Mechanical and Industrial Engineering.

5.061 Technical Orientation
A series of lectures and visits to engineering establishments arranged to familiarize students with the profession of engineering, the industries served by engineers and current activity in engineering research. Development of skill in observing and reporting on technical matters.

5.062 Communications

5.071 Engineering Analysis
Prerequisite: 10.022.

5.072 Statistics/Computing
Prerequisites: 10.001 or 10.011.
Statistics: An introduction to probability theory. Random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of \( X^2, t \) and \( F \). Estimation by moments and maximum likelihood: confidence interval estimation. The standard tests of significance based on the above distributions, with a discussion of power where appropriate. An introduction to linear regression.

5.073 Numerical Analysis/Mathematics
Prerequisites: 10.022, 5.072 (Computing Strand).
Numerical methods for solution of non-linear equations, linear and non-linear systems, ordinary and partial differential equations. Complex variable theory: differentiation, contour integrals; Laplace and Fourier transforms. Variational methods: optimality conditions; functionals; Eulers-Lagrange equations; transversality and boundary conditions; one dimensional search; introduction to non-linear programming.

5.074 Computing Science for Mechanical Engineers
Prerequisite: Computing strand of 5.072.

5.111 Mechanical Engineering Design I
Prerequisites: 5.010, 5.030, 5.040. Co- or prerequisites: 5.330, 5.611, 5.411, 8.259, 5.032.
Application of design strategy to creative design projects. Modelling, analysis and design of basic engineering elements and systems with
further engineering drawing practice. Review of currently available mechanical technology and use of standard equipment items, codes and trade literature.

5.112 Mechanical Engineering Design II  F L1T2
Prerequisite: 5.111. Co- or prerequisite: 5.412.
Mathematical modelling and analyses, decision theory, computer programming for design applications. More advanced design analyses and drawing with individual and group project engineering experience.

5.113 Mechanical Engineering Design III  F L1½T4½
Prerequisite: 5.112 or 5.123.
Special analytical and experimental techniques of engineering design. Optimization; reliability analysis. Major and minor design projects.

5.121 Mechanical Engineering Design I  S1 L4T4 S2L3
Prerequisites:
- 2 unit Science (Physics)
- 4 unit Science (multi/strand)
- 2 unit Industrial Arts
- 3 unit Industrial Arts


Introduction to Engineering Design: Engineering method, problem identification, creative thinking, mathematical modelling, computer aided design, materials and processes, communication of ideas.

Design for Manufacture: The implementation of design and its interaction with manufacturing processes. Manufacturing capabilities and tolerancing. Selection of materials and processes. Approximately 60 hours of practical training, including casting, welding fitting and machining. Project involving appraisal of an existing design and a report recommending design improvements, materials, equipment items and processes to be utilized.

Introduction to Materials Science: The structure and properties of the main types of engineering materials, with emphasis on the way in which properties may be controlled by controlling structure.

5.122 Mechanical Engineering Design II  F L1T2
Prerequisites: 5.010 or 5.0101, 5.121, 5.421 or 5.040 or 5.020. Co-requisite: 5.422.
Application of design strategy to creative design projects. Modelling, analysis and design of basic engineering elements and systems with
5.1245  Computer Based Engineering Design  S2 L2T1

Prerequisites: S1 of 5.123, 5.074, 5.423.


5.303  Mechanical Vibrations  S2 L1T½

Prerequisites: 5.330, 10.022.


5.324  Automatic Control Engineering  F L2T1

Prerequisite: 10.002.

Laplace transforms and transfer functions. Mathematical modelling of dynamic engineering systems: block diagram methods; properties of linear elements; linearization; analysis of components and systems. Time response and stability: response of first- and second-order systems; system stability; Routh's criterion. Introduction to analog computing. Root locus method. Frequency response: the Nyquist criterion; closed loop transient response from the open loop frequency response; Bode diagrams. Control systems: types of control action and their effects on system response; controller selection and tuning; analysis of pneumatic control system components.

5.330  Engineering Dynamics  F L1T1

Prerequisites: 1.001 or 1.951, 5.010 & 10.001 or 10.011.

Kinematics and kinetics of particles and rigid bodies in planar motion: absolute motion and motion relative to translating and rotating frames of reference; constraint and degrees of freedom; moment of inertia; friction; dynamic equilibrium, differential equations of motion; gyroscopic couple; work and energy, variational principles; impulse and momentum; impact.

5.331  Dynamics of Machines I  F L1½T½

Prerequisites: 5.330, 10.022.


Mechanical Vibrations: Simple harmonic motion. One degree of freedom systems, free and forced vibration, transmissibility and motion isolation. Whirling of shafts.

5.332  Dynamics of Machines II  F L2T1

Prerequisite: 5.331 or 5.333.


5.333  Dynamics of Machines  S2 L2T1

Prerequisites: 5.330, 10.022.


5.334  Engineering Dynamics II  SS L2T1

Prerequisite: 5.333 or 5.331.

Inertia effects in machinery; analysis of torsional and translational disturbances set up in machines containing one or more reciprocating masses; means of reducing or eliminating undesirable effects. Mechanical vibrations: two degrees of freedom systems; free and forced vibrations; applications; the undamped vibration absorber. Multiple rotor systems: free and forced torsional vibrations. Geared branched systems. Introduction to beam vibrations. Matrix methods.

5.343  Linear Systems Analysis  S1 L2T1

Prerequisites: 5.330, 10.022.

Models of physical systems: differential equations for physical systems including mechanical, electrical, hydraulic, thermal and pneumatic systems; linearization. System analysis techniques: solution by Laplace transform methods. Transfer functions and block diagrams. System response: response of first and second order systems to impulse step, ramp, sinusoidal and periodic inputs; higher order system response; system stability, applications.

5.344  Feedback Control  S1 L2T1

Prerequisite: 5.343.


5.3541  Engineering Noise I  S1 L2T1

Prerequisite: 5.073.

5.3542 Engineering Noise II  
**S2 L2T1**  
**Prerequisite:** 5.3541.  

5.412 Mechanics of Solids III  
**F L1½T½**  
**Prerequisites:** 5.411, 8.259, 10.022.  
Fatigue strength, biaxial and triaxial loading. Virtual work-unit load method for deflections of beams, frames and rings; statically indeterminate structures; three-moment equation. Introduction to theory of elasticity; stress, strain, torsion. Membrane analogy. Inelastic behaviour of bars, beams, shafts and columns. Introduction to theory of plasticity. Thick curved beams; thick-walled cylinders; rotating discs.

5.413 Mechanics of Solids IV  
**F L2T1**  
**Prerequisite:** 5.412 or 5.423.  

5.421 Mechanics of Solids I  
**S2 L2T2**  
**Co- or prerequisites:** 5.010 or 5.0101.  

5.422 Mechanics of Solids II/Materials  
**F L2T2½**  
**Prerequisites:** 5.010 or 5.0101, 5.421 or 5.040 or 5.020, 10.001.  

5.423 Mechanics of Solids III  
**F L1½T½**  
**Prerequisites:** 5.422 or 5.411, 10.022.  
Fatigue of biaxial and triaxial systems. Deflections of beams and structures. Statically indeterminate beams and structures. Introduction to theory of elasticity; stress, strain, torsion. Membrane analogy. Finite element stress analysis. Basic concepts; structural stiffness method; bar, triangular, rectangular and brick finite elements; force and displacement methods; development and use of computer programs.

5.424 General Mechanics of Solids  
**SS L2T1**  
**Prerequisite:** 5.423.  
Inelastic behaviour of bars, beams, shafts and columns. Thick cylinders and composite cylinders loaded by internal and external pressures; rotating discs; contact stresses. Elementary concepts of fracture mechanics; stress intensity factor; fracture toughness; crack propagation.

5.434 Plates and Shells  
**SS L2T1**  
**Prerequisite:** 5.423.  
Bending of rectangular and circular plates under normal loading; thermal stresses. Shells; membrane stresses, bending stresses, discontinuities at junction of ends; design of pressure vessels.

5.444 Theory of Elasticity  
**SS L2T1**  
**Prerequisites:** 5.423, 5.330, 5.611 or 5.622.  
Mathematical foundations: analysis of stress; deformation and strain; equilibrium, motion and flow; fundamental laws of continuum mechanics; linear elasticity; viscoelasticity; applications.

5.454 Theory of Plasticity  
**SS L2T1**  
**Prerequisite:** 5.423 or 18.413.  
Analysis of stress, strain, strain rate; plastic stress/strain relations with description of experimental verification. Application of plasticity theory to a selection of problems including metal working processes such as extrusion and rolling and metallic friction and wear.

5.464 Structural Instability  
**S1 L1½T½**  
**Prerequisite:** 5.423.  
Buckling of perfect and imperfect columns; bending and buckling of thin flat plates; local instability and crippling of thin-walled columns. Buckling of monocoque cylinders and curved panels. Stiffened panels. Tension field beams.

5.611 Fluid Mechanics/Thermodynamics I  
**F L2T2**  
**Prerequisites:** 1.001 or 1.951 or 1.011; 5.010 or 5.0101; 10.001 or 10.011.  
**Co- or prerequisite:** 5.330.  
5.622 Fluid Mechanics/Thermodynamics \( F \text{ L2T2} \)

Prerequisites: 10.001 or 10.011; 1.951 or 1.001 or 1.011; 5.010 or 5.0101. Co-requisite: 5.330.

Comprises 5.6221, 5.6222, 5.6223.

5.623 Heat Transfer \( \text{SS L2T1} \)

Prerequisite: 5.611 or 5.622; 10.022.

Conduction: steady one and two dimensional; unsteady one dimensional. Radiation: radiation properties; shape factor; compound surfaces. Convection: laminar and turbulent boundary layers and heat transfer; flow in ducts and pipes; natural convection. Design of heat exchangers.
5.644 Solar Energy  SS L2T1
Prerequisite: 5.611 or 5.622; 10.022. Co-requisite: 5.623.

5.653 Compressible Flow  S1 L2T1
Prerequisite: 5.611 or 5.622; 10.022.
Part 1, compulsory for Aeronautical Engineers and forms a component of 5.611 — (7 weeks only).
1. One dimensional steady flow: isentropic channel flow, normal shock waves, supersonic wind tunnels and diffusers, flow visualization. 2. Two dimensional steady flow: oblique shock waves, Prandtl-Meyer expansions, nozzles, aerofoils. 3. One dimensional unsteady flow: moving waves, reflections, explosions in ducts, shock tubes; method of characteristics, internal flows, piston and valve effects.

5.654 Hydraulic Transients  SS L2T1
Prerequisites: 5.611 or 5.622; 10.022.
Mass oscillations in surge systems with various types of surge tanks. Stability of surge systems, comparison with experiment. Alliev's theory of water hammer, fast and slow closures, water hammer in pumping systems, circle diagrams.

5.663 Potential Flow Theory  S1 L2T1
Prerequisite: 5.611 or 5.622; 10.022. Co-requisite: 5.073.

5.664 Multiphase Flow  SS L2T1
Prerequisite: 5.611 or 5.622; 10.022.

5.801 Aircraft Design I  F L2T1
Prerequisites: 5.303, 5.412 or 5.423; 5.800 (full-time only); 5.811; 5.822. Co- or prerequisite: 5.812, 5.823, 5.831.
A co-ordinated course of lectures in aerodynamics, structures and operations leading to detailed design, calculation and drawing of an original aircraft configuration.

5.811 Aerodynamics I  F L2T1
Prerequisites: 5.330; 5.611 or 5.622; 10.022.

5.812 Aerodynamics II  F L2T1
Prerequisites: 5.073; 5.612 or 5.811; 5.303 or 5.331 or 5.334; 5.343.
1. Compressible flow: subsonic, transonic and supersonic two-dimensional flows; viscous boundary layers and heat transfer. 2. Dynamic stability and control; characteristic solutions for rigid aircraft. 3. Hypersonic, high enthalpy flows.

5.822 Analysis of Aerospace Structures I  F L1½T½
Prerequisites: 5.330; 5.411 or 5.422; 8.259; 10.022. Co- or prerequisite: 5.412 or 5.423.

5.823 Analysis of Aerospace Structures II  F L1½T½
Prerequisites: 5.412, 5.423, 5.822.
Structural instability: buckling of perfect and imperfect columns; bending and buckling of thin flat plates; local instability and crippling of thin-walled columns; buckling of monocoque cylinders and curved panels; tension field beams. Stress functions. Shear lag. Warping of thin-walled open and closed section tubes. Torsional buckling. Sandwich construction and analysis. Composite materials; elementary analysis.

5.831 Aircraft Propulsion  F L1½T½
Prerequisites: 5.611 or 5.622; 5.811.
5.901 Introduction to Mathematical Modelling and Decision Making S1 L2T1
Prerequisite: 5.122 or 5.111.

Models and modelling: types, criteria, parameters, constraints; mathematical formulation and validation of models; fundamentals of solution algorithms; post-solution analysis. Decision making: scales and ratings; subjective decision making; mixed rating comparisons; sensitivity; pitfalls. Introduction to project control. Applications from the marine field.

This course is identical with Session 1 of 5.123.

5.902 Ship Management Economics S2 L1½T0
Prerequisite: 10.022. Co- or prerequisites: 5.071 or 5.073.

Engineering Economy portion of 18.021.

Economic objectives of the firm. Economic measures of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return) and their application in the selection and replacement of processes and equipment.

5.911 Ship Hydrostatics F L2T½
Prerequisites: 5.010 or 5.0101.

Basic concepts and integration methods. Hydrostatic particulars and approximate formulae. Intact stability, cross curves and righting arm, stability at small angles and free surface effects, the wall-sided formula, flooding and watertight subdivision. Damaged stability. Launching calculations and docking.

5.921 Ship Structures I F L1½T½
Prerequisites: 5.422 or 5.411; 10.022.


5.922 Ship Structures II F L1½T½
Prerequisites: 5.423 or 5.412; 5.921.


5.931 Principles of Ship Design IA S1 L3T0
Mathematical modelling and decision theory, as applied to design. Introduction to FORTRAN programming.
5.941 Ship Propulsion and Systems F L/T4

Prerequisites: 5.911, 5.953.


5.953 Ship Hydrodynamics S1 L2T1 S2 L1½T½

Prerequisites: 5.330: 5.611 or 5.622: 10.022. Co-requisite: 5.073.

1. 5.663 (Potential Flow Theory) in Session 1. 2. 5.952 (Hydrodynamics) in Session 2. Introduction and elementary methods applied to ship hydrodynamics. Dimensional analysis and experimentation. Motion of a spar buoy and derivation of coefficients in equation of motion. Linearized uncoupled motions of a ship. Non-linear aspects. Coupled heave and pitch motion of a ship. Ocean waves and their properties.

Graduate Study

5.045G Advanced Topic in Mechanical Engineering C2

5.046G Advanced Topic in Mechanical Engineering C2

5.047G Advanced Topic in Mechanical Engineering C2

5.073G Ordinary Differential Equations in Mechanical Engineering C3

Excluded: 5.072G and equivalent.

Solutions and their meaning, integration constants, linearity; special methods of solution; integration factors; variation of parameters; Euler, higher order linear equations; physical origins of ordinary differential equations and linear systems; linearization of engineering problems; stability of engineering systems.

5.075G Computational Methods in Mechanical Engineering I C2

Prerequisite: 5.072 (Computing strand) and 5.073 or equivalent.


5.076G Computational Methods in Mechanical Engineering II C2

Prerequisite: 5.072 (Computing strand) and 5.073 or equivalent.

Partial differential equations: finite differences and finite elements. Mathematical formulation of physical problems in mechanical engineering and their solution.

5.077G Analogue Computation in Mechanical Engineering I C2

Prerequisite: 5.324 or 5.344 or equivalent.


5.078G Analogue Computation in Mechanical Engineering II C2

Prerequisite: 5.324 or 5.344 or equivalent.


5.086G Digital Logic Fundamentals for Mechanical Engineers C3


Discrete logic elements; assembly design; misoriented design; support devices; microprocessor units.

5.087G Microprocessor Fundamentals for Mechanical Engineers C3


Microprocessor chips; system design; memory; past design; programming; applications.

5.088G Industrial Applications of Microprocessors C3

Prerequisite: 5.087G or equivalent. Excluded: 6.432, 6.433G, 6.651G and equivalent.

5.151G  Refrigeration and Air Conditioning Design I  C3
Prerequisite: 5.624 or equivalent.

5.152G  Refrigeration and Air Conditioning Design II  C3
Prerequisite: 5.151G or equivalent.


5.307G  Dynamics I  C3
Excluded: 5.304G and equivalent.

5.308G  Dynamics II  C3
Excluded: 5.307G or equivalent. Excluded: 5.305G and equivalent.

5.317G  Industrial Robotics  C3
Prerequisite: 5.086G or equivalent.


5.318G  Advanced Mechanism Analysis and Synthesis I  C3
Excluded: 5.315G and equivalent.

5.319G  Advanced Mechanism Analysis and Synthesis II  C3
Excluded: 5.316G and equivalent.

A selection of topics from Planar mechanisms: Kinematic analysis of complex mechanisms; kinetic analysis; kinematic geometry; precision position synthesis. Cams: basic and common curves; equations of motion; development of profile; determination of system geometry and mechanical properties; noise, wear, backlash and manufacture. Spatial linkages: structural analysis; closure equations; screw system algebra; special configurations.

5.328G  Control and Modelling of Mechanical Systems I  C3
Prerequisite: 5.412 or 5.423 or equivalent. Excluded: 5.421-4G and equivalent.

5.329G  Control and Modelling of Mechanical Systems II  C3
Prerequisite: 5.328G or equivalent.

Development of modelling techniques using both digital and analogue computation, with special emphasis on the representation of non-linearities. Typical examples of mechanical systems.

5.335G  Vibrations  C2
Comparison of time, frequency, transform domain techniques for linear systems. Analysis of Lagrange’s equation and matrix methods in free, forced multi degree-of-freedom systems. Modal analysis; numerical methods. Beam shaft vibrations; approximate methods. Self-excited vibrations, stability. Random vibrations. Laboratory work on vibration measurement, testing.

5.336G  Random Vibrations  C2
Prerequisite: 5.311 or 5.333 or equivalent.

Probability, vibration theory review, linear mechanical system response to random vibrations. Statistical characteristics: autocorrelation, spectral density, convolution, narrow band processing, consistency, applications.

5.345G  Analogue Control Systems  C3
Prerequisite: 5.324 or 5.344 or equivalent. Excluded: 5.321G and equivalent.


5.346G  Non-Linear Control Systems  C3
Prerequisite: 5.324 or 5.344 or equivalent. Excluded: 5.322G and equivalent.


5.401G  Experimental Stress Analysis  C2
Grid technique; Moire fringe method; Strain gauges; photoelasticity; crack detection techniques. Class project.

5.415G  Stress Analysis for Mechanical Engineering Design I  C3
Prerequisite: 5.412 or 5.423 or equivalent. Excluded: 5.421-4G and equivalent.
5.416G Stress Analysis for Mechanical Engineering Design II C3
Prerequisite: 5.412 or 5.423 or equivalent. Excluded: 5.421-4G and equivalent.

5.417G Mechanics of Fracture and Fatigue C3
Excluded: 5.428G and 5.429G and equivalent.

5.491G Biomechanics I C2
Excluded: 32.511G and equivalent.
Statics, dynamics of the musculoskeletal system: mathematical modeling, computer simulation, analysis of working, walking and athletic activities; analysis of pathological situations.

5.492G Biomechanics II C2
Excluded: 32.521G and equivalent.
The physical properties of materials having significance in biomedical engineering: human tissues, skin, soft tissues, bone; metals. Polymers and ceramics: the effects of degradation and corrosion.

5.601G Computational Fluid Dynamics C3
Prerequisite: 5.076G or equivalent.

5.616G Internal Combustion Engines I C3
Prerequisite: 5.653 or equivalent. Co-requisite (for undergraduates): 5.643. Excluded: 5.615G and equivalent.

5.617G Internal Combustion Engines II C3
Prerequisite: 5.615G or 5.616G or equivalent.

5.621G Gasdynamics I C2
Prerequisite: 5.653 or equivalent.
5.622G Gasdynamics II C2
Prerequisite: 5.653 or 5.621G or equivalent.

5.631G Lubrication Theory and Design I C2
Prerequisite: 5.634 or 5.6342 or equivalent.
Hydrostatic lubrication, squeeze film, hydrodynamic lubrication, slider bearings, tilting pad thrust bearings, journal bearings, practical journal and thrust bearing design; air bearings; friction, wear; dry boundary lubrication; lubricant, bearing material selection; anti-friction bearings.

5.632G Lubrication Theory and Design II C2
Prerequisite: 5.634 or 5.6342 or 5.631G or equivalent.

5.653G Acoustic Noise I C2

5.654G Acoustic Noise II C2
Prerequisite: 5.3542 or 5.634 or equivalent.

5.655G Energy Conservation and System Design C3
Examination of some existing systems, assessment of their energy losses and their improvement by tuning. Alternative energy sources and their availability, energy utilization and efficiency in various systems. Environmental aspects, assessment of emissions, means of improvement. Economically viable energy technology under present conditions. Expected trends in energy technology in the short and long term. A number of case studies.

5.712G Convection Heat Transfer I C2
Prerequisites: 5.623 or equivalent.
5.713G Convection Heat Transfer II  
Prerequisite: 5.712G or equivalent.


5.718G Conduction Heat Transfer  
C2

Steady, one-dimensional conduction. Analysis of extended surfaces. Two- and three-dimensional conduction. Unsteady conduction in one or more dimensions; analytical, numerical and analogical methods of solution. Initial value and boundary value problems. Temperature fields with heat sources. Non-homogeneous bodies; anisotropic bodies; variable material properties.

5.721G Thermal Radiation Energy Transfer  
C3

Prerequisite: 5.623 or equivalent. Excluded: 5.719G and equivalent.

Thermal radiation properties of materials, black bodies; characteristics of real solids, liquids and gases; radiation exchange between infinite surfaces and between finite surfaces; shape factor for various configurations; radiation in an enclosure; radiation behaviour of gases and vapours. Pyrometry. Solar radiation; solar angles; atmospheric absorptions of solar radiation; direct and diffuse radiation; pyrheliometers. Characteristics of solar collector absorbers, selective absorption and radiation. Computer solution of transfer in cavities and from flows.

5.722G Solar Thermal Energy Design  
C3

Prerequisite: 5.721G or equivalent. Excluded: 5.720G and equivalent.


5.751G Refrigeration, Air Conditioning and Cryogenics I  
C2

Prerequisite: 5.624 or equivalent.

5.752G Refrigeration, Air Conditioning and Cryogenics II  
C2

Prerequisite: 5.751G or equivalent.

Thermodynamic principles, diagrams; properties of real fluids, refrigerants. Thermodynamics of change of phase: liquids and dilute solutions; mixtures of liquids; steady flow processes with binary mixtures; rectification of a binary mixture; absorption refrigeration; resorption refrigeration. The vapour compression cycle; multi-pressure systems; analysis of compressor performance; condensers, evaporators and expansion devices; properties of the ideal refrigerant; reversed cycles; analysis and performance characteristics of the complete cycle. Air-cycle, steam-jet refrigeration; application to air conditioning design; cooling towers, mixtures of gases and vapours; psychrometry, evaporative cooling of air; dehumidification of air. Thermoelectric cooling; Seebeck, Joulean, conduction, Peltier, Thomson effects; thermodynamic analysis; thermoelectric materials. Production of low temperatures; liquefaction and rectification of gases; magnetic cooling; application to research.

5.755G Refrigeration and Air Conditioning Applications  
C4


5.909G Research Project  
C9

5.912G Naval Hydrodynamics I  
C2

Prerequisite: 5.663 or 10.411A or equivalent.

5.913G Naval Hydrodynamics II  
C2

Prerequisite: 5.912G or equivalent.

Advanced treatment of topics selected from: ship waves and ship resistance; ship maneuverability; ship motion and seakeeping; hydrofoil and propeller theory; aerodynamics and hydrodynamics of surface effect machines.

5.918G Research Thesis  
C18

5.936G Research Thesis  
C36

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Electrical Engineering and Computer Science

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Undergraduate Study

6.010 Electrical Engineering I  
S1 or S2 L2T4

Prerequisite: Electricity and magnetism section of 1.961.

An orientation subject to acquaint students with the various areas and problems of Electrical Engineering. Some aspects of energy conversion and transmission; electronics; logic, number systems, computers and microprocessors; systems and circuit theory; probability, information and communication. Laboratory exercises and project work in these areas include instrumentation and device characteristics.
6.021A Circuit Theory I  
**Prerequisites:** 1.961 or equivalent, 6.010, 10.001.


6.021B Power  
**Prerequisite:** 6.021A attempted at an acceptable level.

An introduction to the transmission, distribution and utilization of electrical energy, including devices which use the interaction of electric, thermal and magnetic fields. Topics include a revision of three-phase circuit analysis, magnetic circuits, transformers, and basic electromagnetic energy conversion.

6.021C Electronics I  
**Prerequisite:** 1.982, 6.021A.

A unified treatment of the fundamental principles of bipolar and field-effect transistors and their operation in simple circuits at low frequencies and room temperature in the static approximation (i.e. where the frequency and temperature characteristics of the device itself are neglected). Stress on showing how to set up the transistor currents and voltages to give the circuit characteristics desired of the device (i.e. switching, amplification, high (or low) input impedance, etc.). An introduction to the Operational Amplifier and its uses.

6.021D Computing  
**Prerequisite:** Computing strand of 5.030. Excluded: 6.600, 6.611, 6.620 and 6.621.

Programming: systematic development of algorithms and associated data-structures using PASCAL, a high-level, algorithmic, programming language which provides simple, high-level program-control and data-structure definitions facilities. The translation of a program expressed in such a high-level language to a program expressed in the more commonly encountered, lower-level, non-algorithmic programming language FORTRAN. Computer organization: simple machine architecture; data storage devices; simple operating system concepts.

6.021E Digital Logic and Systems  
**Prerequisite:** 10.001.

A hardware oriented subject concerned with the design of digital circuits for control and general computational purposes. Includes representation of digital information, combinational logic design, clocked circuitry, digital systems and PDP 11 assembler programming.

6.0311 Circuit Theory II  
**Prerequisites:** 6.021A, 10.111A, 10.1113, 10.1114, 10.2111, 10.2112, (Two of 10.1113, 10.1114, 10.2111 or 10.2112 may be taken as co-requisites), 6.021B, 6.021C (one of 6.021B or 6.021C may be taken as a co-requisite).

Basic circuit concepts followed by basic system ideas such as order, state, linearity and typical system waveforms.


6.0312 Utilization of Electric Energy  
**Prerequisites:** 6.021A, 6.021B. Co-requisite: 6.0311.

A continuation of study of the utilization of electrical energy commenced in 6.021B. Topics treated included dc machines, three-phase induction machines, single phase machines, motor speed control, the thermal behaviour and rating of machines.

6.0313 Electronics II  
**Prerequisites:** 6.021A, 6.021C. Co-requisite: 6.0311.


6.0314 Systems and Control I  
**Prerequisite:** 6.0311.


6.0315 Electrical Energy  
**Prerequisite:** 6.0312 attempted at an acceptable level.


6.0316 Electronics III  
**Prerequisite:** 6.0313. Co-requisites: 6.0311, 6.021E.

Extension of 6.0313 to include tuned amplifiers, oscillators, large-signal electronics of bipolar and field-effect transistors, charge-control switching analysis for bi-polar and field-effect transistors, power amplifiers, waveform generators and shapers, monostables, astables, and an introduction to digital electronics, with an increasing emphasis on integrated circuit realizations.
6.0317 Communication Systems I

**Prerequisite:** 6.0311. **Co-requisites:** 10.361.

Overview of information acquisition, transmission and processing. Aims to enable students not specializing in this field to understand the communication problems they are likely to meet in their career, and to provide a background if they intend to specialize in communications.

Topics: analogue to digital conversion (sampling, quantizing, aliasing, pulse code modulation, delta modulation), multi-plexing. Transmission through linear systems and nonlinear devices, fast Fourier transform (FFT), algorithm. Design of finite and infinite transforms; analytic signals, signals in systems. Sampling and digital processing of analogue signals. Modulation and demodulation (amplitude, frequency and phase modulation signal to noise ratio, error figure, error probability, bandwidth, spectrum, intersymbol interference). Communication systems (transmission lines, radio wave propagation, antennas and arrays, modern, repeaters, equalizers, line and error coding).

6.0318 Microprocessor Systems and Applications

**Prerequisites:** 6.021D or 6.260, 6.021E or 6.631, 6.021C. Excluded: 6.613.

Review of logic elements and binary codes. LSIs technologies and devices. Microprocessor integrated circuits. Outline of system configurations. Microprocessor busses, control signals and timing. The fetch execute cycle and microprocessor operation. Programming models and instruction sets. Programming elements including addressing modes, arithmetic and logical devices. Memory devices including RAM, ROM, EPROM. Direct memory access. Interrupt systems. A structured approach to programming. System development software including monitors, PROM programmers, editors, assemblers and higher level languages. Development tools, logic state analysers, emulators. Laboratory work involving both hardware and programming experience, where typical applications are considered.

6.041 Electrical Measurements

**Prerequisite:** 6.0311, 6.0313.

A course of lectures and laboratory work of one session's duration treating basic electrical measurements using null or deflection techniques with analog or digital presentation in the range from DC to an upper frequency limit where lumped circuit techniques begin to be inadequate.

6.042 Digital and Analogue Signals

**Prerequisites:** 10.033, 10.361.

Analysis and processing of continuous-time and discrete-time (digital) signals: Generalized Fourier analysis; convolution, correlation, energy and power density spectra. Signal distortion (linear and nonlinear) Hilbert transforms; analytic signals, signals in systems. Sampling and digital processing of analogue signals; the discrete Fourier transform (DFT), the fast Fourier transform (FFT), algorithm. Design of finite and infinite impulse response (FIR and IIR) digital filters. Analysis of random signals and noise; transmission through linear systems and nonlinear devices, signal-to-noise ratios, matched filters. Estimation and measurement of power density spectra.

6.044 Electrical Product Design and Reliability

**Prerequisite:** 10.361.

The design and development of reliable, high-quality hard-ware, from components to systems: product and procurement specifications; factors in choice of system configuration, materials, components, processes, prediction of reliability, availability, system effectiveness; cost-of-ownership optimization; maintainability; thermal design; mechanical design; redundancy; design reviews; fault-free analysis; failure mechanisms; failure mode analysis; Monte Carlo simulation; worst case and statistical design; sensitivity analysis and marginal testing; component screening; product development; life testing, environmental testing, non-destructive testing; quality control, attribute sampling.

6.045 Electrical and Electronics Engineering Materials

**Prerequisite:** 6.0313. Excluded: 6.022.

A survey of materials and their technology for electrical and electronic devices and systems. Influence of molecular and crystallographic structure on the design properties of the relevant properties of metals, semiconductors, glasses, ceramics, polymers, liquids and gases, with particular regard to their electrical, magnetic, mechanical, optical and transducing characteristics and their behaviour in electrostatic, magnetic, electromagnetic and thermal fields. Thick and thin film microcircuits. Superconductivity. Control of material properties through heat-treatment, additives, etc. Composite materials, joining and bonding techniques. Failure mechanisms and long-term stability. Effects of environment, corrosion. Stabilizing and protective treatments. Example applications to illustrate selection criteria for specific purposes, including both traditional applications as well as some of contemporary interest.

6.056 Mechanical Engineering

**Prerequisite:** 1.961 or equivalent, 10.2111, 10.2112.


6.202 Power Engineering—Systems I

**Prerequisites:** 6.0312, 6.0315.

An elective emphasizing parameters and performance of power system components, transmission lines and cables, transformers, synchronous machines; power system overvoltages; fault calculations; circuit interruption; protection; distribution systems.

6.203 Power Engineering—Systems II

**Prerequisite:** 6.202.

A subject emphasizing interconnected system operation, performance and control; synchronous machines, power system analysis, operation and stability, energy resources.
6.212 Power Engineering—Utilization S1 L2T3
Prerequisites: 6.0312, 6.0315.
Topics include: Machines and electrical drives, applications and control, in particular using power rectifiers and thyristors; industrial heating; frequency changing; illumination. A program of experimental projects and design applications will accompany the lectures.

6.222 High Voltage and High Current Technology S1 L2T3
Prerequisite: 6.0315.
An elective concerned with aspects of design and testing of electrical equipment used in the power industry. Topics include: fields and materials as applied to high power apparatus; effects of high currents and high voltages; design of testing equipment; methods of measurement of hv and hc under steady state and surge conditions; effects of transients; earthing techniques.

6.303 High Frequency Circuits and Electronics I S1 L2T3
Prerequisites: 6.0311, 6.0316, 6.0317.
Fundamental aspects of high frequency and microwave circuits and electronics: TEM transmission lines, with emphasis on coaxial and microstrip lines and components. Introductory antenna theory, phased arrays and wide-band antennas. Two-port characterization, scattering parameters and noise theory, with application to high frequency bipolar and field effect transistors.

6.304 Electronic Devices and Circuits S1 L2T3
Prerequisite: 6.303.
The material extends 6.303 High Frequency Circuits and Electronics I into further areas of high frequency and microwave circuits and electronics: Plane wave propagation and application to terrestrial communications. Waveguide theory and aperture antennas. Parametric amplifiers. Microwave sources, with emphasis on Gunn and impact diodes.

6.305 Digital Control S2 L2T3
Prerequisites: 6.0314, 6.0316, 6.0318.
Theory and applications of some electronic devices and systems with an associated laboratory-design program. Analogue or digital integrated circuits introduced as appropriate. Topics may include: active filters, switched transistor application, phase locked loops, optical links, charge coupled devices, power electronics, design factors of large electronic systems.

6.306 Communication Systems IIA S1 L2T3
Prerequisites: 6.0317, 10.033, 10.361.
The theory and practice of modern analogue and digital communication techniques. Topics include: Digital communication (representation of signals as vectors, matched filter, correlation receiver, spectrum bandwidth, line coding); Adaptive equalization, Information Theory (mutual information and entropy, source encoding, rate distortion function, channel capacity); Linear and nonlinear analogue modulation (AM, SSB, FM, etc, signal to noise ratios, characterization and effect of nonlinearity on transmitters and receivers, comparison); Aspects of transmission media relevant to telecommunication systems.

6.307 Communication Systems IIB S1 L2T3
Prerequisites: 6.0316, 6.0317.
The material of 6.0317 is extended and applied to communications systems other than telecommunication systems. Topics covered are radio and sound systems (AM and FM, psychoacoustics, electroacoustics), television (colour vision, teletext, etc), radar and sonar, navigation systems.

6.308 Systems and Control II S1 L2T3
Prerequisites: 6.0311, 6.0314.
The design and analysis and identification of single and multivariable feedback control systems as encountered in industrial processes. Emphasis on the synthesis of a prescribed dynamic performance via both transient and frequency domain methods. Consideration of the effects of nonlinearity on the system performance. Simulation and computer-aided design.

6.309 Digital Control S2 L2T3
Prerequisites: 6.0314*, 10.033, 10.361.
The design and analysis of digital control systems. Consideration of problems in analog-digital and digital-analog conversion such as quantization, aliasing and finite word length and their relation to the design of numerical control algorithms. On-line digital identification and adaptive control techniques as illustrated by the self-tuning regulator, minimum variance and dead beat control structures.

6.312 Computer Control and Instrumentation S1 L2T3
Prerequisites: 6.0314, 6.0316, 6.0318*.
Current practice in hardware and introduction to software techniques as applied to the implementation of control and instrumentation systems. Analog computers and associated circuit techniques. Transducers, actuators, controllers and special electro-mechanical devices as used in industrial instrumentation. Digital instrumentation and displays. Hybrid devices and analog conversion. Sampling. Computer control organization and interfacing concepts. Microprocessor peripherals, including magnetic data storage. Programmable logic controllers. Standard process control configurations. Introduction to software systems for digital control applications. Computer control of processes via on-line languages. Includes a significant laboratory program aimed both at illustrating the lecture material and introducing new concepts.

6.313 High Frequency Circuits and Electronics II S2 L2T3
Prerequisite: 6.303.
The material extends 6.303 High Frequency Circuits and Electronics I into further areas of high frequency and microwave circuits and electronics: Plane wave propagation and application to terrestrial communications. Waveguide theory and aperture antennas. Parametric amplifiers. Microwave sources, with emphasis on Gunn and impact diodes.

6.412 Biomedical Engineering S2 L2T3
Prerequisites: 6.0311, 6.0313, 6.0314, 6.0316.
A course designed to introduce electrical engineering students to the practice of engineering techniques applied to the biological and medical fields. The lectures are supplemented by demonstrations and experimental work, and deal with the basic physiology of cells, tissues, organs and organisms, instrumentation and measurement techniques and modelling of various types of biological systems.

*Pass Conceded not acceptable as prerequisite.
6.512 Advanced Semiconductor Device Theory

Prerequisites: 6.0313.

Principles of operation and circuit characteristics of a range of semiconductor devices including bipolar diodes and transistors, MOS devices and circuits, charge-coupled devices, solar cells, light-emitting diodes, and semiconductor lasers. The lectures are supplemented by experimental work with these devices.

6.522 Transistor and Integrated Circuit Design

Prerequisites: 5.0313, 6.0316.

Analysis of bipolar and field-effect transistor structure and operation as far as necessary for the development of accurate models for use in computer-aided circuit design. Ebers-Moll (E-M) and Gummel-Poon transistor models. Aspects of the solution techniques used in modern CAD programs such as SPICE. Integrated circuit design including special circuit and layout considerations to take advantage of the inherent component matching. Consideration of selected circuits, for example, high-performance operational and instrumentation amplifiers, multipliers and other non-linear circuits, voltage controlled oscillators, A/D and D/A converters, etc., as class interests suggest. Practical work centres around use of the VAX11-780 computing and colour graphic CAD facilities of the Integrated Circuit Laboratory.

6.606 Computing Science Honours

6.607A Computing Hardware Architecture

Prerequisites: 6.613, 6.632, 6.642, 6.643 at an acceptable level.

A review of principles covering hardware technology, PMS (Processor Memory Switch) and ISP (Instruction Set Processor) notation, data representation, basic structures, instruction sets, control units, memory and input/output organization, performance evaluation. Case studies of high performance and vector machines, stack machines, associative and array processors, high level language machines, multiprocessor and distribution systems. Fault tolerant systems, data base machines, data flow and functional processors. A second strand is to be selected for a list which typically includes advanced switching theory, VLSI system design, computer graphics and high speed arithmetic systems.

6.607B Advanced Software Technology

Prerequisites: 6.613, 6.632, 6.642, 6.643 at an acceptable level.

A selection of two topics from a list which normally includes programming language theory, program verification and programming methodology, artificial intelligence, computer system performance.

6.611 Computing I

Prerequisite: As for 10.001. Co-requisite: 10.001 or 10.011. Excluded: 6.600, 6.620, 6.021D.

Introduction to programming: design and correctness of algorithms and data structures; programming in a high level algorithmic language which provides simple, high level program control and data structuring facilities. Problem solving: basic ideas of problem solving; introduction to abstract structures used for computing solutions to problems. Elementary logic, history of computing, computing machinery.

6.612 Computer Systems Engineering

Prerequisites: 6.021E* or 6.331*.

Use of Algorithmic State Machine (ASM) charts for digital system description, specification and design. Machine organization, Microprogramming and emulation techniques.

6.613 Computer Organization and Design

Prerequisites: 6.631* or 6.021E*, 6.021D* or 6.620 or 6.621*.

Excluded: 6.0318.

Bussing structures (asynchronous and synchronous), input/output organization, polling, interrupt and DMA control; parallel and serial device and processor communication and interfacing. Memory organization; CPU and control unit design. Processes: synchronization and communication. Microprocessor case studies.

6.621 Computing II

Prerequisites: 6.611*, 10.001 or 10.011. Excluded: 6.620, 6.021D.

For those students who intend to take further subjects in computer science.

Expansion and development of material introduced in 6.611. Systematic program development; introduction to programming language semantics, reasoning about programs, program derivation, abstract programs, realization of abstract programs (conversion from abstract to concrete). Practice in programming in a high-level programming language. Data-structures: arrays, lists, sets, trees; recursive programming. Introduction to computer organization: a simple machine architecture. Introduction to operating systems.

6.622 Computing Application and Software

Prerequisites: 6.620* or 6.600 (CR) or 6.021D*. Excluded: 6.646.

The use of computers for solving problems with a substantial mathematical and operational research content: includes use of some standard software packages. Topics selected from: discrete event simulation; the SIMULA programming language; pseudo random number generation; simple queueing theory; applications of mathematical programming; statistical calculations, critical path methods; computer graphics; artificial intelligence.

6.631 Assembler Programming and Digital Logic

Prerequisites: 6.620* or 6.621* or 6.600 (CR) or 6.021D*. Excluded: 6.021E.

Assembler programming: programming in a low level machine oriented language in order to illustrate the mapping of higher level abstract constructs onto a typical machine and the interaction between operating systems and devices. Digital logic design: register transfer description of a tutorial computer, switching algebra, minimization, combinational logic design, integrated circuits, registers, counters, and other medium scale integration (m.s.i.) devices, clocked sequential circuits, computer arithmetic.

*Pass Concealed not acceptable as prerequisite.
6.632 Operating Systems
Prerequisites: 6.631* or 6.021E*, 6.641*.
Introduction to operating systems via an intensive case study of a particular system, namely the UNIX time-sharing system which runs on the PDP11 computer. Includes system initialization, memory management, process management, handling of interrupts, basic input/output and file systems. A comparison of UNIX with other operating systems. General principles for operating system design.

6.633 Data Bases and Networks
Data base management systems: data models, relational and network structures, data description languages, data manipulation languages, multi-schema structures. Data integrity and security, recovery, privacy. Computer networks: economic and technological considerations; digital data transmission; error detection and recovery; network configurations, circuit switching, packet switching; communication protocols; current international standards; data compression; encryption and decryption.

6.641 Programming I
Prerequisite: 6.620* or 6.600 (CR) or 6.021D* or 6.621*.
Design and correctness of algorithms and data structures. Data structures: abstraction, representation, manipulation and axiomatization; basic data structures: sets, unions (variant records); dynamic data structures, lists, queues, stacks, trees, balanced trees. Recursion: backtracking algorithms. Files: sequential access, random access, merging, sorting, updating. String manipulation, pattern matching and associative algorithms.

6.642 Programming II
Prerequisite: 6.641*.

6.643 Compiling Techniques and Programming Languages
Prerequisite: 6.641*.
1. Language description: phrase structure grammars, Chomsky classifications, context-free grammars, finite state grammars. Backus Naur Form, syntax graphs, LL(k), LR(k), SLR(k), LAL(k), simple-precedence and weak-precedence grammars. 2. Lexical analysis: translation of an input (source) string into a (machine independent) quasiterminal symbol string. Finite state recognizers. 3. Syntax analysis: top-down compilation for LL(1) grammars using syntax graph driven analysers or recursive descent. Bottom-up compilation for simple- and weak-precedence and LR(k) grammars. 4. Semantic analysis: program translation and code generation; attributed grammars. 5. Compiler generators: automatic generation of compilers for LALR(1) grammars. 6. Code optimization by systematic program transformation. 7. Runtime organization: activation record stacks, heap management.

6.646 Computer Applications
Prerequisite: 6.620* or 6.600 (CR) or 6.021D* or 6.621*, one of 10.311 A, 10.321 A, 10.301, 10.331, 45.101* or equivalent. Excluded: 6.622.
The use of computers for solving problems with a substantial mathematical and operational research content; includes use of some standard software packages. Topics selected from: discrete event simulation; the SIMULA programming language; pseudo random number generation; simple queueing theory; applications of mathematical programming; statistical calculations; critical path methods; computer graphics, artificial intelligence.

6.647 Business Information Systems
Introduction to accounting systems — general ledger, debitors and creditors; auditing and internal system controls; models of business information systems; integrated business systems. System specification, system analysis, system design and implementation; testing and debugging. Managing a project team, project control. The COBOL programming language. File organization and design; sequential, indexed sequential, random, inverted, B-tree file organizations, file updating. Includes an invited lecture strand presented by guests from commerce and industry. A major project, written in COBOL, is undertaken as a team exercise.

6.649 Computing Practice†
Not offered in 1982.
For students majoring in Computer Science who seek a programming career in government or commercial industry. Topics, related to current computing practice, include: Comparative study of computer hardware in current popular use; Comparative study of the 'popular' programming languages, eg COBOL, RPG, BASIC, FORTRAN, PL/1, APL. Job control languages. Data Preparation procedures. Key-board entry. Verification: Word processing; report preparation; documentation. Social implications of computing. Professional responsibilities and ethics. Project management, software engineering; psychology of computer programming.

6.801 Electrical Engineering
Prerequisite: 1.001 or equivalent.
S1: an application-oriented introduction to electronics; a basis of circuit theory and elementary electronics; filters, frequency response, general amplifier characteristics, operational amplifiers and their use in instrumentation, power supplies, analog computers and their use in modelling non-electrical systems. S2: usage of electrical power in industry: the characteristics and selection of electrical machinery, its interface with the prime power supply, protection, electrical safety and compliance with Australian standards. Includes two projects illustrating the application of electrical engineering to various aspects of industry.

6.832 Industrial Electrical Machinery
Prerequisite: 1.001 or equivalent.
An applications-oriented introduction to the usage of electrical machinery in industry. Provides a basis of circuit-theory then considers the characteristics and selection of electrical machinery, their interface continued overleaf

†Can only be counted with at least 3 other Level III Computer Science units.
*Pass Conceded not acceptable as prerequisite.
†May be taken as a co-requisite in 1982.
with the prime power supply, protection and electrical safety. Included in the course is a project illustrating the application of electrical engineering to other disciplines.

6.851 **Electronics and Instrumentation** S1 L1T2

Prerequisite: 1.001 or equivalent.

An applications-oriented introduction to electronics. Provides a basis of circuit theory and elementary electronics and then treats filters, frequency response, general amplifier characteristics, operational amplifiers and their use in instrumentation, power supplies, analog computers and their use in modelling non-electrical systems. Included is a project illustrating the application of electrical engineering to other disciplines.

6.852R **Electrical Machinery and Supply** S2 L1T2

Prerequisites: 6.851R.

A user-oriented introduction to the usage of electrical power in industry, covering the characteristics and selection of electrical machinery, its interface with the prime power supply, protection, electrical safety and compliance with Australian standards. Included in the subject is a project illustrating the application of electrical engineering to various aspects of industry.

6.853 **Analog and Digital Instrumentation** S1 L2T1

Prerequisites: 6.851 & 6.852.

Study of electrical and electronic equipment, emphasising analog and digital techniques applicable to the electrical measurement of non-electrical quantities. Open-loop and closed-loop control systems and some of their applications to instrumentation.

6.854 **Electrical Engineering** S2 T4

Prerequisite: 1.001 or equivalent.

Extensive introduction to the theory and application of heavy current electrical engineering. Commences with the requisite circuit theory and then proceeds to consideration of the distribution of electrical power and the characteristics and selection of electrical machinery.

DC power supplies, three-phase AC supply, voltage regulation, transformers, AC and DC machines and their rating; a project illustrating the application of electrical engineering to various aspects of industry. Consists of two 2-hour tutorial or laboratory sessions per week each commencing with a structured mini-lecture. Detailed lecture notes are provided.

6.855 **Electrical Power Utilization** S2 T4

Prerequisite: 6.851.

Introduction to the distribution and utilization of electrical power in industry. The characteristics and selection of electrical machinery, its interface with the supply, protection and electrical safety; a project illustrating the application of electrical engineering to various aspects of industry. Consists of two 2-hour tutorial or laboratory sessions per week each commencing with a structured mini-lecture. Commences in week 4 of session 2.

6.903 **Industrial Training**

Students enrolled in course 3640 must complete a minimum of 60 days industrial training. Students are required to submit to the School evidence from their employers confirming completion of the prescribed training.

6.911 **Thesis**

For students in the final year of their BE degree course.

6.921 **Project**

For students in the final stage of the BSc (Eng) course.

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**Graduate Study***

6.050G **Occasional Elective — Digital Signal Processing** S2 C3


Advanced subject on the techniques and applications of digital signal processing which assumes students have had basic courses on discrete-time systems and signals (such as digital filters, z-transforms and discrete Fourier transforms) and elementary random processes. Application areas stressed are telecommunications, speech processing and seismic signal processing and possibly radar and sonar. Topics to be included are: interpolation and decimation of digital signals with applications in telecommunications (e.g. TDM/FDM transmultiplexers); linear prediction with autoregressive (AR) and moving average (MA) parameter estimation applied to spectrum estimation and speech analysis; least mean-square adaptive and predictive deconvolution, (including Wiener and Kalman filtering), with applications in impulse response restoration and the removal of noise and echoes in communication systems and seismic signals; short-time Fourier analysis and synthesis and homomorphic signal processing for speech and seismic signals; two dimensional digital signal processing with applications in image de-blurring and data compression. Practical work includes computer assignments and the use of special purpose programmable hardware signal processors.

6.053G **Advanced Mathematics II** C3

Mathematical techniques applicable to electrical engineering problems. Topics may include: an introduction to state variable theory, Green's functions, operator theory.

6.054G **Numerical Computation** C3

Topics include numerical solution of partial differential equations and approximation theory.

6.060G **Microprocessor Systems** S2 C3


*Subjects which do not have a session notation are not offered in 1982.
including addressing modes, arithmetic and I/O. Memory devices including RAM, ROM, EPROM. Input/output devices and support chips. Parallel and serial I/O devices. Direct memory access. Interrupt systems. Microcomputer system devices including cassette tape, floppy disk, keyboards, LED and video displays. System development software including monitors, PROM programmers, editors, assemblers and higher level languages. Development tools, logic state analyzers, emulators. The course will include laboratory involving both hardware and programming experience.

6.071G Electrical Measurements C3

Electrical measurements of moderate precision. Theory and practice of deflection measurements and null techniques at DC and low audio frequencies.

6.073G Precise Electrical Measurements C3

Prerequisites: 6.0311, 6.0313, 6.041 or equivalent.

An advanced course primarily devoted to the special problems of precision measurements at DC and audio frequencies. Establishment of electrical standards.

6.074G Superconductivity S1 C3

The theory of superconductivity and its application. Includes loss mechanisms, ac losses, flux jumps, superconducting materials, applications to electrical apparatus.

6.075G Electric Contacts C3

The theory of stationary electric contacts making use of classical field theory and the modern ideas of electronic conduction. Topics may include constriction and film resistance, elastic and plastic deformation of contacts, thermal behaviour, electron tunnelling through thin films, tarnishing, fretting, formation of whiskers and bridges, material transfer in small contacts.

6.150G Communications Elective — Applied Optoelectronics S2 C3


6.160G Field Theory in Electrical Engineering C3

Revision of metric transformations and co-ordinate systems. Solution of the Laplace and Poisson equations in the eleven Eisenhart co-ordinate systems in three dimensions. Extension to selected cases of the diffusion and wave equations.

6.161G Field Mapping C3

The Laplace and Poisson equations: complex variable techniques for 2-dimensional solutions. Graphical, experimental and numerical methods for 2- and 3-dimensional problems. The Helmholtz equation. Cases where solutions may be based on the Laplace equation. Review of selected examples in electrical engineering.

6.164G Microwave Antenna Theory and Applications S2 C3

Co-requisite: 6.1670 or similar.


6.167G Propagation and Transmission of Electromagnetic Waves S1 C3


6.169G Microwave Circuits: Theory and Techniques S2 C3

Co-requisite: 6.1670 or similar.

Properties of microstrip transmission lines and the theory and design of microwave integrated circuit components and systems. Includes: microwave measurement techniques, waveguide components and applications.

6.170G Microwave Electronics S2 C3


The principles and applications of solid state and electron tube microwave devices. Includes: Gunn, IMPATT, TRAPATT and PIN diodes; mixers and detectors; space charge waves; travelling wave tubes, klystrons and crossed-field devices.

6.224G Electrical Insulation Engineering S1 C3

Prerequisite: 6.202 or 6.222 or equivalent.

Co-ordinated approach to the design of insulation systems for application at high and low voltages. Basic principles, experimental and theoretical factors involved in the establishment of particular design criteria. Practical situations and demonstrations.

6.225G Electrical Discharges and their Technical Applications C3

Prerequisite: 6.202 or 6.222 or equivalent.

Low and high pressure gaseous discharges, both naturally occurring and laboratory produced. Methods of production of discharges. Diagnostic techniques. Arcing in circuit interrupters and methods of control and extinction. Other technological applications of electrical discharges.
6.226G Electrical Apparatus Design  C3
Prerequisite: 6.222 or equivalent.

Based on fundamental concepts and in which thermal, electric and magnetic properties on a macroscopic scale and their inter-relationships are displayed in relation to the design of electrical and electronic apparatus.

6.227G Assessment of Insulation Performance in Electrical Plant  C3
Prerequisite: 6.202 or 6.222 or equivalent.

Selection from: design test requirements. Forms of high voltage works test: alternating, impulse, switching surge and direct. Non destructive tests: dielectric loss angle, dispersion, partial discharge and insulation resistance. Methods of determining material condition: moisture content, gas in oil, impurities, electron microscopy including determination of aging and long life. Commissioning and site tests.

Demonstrations and projects to support the lecture material.

6.228G Power System Equipment  C3
Prerequisite: 6.202 or equivalent.

Includes study of the operating characteristics and major design features of the items comprising a power system, including alternators, power transformers, voltage and current instrumentation equipment, oil and gas insulated circuit breakers, isolators, overhead lines and components. Lightning arrestors and protection for lines and substations. Power and line coupling capacitors, bus bars, connectors, cables and bushings. Line carrier systems.

6.234G Power System Protection  S1 C3
Prerequisite: 6.202 or equivalent: credit level or higher.

The theory and application of protective devices and systems, related to the protection of transmission lines, transformers, busbars and generators.

6.246G Power System Operation and Control  S2 C3
Prerequisite: 6.247G.


6.247G Power System Analysis  C3
Prerequisite: 6.203 or equivalent.

Subject Descriptions

6.337G Sound Broadcast Systems C3
Prerequisites: 6.167G, 6.341G or similar.

Theory and practice of sound broadcasting systems. Topics: Specifications: coverage, bandwidth, power, AM radio: studio equipment, sound equipment, medium and shortwave systems, transmitters, antennas. FM radio: stereotransmission, studio equipment, transmitters, antennas. Recording equipment: links, etc. Distortion: distortion in recorders, distortion and noise in various parts of the transmission path.

6.338G Television Systems C3
Prerequisites: 6.167G, 6.341G or similar.


6.339G Electroacoustics C6
Aspects of acoustics which are relevant to sound engineering. Includes: scalar wave equation, plane and spherical waves, plane piston as a sound source, analysis of mechanical and acoustical lumped systems; loudspeaker and microphone types, practical aspects; room acoustics: sound recording; the ear, loudness and annoyance; underwater sound; introduction to sound in solids.

6.340G Communication Electronics S1 C3
Modern electronics as used in communication systems. Includes: analogue and digital integrated circuits (including ADCs, DACs PLLs, VCOs, multipliers, etc, and a survey of the main digital IC families); high-frequency and noise performance of active and passive circuits, particularly those using transistors, transistor ratings: microwave ICs: microstrip, thick film, and thin film circuits; CCDs and SEW devices, and their use in signal processing; introduction to active and other filters: factors involved in the design of large electronic systems.

Prerequisite or co-requisite for 6.170G and 6.345G.

6.341G Signal Analysis S1 C3
Excluded: 6.042, 6.484G, 32.621G or similar.

The fundamental aspects of the analysis and processing of digital and analogue signals, with emphasis on random signals and noise. Includes: Generalized Fourier analysis: convolution, correlation, energy and power density spectra, Hilbert transforms: analytic signals and signals in systems. Sampling and digital processing of analogue signals, including digital filtering. The discrete Fourier transform (DFT) and the use of fast Fourier transform (FFT) algorithms. Random processes, the transmission of signals and noise through linear systems and non-linear devices. Poisson and Gaussian random processes. Estimation and measurement of power density spectra.


6.343G Digital and Analogue Communications S1 C3
Co-requisite: 6.042 or 6.341G or similar. Excluded: 6.323 or similar.

Fundamentals of modern telecommunications systems, including theoretical and practical aspects of: linear and non-linear analogue modulation (AM, SSB, FM, etc), digital signal transmission, pulse code modulation, computer communication, effects of noise in analogue and digital systems, error control, multi-channel systems (FDM, TDM, etc), synchronization, relay systems, optimum transmitters and receivers. Prerequisite or co-requisite for 6.347G and 6.348G.

6.344G Communication Theory C3
Prerequisite: 6.341G or similar.

An advanced subject, mainly for potential research workers, concerned with the theoretical basis of information transmission and the design of optimum analogue and digital communication systems. Topics: Information theory of discrete and continuous systems, channel capacity, rate distortion theory and fidelity criteria, Information theory for two-way communication. Optimum detection and estimation of analogue and digital signals using maximum likelihood (ML), maximum a posteriori (MAP), minimum mean-square error (MMSE) etc. criteria. Includes Wiener and Kalman filtering, and optimum detection and estimation of linearly and non-linearly modulated, analogue or digital, signals.

6.345G Analogue and Digital Filters C3

Theory and practice of modern filter design, particularly the design of active and digital filters. Includes: overview of modern filter theory, the approximation problem for analogue and digital filters, active filters and digital filters. In addition: classical LC filters, sensitivity and parasitics, equalizer design, adaptive and/or nonlinear equalization, mechanical filters, digital signal processing techniques.

6.347G Digital Communications S2 C3
Prerequisite: 6.343G or similar.

Advanced and unified treatment of digital transmission systems. Principal topics are: Baseband ASK digital communication Systems, including inter-symbol interference, eye patterns, power spectral density, probability of error estimates and bounds, Nyquist criterion partial response signals (eg simple and modified dubinary). Digital Modulation including various types of shift keying modulation such as amplitude, amplitude and phase, offset amplitude and phase, phase, frequency and minimum shift keying (ASK, APSK, OAPSK, PSK, FSK and MSK), power spectral density, probability of error, signal constellations and system comparison. Line Coding including linear codes, alphabetic codes, non-alphabetic codes and their comparison. Equalization including linear, non-linear, adaptive and automatic equalization and Viterbi decoders.

6.348G Optical Communications S1 C3
Co-requisites: 6.167G, 6.343G or similar.

Optical communications, with emphasis on optical fibre communication. Includes: theory of optical fibre propagation, cable technology, LD and laser sources, optical detectors and receiver design, measurements on optical fibres, system performance, wide-band systems and future systems, applications to power and military systems.

6.349G Radar and Navigation Aids C3
Co-requisites: 6.167G and 6.341G or similar.

Theory, performance and applications of various electronic location and navigation systems. Includes: review of basic radar theory, CW radar, pulse radar, pulse-Doppler radar, tracking radar, detection of radar signals in noise, error analysis, clutter suppression, multiple-target detection, theory of high-resolution radar, synthetic aperture radar, terrain-avoidance and terrain-following radar; aircraft landing systems; DME; radio ranges; hyperbolic navigation systems, Doppler navigation, satellite navigation.
6.375G Integrated Circuit Technology

An account of the modern planar technology of semiconductor device and integrated circuit fabrication.

6.376G Reliability Engineering

Principles and applications of the reliability engineering concept, with equal emphasis on design analysis, developmental engineering, calculation and prediction of reliability and associated parameters, quality control, failure mechanisms, reliability testing, economic basis of reliability and on reliability improvement techniques. Applicable to both electronic and non-electronic systems.

6.377G Integrated Circuit Design

Prerequisite: 6.0316 or equivalent.

An advanced course on the design of integrated circuits, including the properties and modelling of integrated circuit elements, dc and ac design of operational amplifiers, low-pass and bandpass circuits, digital gates and complex functions, computer-aided design.

6.378G Solar Energy Conversion


6.380G Data Acquisition and Analysis in Remote Sensing

Prerequisites: 10.361 or similar.

Techniques for extracting information from remotely sensed data with particular emphasis on satellite imagery. Topics taken from: nature and characteristics of earth resources and related satellites; satellite sensors and data formats; image enhancement techniques; image classification methods, including clustering, classification and feature selection; image classification methodologies; new horizons in remote sensing image analysis.

6.387G Programming and Software in Remote Sensing

A detailed treatment of computer methods for implementing analytical techniques used with remotely sensed data. Topics include: software requirements for image enhancement and analysis; structure and capabilities of the software packages LARSYS, ORSER, BICEP, LASP; implementation of classification methodologies; introduction to image processing hardware and associated operating systems; interactive image processing.

6.433G Applied Microprocessor Design S2 C3

Prerequisite: 6.060G.

Aims to familiarize the systems designer with the architecture and applications of the rapidly expanding family of microprocessor hardware support devices for dedicated control functions. Topics include: review and comparison of bus protocols of common systems; architecture, programming and applications of specialized system support devices and peripheral control chips; single chip microprocessors, architecture and applications to dedicated control tasks.

Laboratory work includes individual design projects involving typical systems application of these devices.

6.452G Feedback Control I S1 C3

Excluded: 6.412.

An intensive series of lectures and tutorials for upgrading at graduate level those students who are deficient in the basics of control. Material covered includes both time and frequency domain approaches to the design of control systems for linear, continuous single input/single output plants. Topics include: Nyquist stability theory; root locus diagrams; Nichols charts; state feedback and observer design. Computer-aided design techniques are applied where appropriate.

6.453G Computer Methods of Optimization C3

Use of digital, analog and hybrid computers for the solution of optimization problems in engineering. Includes: constrained and unconstrained minimization, review of search techniques, optimal control and the two point boundary value problem, linear quadratic problems and minimum time schemes. All methods are implemented on the computer.

6.455G Systems Identification and Modelling C3

Develops the basic techniques used in System Identification and Modelling. Topics include: representation of static and dynamic
6.456G General Concepts in Formal System Theories C3

Provides fundamental concepts common to many formal abstract system theories reflecting different aspects of the physical systems, which are their bases.

Input-output, state transition, fuzzy, axiomatic-hierarchical and evolutionary representors will be reviewed with discussion based on differential and discrete models, and some form of pulsed automata.

Basic concepts presented include the state properties and basis functions for linear systems; equivalence and reduction, structure, decomposition and interconnection, complexity; accessibility of states and stability considerations.

6.457G Cybernetic Engineering S1 C3

The fundamentals of cybernetic engineering, the genesis of cybernetics, machines modelled on life and the evolution to present day robots. Includes: biological information transmission (biochemical coding and control, genetic and neural), pattern recognition learning systems and perceptrons, sub-systems of the human brain, and 'functional' descriptions for a 'Cybernetic Brain', an introduction to industrial manipulators and third generation robots; self-organizing control for manipulators and robots and the social consequences of flexible automation with industrial robots.

6.458G Decision and Syntactic Systems for Digital Pattern Recognition C3

Concepts and techniques in decision-theoretic pattern recognition systems with an in-depth study of both non-parametric and parametric methods. Includes: pattern, feature and classification spaces, feature selection, linear discriminant functions and training algorithms, piecewise linear, discriminant functions; decision rules; the Bayes framework, approximation of probability densities; clustering and dimensionality reduction. Structural pattern recognition, including such topics as formal linguistics, primitives, grammar and syntax analysis as a recognition procedure.

6.459G Control Computing C3

Prerequisites: 6.412 and 6.021D.

Review of fundamental principles of digital and analog computation with special reference to the solution of engineering and control problems. Topics include: small computer systems architecture; process control interfacing techniques; machine language programming; operation of hybrid computers and their applications.

6.460G Real-Time Computing and Simulation S2 C3

Simulation of industrial processes by the use of real time modelling techniques is now an acceptable method for the study for complex industrial plant, eg, fossil-fired boiler-turbines; 747 aircraft; nuclear reactors. The fundamentals of real time computing, with examples carried out on an EAI 2000 — PDP-11 computing system. Analog, digital and hybrid simulation techniques as applied to the solution of lumped and distributed parameter systems.
Models of Linear and Nonlinear Systems including lumped and distributed systems, continuous and sampled data systems. Fitting parameters to linear models by batch and recursive methods. State estimation. Systems with time delays and types of nonlinearities. Introduction to digital process control including algorithms for 3-term controllers, deadbeat response systems and optimal control.

6.481G Biology and Physiology for Engineers S1 C3
Bridging the language barrier between biology and engineering. Some problems and techniques of biology and medicine encountered by the biomedical engineer. Cells, tissues and organs, with emphasis on their system, function and characteristics.

6.484G Biological Signal Analysis S1 C3
Excluded: 6.341G.
Digital computer methods of extracting information from biological signals using filtering and averaging, expectation density functions, correlation functions, spectral analysis and other techniques. Methods of constructing models of biological systems.

6.485G Medical Instrumentation C3
A critical survey of the theory and practical applications of medical transducers and electomechanical equipment in common use in hospitals and research laboratories.

6.650G Computer Science Elective — VLSI System Design S2 C3
Prerequisites: 6.021E, 6.631, 6.0313 or similar. Excluded: 6.607A.
Introduction to the design and implementation of very large scale integrated systems, using MOS technology. Basic information about integrated devices, circuits, digital subsystems and system architecture. Design procedures, including structured design methodology, symbolic layout, use of scalable design rules, delay time estimates. Fabrication procedures and computer aided design. Scaling effects. A design project in LSI is completed through to layout.

6.651G Digital Electronics C3
Prerequisites: 6.021E and 6.0313, or 6.631.
Digital circuits and principles, sub-system organization, microprocessors, memory technology, interface design, integrated circuit technologies and characteristics.

6.654G Digital Systems S1 C3
Prerequisites: 6.021E. Excluded: 6.612.
Computer architecture, implementation and realization. Use of hardware description languages for the analysis, design and specification of arithmetic units, storage and control Microprogramming techniques.

6.655G Computer Organization and Architecture S2 C3
Basic principles of computer architecture. A comparative study of the architectural features of a number of significant computer systems.
Civil Engineering

Undergraduate Study

8.001 Industrial Training
Prerequisite: 8.670. Requirement for the Bachelor of Engineering Degree.

Students are required to complete a minimum of sixty working days of approved industrial training and submit a report on this training before the fourth week of Session 1.

8.002 Industrial Experience
Requirement for the Bachelor of Science (Engineering) degree.

A minimum of three years of satisfactory industrial experience must be obtained concurrently with attendance in the course. Students are required to submit to the School on enrolment in the final year evidence from their employers confirming completion of the prescribed period of industrial training.

8.011 Special Projects  SS L0T3
Equal to one technical elective.

A minor thesis or research project on any approved topic.

8.012 Elements of Architecture  SS L2T1
Introduction concerning the influence of structural technique in the past on architectural styles. Effect of modern structural engineering systems on architecture. Responsibilities of the structural engineer as a consultant.

8.013 Bridge Engineering  SS L1½T1½
Prerequisite: 8.1822.

An introductory subject in the design of road and railway bridges. Types of bridges, economic spans and proportions. Design loads and codes. Aspects of the design of steel, reinforced concrete, prestressed concrete, and composite bridges by empirical, elastic and limit state methods.

8.014 Computer Applications in Civil Engineering  SS L2T1
Prerequisites: 8.2733, 8.351 or 8.362, 8.360.

Advanced programming techniques such as the use of tapes, discs and plotters. Applications of advanced computational methods to structural analysis, geotechnical and flow problems.
8.015 Road Engineering SS L2T1
Prerequisite: 8.671. Co-requisite: 8.2732.

8.017 Transportation Engineering SS L2T1
History, development and characteristics of modes of transport. Fundamentals and evaluation of transport systems, performance and output. Interaction between land use and traffic demand.

8.018 Construction Engineering SS L2T1
Prerequisites: 8.671, 8.312 or 8.301.
Advanced construction methods and techniques with special reference to major civil engineering projects under construction in Australia.

8.019 Railway Engineering SS L2T1

8.020 Hydrology SS L2T1
Prerequisite: 8.522.
Flood estimation with particular reference to design and flood forecasting. Outline of current practices and recent developments. Discussion of possible/likely implications of recent developments for the practising engineer.

8.021 Environmental Aspects of Civil Engineering SS L2T1
Prerequisite: 8.301 or 8.312.
Examination of the professional issues arising from the environmental impact of civil engineering planning, design and construction. Methodologies for environmental impact evaluation and general project evaluation. Environmental legislation, institutional procedures and decision-making processes. Case studies and project work in the above context.

8.023 Hydrodynamics SS L2T1
Prerequisite: 8.572.
Equations of continuity, motion and vorticity; stream function and velocity potential function; Laplace equation; standard flow patterns; practical applications.

8.024 Foundation and Dam Engineering SS L2T1
Prerequisite: 8.2732.

8.025 Structural Failures SS L2T1
Prerequisites: 8.174, 8.1822.
Case studies of significant structural failures and distress during concept, construction, design and use. Modes, causes, consequences, responsibilities, corrective procedures.

8.026 Systems Methods in Civil Engineering SS L2T1
Prerequisite: 8.672.
The development of models for the definition, design, and control of engineering problems in construction project management. Influence of decision level on systems model formulation. Case study approach coupled with field investigations and group projects. All students are required to visit a nominated field site as an integral part of the subject.

8.027 New Materials I SS L2T1
Prerequisite: 8.2722.

8.028 New Materials II SS L2T1
Prerequisite: 8.1822, 8.2722.

8.029 Continuum Mechanics SS L2T1
Prerequisite: 8.172.
Concept of continua, mathematical foundations, analysis of deformation, strain and stress, fundamental laws of continuum mechanics, constitutive equations, mechanical properties of solids and fluids, simple problems in elasticity.

8.030 Construction Management SS L2T1
Co-requisite: 8.672.
Civil Engineering Construction organization, management and control.

8.031 Construction Project Finance SS L2T1
Co-requisite: 8.672.
Civil Engineering construction project feasibility, financial management, cash flow, cost control, insurance and company finance.
8.032 Construction Law  SS L2T1
Prerequisite: 8.672.
The legal system, court procedures, sources of legal information, areas of liability for the professional engineer. The basic rules and concepts of the laws of tort and contract, with particular reference to their application to construction work. Case studies of significant litigation involving construction engineers and their actions. Arbitration as an alternative means of settling disputes.

8.033 Industrial Law and Arbitration  SS L2T1
Prerequisites: 8.672, 8.032.

8.034 Engineering Economy  SS L2T1
Prerequisite: 8.672.
Economic evaluation of civil engineering projects, including benefit-cost analysis and rate of return analysis.

8.038 Special Topics in Reinforced Concrete Design  SS L2T1
Prerequisite: 8.182.

8.039 Computer Programming  SS L2T1
Excluded: 8.360.
Introduction to the use of higher level programming languages such as PASCAL and FORTRAN and the principles of program design. Computing techniques. Development of software and its applications.

8.040 Advanced Engineering Geology  SS L2T1

8.041 Geological Engineering  SS L2T1
Prerequisite: 8.272.

8.042 Water Resources  SS L2T1
Prerequisite: 8.182.
Resource systems approach to the problem of matching, by means of engineering works, the supply of water and the demand for water. The design and operation of water resource systems.

8.043 Public Health Engineering  SS L2T1
Prerequisite: 8.581.

8.047 History of Civil Engineering  SS L2T1
A study of the theoretical, practical and sociological aspects of the development of civil engineering, including its relationship to other disciplines.

8.051 Design Project — Materials  SS L2T1
Final year design project in the field of civil engineering materials.

8.052 Design Project — Structures  SS L2T1
Prerequisite: 8.191.
Final year design project in the field of structural engineering.

8.053 Design Project — Water  SS L2T1
Prerequisite: 8.573 or 8.582 or 8.581.
Final year design project in the field of hydraulics and water resources.

8.054 Design Project — Engineering Construction  SS L2T1
Prerequisite: 8.672.
Final year design project in the field of engineering construction and management.

8.055 Applied Structural Analysis  SS L2T1
Prerequisite: 8.191.
Practical applications of methods of structural analysis both for a small design office (with programmable calculator) and a design office of moderate or large size (with mini-computer, terminals and commercial programs.)

8.056 Practical Structural Design  SS L2T1
Prerequisite: 8.191.

8.057 Special Topics in Prestressed Concrete  SS L2T1
Prerequisite: 8.182.
Historical development, methods of prestressing, general flexural theory, calculation of losses, anchorage zone design, partial prestressing.

*Students who have failed this subject may apply for permission to enrol simultaneously in this subject and the subsequent subject.
8.058 Special Topics in Steel Design  SS L2T1
Prerequisites: 8.174, 8.1821.


8.059 Structural Vibrations  SS L2T1
Prerequisite: 8.174.

Importance of structural dynamics in civil engineering; earthquake effects and design requirements in buildings and other structures; wind loads on structures. Review of basic methods in dynamic analysis, with structural applications.

8.060 Numerical Methods in Geotechnology  SS L2T1
Prerequisite: 8.2732, 8.2733.

Introduction to finite element methods; application of finite element and finite difference techniques to various soil mechanics and rock mechanics problems such as stability analysis of foundations, retaining walls, tunnel openings; prediction of settlement of footings, piles and raft foundations; seepage and consolidation analysis.

8.062 Construction Camp  SS L1T2
Prerequisite: 8.672.

A one week field camp involving several of the following Falsework systems and field productivity measurements; Optimization of earthmoving equipment performance; Concrete pumping systems; Pile driving practice and the measurement of performance parameters; Bridge erection techniques; Rock drilling and blasting design and management; Formwork design and erection and concrete pressure measurements; Operation of earthmoving plant and demonstration of plant capabilities; Noise measurements on construction sites; Prestressing calculations and measurements on a full scale beam; Crane capacity and productivity measurements; Dewatering systems and measurement of well point performance; Site investigation; Compaction.

8.063 River and Coastal Engineering  S2 L2T1
Prerequisite: 8.573.

Sediment transport in channels and rivers. Coastal processes, wave characteristics and longshore transport. Design and use of hydraulic models.

8.081 Probability and Statistics for Civil Engineers  SS L2T1
Prerequisite: 8.351 or 10.381.

Tests of hypotheses. Analysis of variance and co-variance. Stochastic processes; queues (single and multiple channels), Markov chains, simulation, Bayesian decision. Applications to structural, geotechnical, and water problems.

8.082 Numerical Methods for Civil Engineers  SS L2T1
Prerequisite: 8.362.


8.113 Civil Engineering for Electrical Engineers  SS L2T2
Prerequisites: 8.177, 8.178.

Includes an introduction to the various branches of civil engineering, the nature and organization of the profession. Relationship between clients and design consultants. The historical development of Civil Engineering. Theory of beams and trusses, resultant forces, structural action, stress and strain. Relation between load, shear force and bending moments, geometric properties of sections, deflection of beams. Properties of materials used in structures: various steels, concrete (plain, reinforced and prestressed), aluminum and timber. Brittle fracture. Introduction to buckling. Engineering failures. Introduction to design of transmission lines and towers.
8.1811 Structural Design IA

SS L1T2

Prerequisite: 8.170, 8.171. Co-requisite: 8.172.

Introduction to design concepts: structural safety: strength and serviceability. Characteristics of structural materials. Design of statically determinate, laterally supported beams and reinforced concrete, steel and timber; behaviour at service loads and in the overload range up to failure; analysis from basic principles; design for strength and serviceability.

8.1812 Structural Design IB

SS L1T2

Prerequisites: 8.172, 8.1811.

Behaviour, analysis and design from basic principles of simple structural members and systems; reinforced concrete one-way slab and beam floor systems; T-beams; one-way slabs. Bond, anchorage and crack control. Composite steel-concrete beams. Axially loaded tension and compression members in steel and reinforced concrete. Simple steel trusses; welded and bolted (commercial bolts only) connections for axially loaded steel members.

8.1821 Structural Design 2A

SS L1T2

Prerequisite: 8.1812.

Approaches to design; limit states. Wind loading; design of wind-resisting systems. Behaviour, analysis and design from basic principles of simple structural members: Statically determinate prestressed concrete beams; effect of prestress on service load behaviour; full and partial prestress; moment and shear capacity; deflection calculation; end block design. Reinforced concrete beam-columns; interaction curves and design procedures.

8.1822 Structural Design 2B

SS L1T2

Prerequisite: 8.1812.

Behaviour, analysis from basic principles, and design of structural members and components; Laterally unsupported steel beams and plate girders; lateral and local buckling. Compression members with elastic end restraints. Steel beam-columns. Bolted and welded connections under eccentric loading; high strength bolts. Plastic design of steel continuous beams. Design and detailing of reinforced concrete continuous beams. Timber beams; compression and tension members, and connections: Deflection calculations.

8.191 Structural Engineering

SS L1½T1½

Prerequisites: 8.174*, 8.1821, 8.1822*.


2. Reinforced concrete two-way slabs. Flat slabs; static moment; simplified equivalent frame method for determination of design moments; punching shear. Plastic design of steel portal frames. Introduction to design of reinforced concrete retaining walls, and spread and strip footings.

8.271 Introduction to Materials

SS L2T0

Types of civil engineering materials: historical development, characteristics, response to environment; material selection; traditional and new materials. Nature of materials: structure, imperfections; relationship of properties to structure; phase equilibria, iron-carbon system.

8.2721 Civil Engineering Materials I

SS L2T2

Prerequisite: 8.271.


8.2722 Civil Engineering Materials II

SS L2T2

Prerequisite: 8.271.


8.2731 Geotechnical Engineering I

SS L1T1

Prerequisite: 8.2721.

Basic soil properties and classification for engineering purposes; soil water, soil suction and the effective stress law, steady flow of water through soils; consolidation of soil masses; failure and shear strength of soils, stress strain characteristics of soils.

8.2732 Geotechnical Engineering II

SS L1T1

Prerequisite: 8.2731.

Site investigation principles and practice; compaction and mechanical stabilization for soil masses; lateral earth pressures and retaining wall analysis; bearing capacity of isolated foundations; settlement analysis of isolated foundations; slope stability analysis for natural and man made slopes.

8.2733 Rock Engineering

SS L1T1


8.2741 Concrete Technology

SS L2T2

Prerequisite: 8.2721.


8.2742 Metals Engineering

SS L2

Prerequisite: 8.2722.

Application of metals in civil engineering structures; steels, aluminium alloys and other common metals. Design for avoidance of service continued overleaf
failures. Corrosion, basic principles, causes and control. Fatigue and brittle fracture; relationships between material toughness, design stress, flaw size, stress concentrations and service conditions; effects of temperature, loading rate, restraint. Tradition and applied fracture mechanics approaches to fracture safe design. Welding, significance for the designer, quality requirements and control.

8.311 Systems Engineering I  SS L1T1
Prerequisifes: 6.0102, 8.670, 10.001.

The systems approach to problem formulation and analysis by introduction to elements of systems theory and case studies relevant to engineering and project design.

8.312 Systems Engineering II  SS L1T1
Prerequisite: 8.311, 8.360 Co-requisite: 10.381.

Formulation of engineering resource problems for numerical analysis and decision-making, and study of a selected set of numerical evaluation techniques.

8.351 Engineering Mathematics  SS L2½T2½
Prerequisite: 10.022.


8.360 Computing  SS L1½T1½
An introduction to the use of higher level programming languages such as PASCAL and FORTRAN and the principles of program design. Computing techniques. Development of software and its applications.

8.362 Engineering Computation†  SS L2T1
Prerequisite: 10.022.

Solution of equations encountered in stress analysis. Eigenvalue algorithms for buckling and vibration problems. Finite difference solution to deflection of beams and plates, heat conduction, flow of fluids and wave propagation.

8.401 Transport Engineering I  SS L2T1

8.402 Transport Engineering II  SS L2T1
The land use/transport system — urban, regional and local systems. Definitive concepts and ideas — land use potential, transport impedance accessibility, traffic generation. Equations of state of a land use/transport system; feedback equilibrium. Land use transport planning process; land use, traffic generation, distribution, assignment and evaluation models. Strategic planning issues; optimization, sensitivity analysis, constraints and resources. Operational planning.

8.571 Hydraulics I  SS L1½T1½
Prerequisites: 5.0201, 10.001.


8.572 Hydraulics II  SS L1½T1½
Prerequisite: 8.571.


8.573 Hydraulics III  SS L1½T1½
Prerequisite: 8.572.


8.581 Water Resources I  SS L1½T1½
A prior knowledge of elementary hydraulics is assumed.


8.582 Water Resources II  SS L1½T1½
A prior knowledge of elementary hydraulics is assumed.

The hydrologic cycle, water and energy balances, climatology, atmospheric moisture, precipitation, runoff cycle, infiltration, stream gauging, hydrograph analysis, storm runoff and loss rates, design storms, flood estimation, yield and storage determination.

8.583 Water Resources III  SS L1T2
Hydraulics of groundwater systems, application to regional problems. Water resources planning, systems approach, applied aspects of water engineering.

†Available from 1983 onwards.
8.670 Introduction to Engineering Construction

Introduction to construction engineering, projects and decision agents, construction equipment and methods. A report required involving site visits on a construction operation.

8.671 Engineering Construction

Prerequisite: 8.670.
Role of professional construction engineer. Project breakdown into construction activities and operations. Engineering construction characteristics of equipment, materials and methods with emphasis on earth-moving, rockworks, compressed air and concrete placement and formwork.

8.672 Planning and Management I

Prerequisite: 8.671.
Project definition, documents, estimating, planning and scheduling models. Project finance and cost control methods. Field project management and reporting systems.

8.673 Planning and Management II

Prerequisite: 8.672.
Fundamentals of Engineering Economy developed within a micro-economic systems framework for application by the following decision-makers: plant engineer, contractor, developer, local government engineer, and State/National engineering project managers.

8.674 Planning and Management III

Prerequisite: 8.672.
Project implementation, organization and control, field management techniques, industrial relations, field documentation and information flow, field change orders, risks, and delays, legal aspects, the relationship and duties between professional agents involved in projects.

8.711 Engineering for Surveyors I


8.712 Engineering for Surveyors II

Municipal Engineering, Soil Mechanics: Soil forming processes, pedological classification, engineering classification of soils, pavement design based on engineering classification; effective stress concept for saturated and unsaturated soils, shear strength, flow of water through soils, consolidation; slope stability and earth pressures. Public Utilities: Relationship between urban development and each of water supply, wastewater and stormwater drainage, transport.

Servicing Subjects

8.112 Structures
8.250 Properties of Materials

Graduate Study

8.401G Human Factors in Transport

Human capabilities, ergonomic principles, attitudes to new concepts, planning, the law, application to transport planning, design and implementation. The human as a processor of information, influence on design of transport facilities particularly information displays, signals, signs and lighting.

8.402G Transport, Environment, Community


8.403G Theory of Land Use/Transport Interaction

Theoretical aspects of land use transport planning. Basic concepts, data collection methods, systems models and equation of state (functional, behavioural, optimizing). Introduction to land use-transport modelling (land use, generation, distribution, modal assignment, network assignment, evaluation). Planning methodologies (short-, medium-, long-term; action planning, strategic planning; local, urban, regional, national).

8.404G Local Area Transport Planning

Application of theoretical methods to local area planning. Local government planning and engineering: pedestrian planning, frontage land use problems, analysis of residential areas, industrial estates, shopping centres and recreational facilities, accessibility studies, environmental studies, parking studies.

8.405G Urban Transport Planning Practice

8.406G Regional Transport Planning S2 C3
The role of transport in economic and social development in regions including Third World countries; historical and contemporary analysis. Analytical techniques for regional planning. Planning practice, feasibilities studies, evaluation methods. Case studies.

8.407G Transport System Design (Non-Urban) S1 C3
Process of location of road, railway and airport facilities. Data collection, alternative routes, public discussion, methods, techniques, aids, plans and diagrams produced. Geometric form: differences between road, railway and airport carriageway layout. Optical guidance, design models, landscape, provision for surface-water signposting, fencing and posts.

8.408G Transport System Design (Urban) S2 C3
Types of urban transport facilities. Distributors, streets, bicycle routes, walk-oriented areas, bus lanes and rapid transit lanes, stops and change terminals, noise control. Minimum geometric form: speed range controls, provision for surface water on urban roads, landscape. Design of intersections and parking areas.

8.409G Interchange Design SS C3
Central projection theory and application to alignment design; perspective drawing methods, introduction to aerial and terrestrial photogrammetry, photomaps and photomontage as applied to transport facilities. Speed change lanes, exit and entrance terminals, ramp types, ramp speeds and design. Interchange location and layout, provision for surface water, signposting. Computer use. Safety measures during maintenance.

8.410G Highway Engineering Practice Part I S1 C3

8.411G Highway Engineering Practice Part II S2 C3

8.412G Economics for Transport Studies S1 C3

8.413G Transport Economics S2 C3
Cost and price analysis of each of the transport modes (road, rail, air and sea). Welfare analysis and taxation theory with respect to transport. Economics of location; economics of land use models; regional trade model.

8.414G Transport Systems Part I S1 C3

8.415G Transport Systems Part II S2 C3
Historical introduction to transport systems and development of various transport modes; road (vehicles, pedestrians, cycles), conveyor, rail, sea and air. Analysis of the operational characteristics of vehicles in the transport modes of road, rail and air. Analysis of the requirements of the rights of way for each transport mode. Development of optimum criteria for the distribution of cargo and passenger traffic. Terminals and mode transfer facilities. Development of system operational models. Energy consideration, new systems.

8.416G Traffic Engineering F C6

8.417G Transport and Traffic Flow Theory F C6
Analysis of deterministic and stochastic models of the traffic stream. Topics covered include the following: Definition and measurement of traffic stream parameters. Space and time distribution of speed. Overtaking models and the moving-observer method. Fundamental diagram of traffic. Car-following theory. Headway and counting distributions. Introduction to queueing theory. Simulation techniques. Signalized and unsignalized intersections.

8.418G Statistics for Transport Studies Part I S1 C3
8.419G  Statistics for Transport Studies  Part II  S2 C3

8.420G  Transport Engineering Elective  SS C3
An occasional offering in a specialized Transport and Highways topic selected according to current demand and/or availability of a local or visiting specialist.

8.701G  Economic Decision Making in Civil Engineering  C3
Review of practical engineering decision-making problems and relevant techniques. Engineering economics, benefit/cost analysis, consideration of inflation and taxation in investment decisions, bidding, decision theory, microeconomic theory, objectives and criteria, multiple objective planning.

8.702G  Network Methods in Civil Engineering  C3
Graphs, flow-in networks, optimal paths, critical path schedule, resources leveling, simulation networks, stochastic networks, project management, further applications.

8.703G  Optimization Techniques in Civil Engineering  C3
Search, linear programming, non-linear programming, geometric programming, calculus of variations, maximum principle, applications.

8.704G  Stochastic Methods in Civil Engineering  C3
Queueing, Markov processes, theory of storage, reliability, renewal, application, transportation and allocation.

8.705G  System Modelling  C3
The development of system models for specific problem areas and decision positions. Problem environment, goals, objectives, and definition established by field contact and team discussion, information flow requirements and the design of user-oriented decision processes. Class size is limited to selected students.

8.706G  Experimental Methods in Engineering Research  C3
Purposes of experimentation in engineering research. Design of experiments; factorial and other designs; replication. Analysis of experimental data: analysis of variance and covariance; spectral analysis; other statistical methods. Decision theory.

8.707G  Numerical Methods in Civil Engineering  C3

8.710G  Advanced Topics in Optimization in Civil Engineering  C3
Special studies in optimization in Civil Engineering design and construction to be offered from time to time by appropriate specialists.

8.714G  Advanced Topics in System Modelling  C3
Special studies in system modelling to be offered from time to time by appropriate specialists.

8.723G  Construction Design  C3
Design of field services and structures: compressed air services, cofferdams, ground anchors, floating plant, formwork and falsework, bridge centring, well-points and dewatering systems.

8.724G  Construction Technology  C3
A selection of topics from: drilling, blasting techniques, tunnelling, rockbolting and other ground support, earth/rock transport, harbours, railways, dams, bridges, structural steelwork techniques, pipeline construction, foundation grouting, compressed air work.

8.725G  Construction Accounting and Control  C3

8.726G  Construction Law and Professional Practice  C3

8.727G  Construction Planning and Estimating  C6
Project initiation and development, feasibility studies, planning and estimating procedures, contract administration; estimating costs of labour, plant and materials, indirect costs and overheads, profit; construction administration. Preparation of cost estimate for a major civil engineering project.

8.728G  Design of Construction Operations  C6
Heavy equipment, labour intensive, and composite operations: spatial layout and material flow concepts; the modelling of operations at the micro, macro, and systems level; engineered estimates and productivity prediction models; analysis of construction operations by timelapse methods; field methods at foreman, superintendent, engineer, and project manager levels; field studies of specific construction operations.

8.731G  Project Management  C3
A problem-oriented approach to Project and Mission management; the nature of engineering and construction projects: the project team; behavioural aspects of project management; the organization and management of project resources; short term field planning and management strategies.
8.732G Advanced Project Management Theory
A theoretical and formative approach to Project and Mission Management; management strategies and project success evaluation techniques; organizational and behavioral aspects of the project team structure; behavior norms and their impact on project team motivation; project management decision processes; case studies in project management.

8.748G Pavement Materials I
Properties and usage of soil and rock as pavement materials in road, rail or other construction work. Modification and evaluation of these properties; criteria for use and acceptance testing; variability and quality control: requirements of crushed rock for surfacing; use of non-standard materials in pavements: materials resources: in service conditions and their effect on materials performance.

8.749G Pavement Materials II

8.750G Pavement Design and Evaluation I
Pavement types for road, rail, airfield and other works: Stress distribution in pavements, theoretical and actual: sub-grade conditions and traffic loadings: design principles methods; and criteria for flexible pavements: design principles, methods and criteria for rigid and semi-rigid pavements, including stabilized soil and multilayer pavements: design principles, methods and criteria for design of raifark. Design of special-duty and temporary pavements.

8.751G Pavement Design and Evaluation II

8.752G Terrain Engineering
Basic geology, geological processes and geomorphology as they affect the planning of engineering works and construction. Specific civil engineering applications for highways, water storages, buildings, civil and military transport operations, etc. Photo interpretation, ground surveying, terrain mapping, information storage and retrieval.

8.753G Soil Engineering

8.754G Applied Soil Mechanics
A detailed study of rigid and flexible retaining structures, and of slope stability using both traditional and recent analytical methods. Applications of plasticity theory, refined failure surface analyses and the finite element method.

8.755G Materials of Construction (Concrete Technology) I
Concrete as a structural material. Basic Structure: strength microcracking and failure mechanisms; significance of tests and relation to design requirements. Variability, target strength, code and special criteria for acceptance and rejection of concrete. Non-destructive testing. Accelerated curing and special high-strength concretes for column and prestressed construction. Recent developments in constituent materials, special cements and admixtures. Workability, mix design theories and practical applications.

8.756G Materials of Construction (Concrete Technology) II
Concrete as a structural material, with special application to marine structures. Volume changes, shrinkage and thermal stresses; creep; predicated and design values. Cracking of plain and reinforced concrete, fracture toughness and extensibility, cracking problems caused by volume changes and creep effects in mass and offshore-type structures. Bond and impact strengths. Durability and fatigue of reinforced and prestressed concrete. Types of durability breakdown, sea water attack, FIP and other design recommendations and current research for marine structures. Special concretes.

8.764G Composites in Civil Engineering
History; relationship between structure and mechanical and physical properties. Elastomers, adhesives, reinforced plastics natural composites. Applications and case studies.

8.765G Welding in Structural Engineering
Terminology, welding processes, metallurgy, weldability of ferrous and non-ferrous metals, pre-heat and post-heat treatments residual stresses and distortion, weld quality levels, destructive and non-destructive testing, economic welded design, quality assurance.

8.771G Foundation Engineering
A specialized study of theoretical and practical aspects of geotechnical engineering directly relevant to the analysis and design of foundation systems. The primary object of the course is to establish the state-of-the-art with particular emphasis on the application of recent theoretical developments to foundation engineering, including piles, rafts, raft-piles, laterally loaded piles, retaining structures and techniques of strengthening soils.
8.773G Materials of Construction (Metals) III

Previously 8.756G.

Use of metals as structural materials: specification; structural aluminium alloys; modern steels; philosophy of materials selection; properties, applications, limitations; behaviour under mechanical loading; effects of environment; corrosion and corrosion protection.

8.774G Soil Dynamics

Fundamentals of vibrations: wave propagation in elastic, homogeneous medium; wave propagation in layered medium; vertical, sliding, torsional and rocking motion or footings on elastic half-space; behaviour of dynamically loaded soils; design procedures for dynamically loaded foundations.

8.775G Geotechnical Aspects of Natural Hazards

Basic principles involved in earthquake engineering: treating on seismic waves; earthquake effects on foundations of buildings, dams slopes and embankments, intake towers, etc. Criteria for earthquake resistant design: landslides and their effects on soil slopes; probabilistic evaluation of slope failures; treatment of slopes; liquefaction.

8.776G Rock Mechanics

Strength and deformation characteristics of rock mass and joints: flow through joints and porous rock; failure criteria; stresses and deformations around underground openings; tunnel lining and rock anchors; stability of rock slopes; stabilization of rock slopes; stability of underground excavations related to mining; foundations of dams in fissured and layered rocks.

8.777G Numerical Methods in Geomechanics

Fundamentals of finite element and boundary element methods: deformation and flow problems; linear and non-linear analysis; applications to underground openings, stability of slopes, foundations, mining excavation; seepage and consolidation; soil-structure interaction problems; earth pressures, retaining walls and buried pipes; thermal stress analysis.

8.778G Geotechnical Processes for Energy Resources

Principles of rock fragmentation: blasting patterns; prediction and estimation of ground vibrations; damage criteria; numerical techniques for the prediction of rock fracture; grouting materials and techniques.

8.779G Building Materials Technology in Third World Countries

Appropriate technology and building, traditional materials; cement and concrete, bricks, soil and stabilized soil, timber and timber products, composite materials, ferrocement; material selection.

8.780G Geological Engineering


8.802G Elastic Stability I

Euler strut; uniform and non-uniform cross sections. Eccentric loading; stressing beyond the elastic limit. Struts continuous over several supports. Stability of frames.

8.803G Elastic Stability II

Energy methods of formation of stability problems. Approximate methods. Thin-walled open section struts; lateral buckling of beams; bending and buckling of thin plates.

8.804G Vibration of Structures I

Review of basic aspects. Analysis of lumped mass systems with various degrees of freedom. Vibration in beams and other continuous structures.

8.805G Vibration of Structures II


8.806G Prestressed Concrete I

Historical development. Methods of prestressing. Elastic analysis and design. Flexural capacity and shear capacity of prestressed elements.

8.807G Prestressed Concrete II


8.808G Prestressed Concrete III

Partially prestressed concrete; cracked section analysis; crack control and deflection calculations; determination of appropriate level of prestress; strength calculations. Rational design procedures for prestressed members. Continuous beams; secondary moments; practical design procedures.

Prestressed slabs; two-way slabs; flat slabs; load balancing approach to design; effect of tendon distribution; design procedures; flexural and shear strength; deflections.
8.809G Reinforced Concrete I C3
Historical development. Methods of analysis and design, including limit state concepts. Analysis and design for bending, compression and combined bending and compression. Shear and torsion. Serviceability requirements.

8.810G Reinforced Concrete II C3

8.811G Reinforced Concrete III C3

8.812G Plastic Analysis and Design of Steel Structures I C3
The perfectly plastic material; the plastic hinge; plastic collapse of beams and frames; basic theorems; general design methods.

8.813G Plastic Analysis and Design of Steel Structures II C3
Estimation of deflections; factors affecting plastic moment; shake-down; three-dimensional plastic behaviour; minimum weight design.

8.814G Analysis of Plates and Shells C3

8.817G Experimental Structural Analysis I C3
Dimensional analysis and principles of similitude, model analysis and design of models. Instrumentation and special methods of measurement. Evaluation of data.

8.818G Bridge Design I C3

8.819G Bridge Design II C3

8.820G Structural Analysis and Finite Elements I C3

8.821G Structural Analysis and Finite Elements II C3

8.822G Structural Analysis and Finite Elements III C3
Application of the finite element method to analysis of structures. Verification of the results of standard computer programs. Structural stability and vibration of structures.

8.830G Hydromechanics C3
General equation of fluid motion, potential flow, conformal mapping, laminar flow, Navier-Stokes equations; turbulence, shear flows, jets and wakes, boundary layers, turbulent mixing, diffusion, air entrainment, cavitation, stratification.

8.831G Closed Conduit Flow C3
Theories for energy loss in conduit flows, roughness at pipe walls and tunnels, design applications. Cavitation in conduits, transport of waterborne mixtures in pipes, accuracy of flow measurement in pipe lines.

8.832G Pipe Network and Transients C3

8.833G Free Surface Flow C3
Theory of water flow in open channels. Application of theory to design of hydraulic structures, spillways, control gates, energy dissipators, channel transitions. Use of hydraulic models.

8.835G Coastal Engineering I C3
Theory of periodic waves as applied to tides and wind generated waves in water of varying depths. Wave and tide prediction.

8.836G Coastal Engineering II C3
Wave forces on structures, shore processes and beach erosion. Estuarine hydraulics, wave and tide models.
8.837G Hydrological Processes C3
Hydrologic cycle, water and energy balances, atmospheric moisture, precipitation process, evaporation and transpiration, storm runoff process, land use and management, stream gauging, instruments.

8.838G Flood Design C3
Excluded: 8.846G.
Introduction to flood estimation, design rainfall data, hydrograph analysis, storm runoff, loss rates, rational method, unit hydrographs, introduction to urban drainage design, flood frequency.

8.839G Advanced Flood Estimation C3
Flood routing, catchment characteristics, runoff routing, synthetic unit hydrographs, urban runoff, regional empirical flood estimation methods, advanced unit hydrograph theory.

8.840G Reservoir Design and Yield Determination C3
Storage-yield analysis, extension of runoff records, deterministic catchment models, stochastic hydrology, storage probability studies, spillway capacity and reservoir flood routing.

8.841G Hydrometeorology C3
Water and energy balances, atmospheric moisture, precipitation, evaporation and transpiration, snow and snowmelt, extreme precipitation.

8.842G Groundwater Hydrology C3
Confined and unconfined aquifers, analogue and digital models of aquifer systems, water movement in the unsaturated zone, recharge, groundwater quality, sea water intrusion.

8.843G Groundwater Hydraulics C3
Mechanics of flow in saturated porous materials, steady and unsteady flow to wells, leaky aquifers, partial penetration, multiple aquifer boundaries, delayed yield from storage, regional studies.

8.844G Soil-Water Hydrology C3
Hydrologic characteristics of unsaturated media, hysteresis, theory of infiltration, drainage and redistribution studies, laboratory and field instrumentation, applications to field problems.

8.845G Urban Drainage Design C3
Excluded: 8.838G.
Introduction to flood estimation design, rainfall data hydrograph analysis, storm runoff, loss rates, rational method. Urban drainage design.

8.846G Water Resources Policy C3
Resource economics, water supply, water demand, multiple objective planning, multiple purpose projects, water law, water administration, case studies.

8.847G Water Resource System Design C3
Principles of the optimal design and operation of multiple purpose, multiple component, water resource systems; evaluation of cost and benefits in complex and simple systems.

8.848G Drainage of Agricultural Land C3
Characteristics of drainage systems, steady and unsteady state drainage formulae, conformal transformation solutions, soil characteristics, field measurement of hydraulic conductivity and soil water pressure, significance of unsaturated zone, practical aspects.

8.849G Unit Operations in Public Health Engineering C3
Theory of physical, chemical, biological, and hydraulic processes used in both water and wastewater treatment. Applications where these are common to both water and wastewater treatment.

8.850G Water Distribution and Sewage Collection C3
Water collection, transmission and distribution systems — layout design and analysis, reservoirs, pumping. Sewage collection system design and analysis — capacities, corrosion, pumping.

8.851G Solid and Liquid Waste Management C2
Sources and nature of refuse-collection and transportation-disposal: sanitary landfill, incineration, pyrolysis, resource recovery, composting. Collection, treatment and disposal of strong liquid wastes.

8.852G Water and Wastewater Analysis and Quality Requirements C3
The effects of impurities in water and wastewater on its suitability for various beneficial uses, and methods used for detecting impurities. Analytical methods used in water and wastewater treatment for monitoring and process control.

8.853G Water Treatment C3
Application of processes and process variations used to upgrade the quality of water for specified uses, with particular reference to the treatment of water for municipal use.
8.857G Sewage Treatment and Disposal C3
Application of processes and process variations used to improve the quality of sewage effluent, and the disposal of the effluent. Re-use of effluents where applicable. Sludge treatment and disposal.

8.858G Water Quality Management C3
Fundamental concepts; systems approach to quality aspects of water resource systems; quality interchange systems; quality changes in estuarine, surface, and ground water. Quality management by engineered systems. Economic criteria relating to water use and re-use systems.

8.860G Investigation of Groundwater Resources I C3
Occurrence and extraction of groundwater, investigation and drilling methods, systems approach, optimization techniques, conjunctive use studies, quality of groundwater.

8.861G Investigation of Groundwater Resources II C3
Geophysical methods, remote sensing, photointerpretation, and-environment studies, analog models, case studies.

8.862G Fluvial Hydraulics C3
Unsteady and varied flow in non-uniform channels, secondary currents, sediment transport, channel morphology, scour and shoaling, river control works, modelling of fluvial processes.

8.863G Estuarine Hydraulics C3

8.864G Arid Zone Hydrology S1 L1½T1½ C3
Co-requisite: 8.837G, 8.838G.
Arid zone rainfall characteristics, data collection and instrumentation, runoff processes, infiltration, transmission loss, recharge processes, flood characteristics and design; water yield, storage of water; evaporation and evaporation suppression; sediment transport and measurements.

8.865G Arid Zone Water Resources Management S1 or S2 L1½T1½ C3
Water as a resource demand for and supply of water; works and management to match demand with supply. Special features of the arid zone climate, water uses, quantification of demand quantities and qualities; and zone grazing system modelling, water supplies, quantities and qualities, measurement of flow rate, volume, quality. Engineering works design, construction, operation and maintenance of works, including excavation tanks, dams, pipelines, pumps, windmills, engines and motors, troughs, costs, reliability; energy sources for pumping. Special practices: water spreading, irrigation including trickle irrigation; evaporation reduction, desalination.

8.901G Civil Engineering Elective I C3
A Session 1 occasional elective on a civil engineering topic, selected according to current demand and availability of local and visiting specialists.

8.902G Civil Engineering Elective II C3
A Session 2 occasional elective on a civil engineering topic, selected according to current demand and availability of local and visiting specialists.

8.909G Project C9

8.918G Research Project C18

Mathematics

Undergraduate Study

10.001 Mathematics I F L4T2
Prerequisites:

HSC Exam Percentile Required

- 2 unit Mathematics  71-100
- 3 unit Mathematics  21-100
- 4 unit Mathematics  1-100

Excluded: 10.011, 10.021A, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra an introduction to abstract algebra, elementary computing.

10.011 Higher Mathematics I F L4T2
Prerequisites:

HSC Exam Percentile Required

- 3 unit Mathematics  71-100
- 4 unit Mathematics  11-100

Excluded: 10.001, 10.021A, 10.021B, 10.021C.

Calculus, analysis, analytic geometry, linear algebra, an introduction to abstract algebra, elementary computing.
10.022 Engineering Mathematics II  F L2T2
Prerequisite: 10.001 or 10.011.
Differential equations, use of Laplace transforms, solutions by series; partial differential equations and their solution for selected physical problems, use of Fourier series; introduction to numerical methods; matrices and their application to theory of linear equations, eigenvalues and their numerical evaluation; vector algebra and solid geometry; multiple integrals; introduction to vector field theory.

10.031 Mathematics  F L1T1
Prerequisite: 10.001 or 10.011 or 10.021C(CR).
Differential equations, use of Laplace transformations, solution by series; partial differential equations and their solution for selected physical problems, use of Fourier series; multiple integrals, matrices and their application to theory of linear equations, eigenvalues; introduction to numerical methods.

10.033 Electrical Engineering Mathematics III  F L1½T½
Prerequisites: 10.111A, 10.1113, 10.1114, 10.2111, 10.2112.
Optimization.

10.111A Pure Mathematics II — Linear Algebra  F L1½T1
Prerequisite: 10.001 or 10.011.

10.1113 Pure Mathematics II — Multivariable Calculus  S1 or S2 L1½T1
Prerequisite: 10.001 or 10.011.
Multiple integrals, partial differentiation. Analysis of real valued functions of one and several variables.

10.1114 Pure Mathematics II — Complex Analysis  S1 or S2 L1½T1
Prerequisite: 10.001 or 10.011.
Analytic functions. Taylor and Laurent series, integrals Cauchy's Theorem, residues, evaluation of certain real integrals.

10.2111 Applied Mathematics II — Vector Calculus  S1 or S2 L1½T1
Prerequisite: 10.001 or 10.011.
Vector fields; divergence, gradient curl of a vector; line, surface, and volume integrals. Gauss' and Stokes' theorems. Curvilinear coordinates.

10.2112 Applied Mathematics II — Mathematical Methods for Differential Equations  S1 or S2 L1½T1
Prerequisites: 10.001 or 10.011.

10.341 Statistics SU  F L1½T½
Prerequisite: 10.001 or 10.011.
Introduction to probability theory, random variables and distribution functions. Sampling distributions, including those of t, X² and F. Estimation procedures, including confidence interval estimation with an emphasis on Least Squares and surveying problems, and computer based exercises.

10.351 Statistics SM  F L1T½
Prerequisite: 10.001 or 10.011.
For students in Aeronautical, Industrial and Mechanical Engineering and Naval Architecture as part of 5.071 Engineering Analysis.
An introduction to probability theory, with finite, discrete and continuous sample spaces. Random variables: the standard elementary distributions including the binomial, Poisson and normal distributions. Sampling distributions: with emphasis on those derived from the normal distribution: t, X² and F. Estimation of parameters: the methods of moments and maximum likelihood and confidence interval estimation. The standard tests of statistical hypotheses, and, where appropriate, the powers of such tests. An introduction to regression and the bivariate normal distribution.

10.361 Statistics SE  F L1½T½
Prerequisite: 10.001 or 10.011.
For students in the School of Electrical Engineering.
An introduction to probability theory, Random variables and distribution functions; the binomial, Poisson and normal distributions in particular. Standard sampling distributions, including those of X² and F. Estimation by moments and maximum likelihood; confidence interval estimation. The standard tests of significance based on the above distribution with a discussion of power where appropriate.

10.381 Statistics SC  S1 or S2 L1T1
Graduate Study

10.061G Advanced Mathematics for Electrical Engineers
Boundary value problems in partial differential equations. Selected topics from complex variable analysis, integral transforms, and orthogonal functions and polynomials.

10.361G Statistics

10.371G Statistics
Revision of probability and distribution theory, including estimation of hypothesis testing. Extension of this to include topics such as more complex probabilistic modelling, analyses of modified data (censored, truncated and missing observations), general statistical inference (decision theory), acceptance testing, and reliability analysis (hazard functions).

Graduate Study

14.042G Industrial Law
The elements of the law of contract and tort as applied to industrial law; the New South Wales and Commonwealth industrial arbitration systems, including award making and interpretation, and industrial disputes; workers’ compensation.

14.062G Accounting for Engineers
Problems related to industrial situations, and their relevance in decision-making. Manufacturing and cost accounts, budgeting and budgetary control, cost analysis and control and profit planning.

Accountancy

Undergraduate Study

14.001 Introduction to Accounting A
S1 L2T0
An introduction for non-commerce students to the nature, purpose and conceptual foundation of accounting, information systems including accounting applications. Analysis and use of accounting reports.

14.002 Introduction to Accounting B
S2 L2T0
Prerequisite: 14.001.
An introduction for non-commerce students to managerial accounting. Long-range planning, budgeting and responsibility accounting; cost determination, cost control and relevant cost analyses.

Economics

Industrial Relations

Undergraduate Study

15.501 Introduction to Industrial Relations
S2 L2T1
For students enrolled in Faculties other than Commerce and Arts. Designed to provide a practical introduction to important industrial relations concepts, issues and procedures. Includes: the organs, evolution and operation of the Australian system of industrial relations; the structure and role of trade unions and employer bodies; the function of industrial tribunals such as the Australian Conciliation and Arbitration Commission and the NSW Industrial Commission; wages structure and determination; employment, unemployment and retraining; the nature and causes of strikes and other forms of industrial conflict; the processes and procedures for conflict resolution.

Where appropriate to class composition, particular attention is paid to individual industries.
Industrial Engineering*

Undergraduate Study

18.003 Numerical Methods/Industrial Experimentation
Prerequisites: 5.072, 10.001, 10.022.


18.004 Manufacturing Management
Prerequisites: 18.503, 18.603, 14.001, 14.002.


18.011 Industrial Engineering IA
Prerequisite: 10.022. Co- or prerequisite: 5.071, 5.111 or 5.122.


18.012 Industrial Engineering IIA
Prerequisites: 5.112 or 5.123, 18.011.


18.020 Industrial Orientation
Prerequisite: 5.071.

A series of lectures and discussions designed to prepare students for Industrial Training. Topics include: Forms and structure of private and public organizations; line and staff; authority and responsibility; company objectives, functions of staff departments, eg personnel, purchasing, quality control, industrial engineering, accounting; new forms of organization, industrial legislation, industrial relations, safe practices. Employer expectations of the trainee engineer, requirements for the Industrial Training Report. Introduction to the specialist streams of the Years 3 and 4.

18.021 Industrial Engineering IB
Prerequisite: 10.022. Co- or prerequisite: 5.071.


18.022 Industrial Engineering IIB
Prerequisites: 5.071, 18.021.

Design of Manufacturing Facilities: Product and objectives, equipment selection. Charting and systematic improvement of methods, factory and workplace layout, the factory environment. The Use of Human and Physical Resources: Motion and time study, financial incentives, applications to machine controlled processes. Work sampling and data collection, predetermined motion-time systems.

Industrial Psychology: Individual differences, operator selection and learning, motivation to work, conflict and frustration, social aspects of industry, worker participation.


18.091 Industrial Management
Prerequisites: 10.2112, 10.361.

Engineering Economy: Economic objectives of the firm. Economic measures of performance: net present value, annual equivalent value and the DCF rate of return (including the incremental rate of return) and their application in the selection and replacement of processes and equipment. Introduction to Operational Research: The formation and optimization of mathematical models of industrial processes. The development of decision rules. Some techniques of operational research and applications, eg mathematical programming, queueing theory, inventory models, simulation, critical path networks. The Use of Human and Physical Resources: Methods engineering, ergonomics, motion and time study, financial incentives, applications to machine controlled processes; work sampling and data collection. Plant location, factory layout. Production and Quality Control: Control of jobbing, repetitive batch and continuous production. Manufacturing organizations.

*Industrial Engineering is a Department within the School of Mechanical and Industrial Engineering.
functions, inter-relationships and information flow. Sampling techniques in quality control, control charts. Introduction to inventory Control: Analysis of some engineering planning decisions.

18.224  Numerical Control of Machine Tools
S1 or S2 L2T1
Overview of numerical control systems; machine specification and selection; manual part programming; production and operator aspects including selection of operating conditions, work holding devices and tooling; introduction to computer assisted programming.

18.303  Methods Engineering
F L1T1
Prerequisites: 5.072, 18.020.

Aims: Historical development, measurement of productivity. 
Methods study: motion economy, ergonomics, man-machine relationships.
Factory environment: layout, conditions, safety.
Work measurement: purposes, time study, fatigue, human work capacity, predetermined motion time systems, regression methods, work sampling.
Human factors: motivation to work, job satisfaction, socio-technical systems, incentive plans.
Laboratory: exercises in work measurement, workplace design, ergonomics.

18.403  Production Design and Technology
F L2T2
Prerequisites: 5.072, 5.422 or 5.411 and 8.259.

Basic metrology and tolerancing; introduction to plasticity theory and its application to theories for machining and forming; economics of production processes; interpretation of machines and tools; principles of process selection; review of major processes; interaction of design, production quantity, materials and processes; value analysis.

18.404  Design for Production
F L1T1
Prerequisite: 18.413.

Overview of design for production and its relation to overall design process; selection, specification and interpretation of tolerances; process selection; analysis of various production processes; jig, fixture and gauge design.

18.413  Design for Industrial Engineers
S1 L1T1 S2 L1T2
Prerequisites: 5.122 or 5.123, 5.422 or 5.411 and 8.259.

Session 1: Industrial design. Tooling design. Production aids. Fluid power systems. Introduction to fatigue in design.

Session 2: (Common with Session 2 in 5.123 Mechanical Engineering Design III) More advanced design analyses, component design and drawing with individual and group projects of an interdisciplinary nature.

18.431  Design for Production
F L1T2
Prerequisite: 5.112.


18.432  Design of Production Systems
F L2T4 (Project)

Prerequisites: 5.071, 18.011, 18.021.

This subject may be taken only by part-time students in their final year.

Interchangeable Manufacture: Design for production, tooling, gauges, metrology.

Process Selection: Evaluation of alternative processes, make or buy decisions, planning the process sequence, case studies.

Production Planning: Forecasts, capacity decisions plant location, factory design and layout.

Production Systems: Computer systems for production control and information flow, computer control of machines and groups of machines, socio-technical systems.

Project: The project will consist of the design analysis for production and the planning of the production system for the manufacture of a simple engineering assembly. A comprehensive written report will be required.

18.503  Operations Research A
F L2T1
Prerequisites: 5.072, 10.022. Co-requisite: 18.803.

History and overview of operations research. Decision theory. Methodology: identification and formulation of the problem; construction of a model; obtaining solutions; testing the model and implementing the solution. Case study.

18.551  Operations Research
F L2T1

Prerequisites: Either 5.071 and 18.021 or 10.031, 10.331 and 18.121.

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queueing theory, inventory models, replacement and reliability models; simulation. These techniques applied to situations drawn from industrial fields, e.g production planning and inventory control. Practical problems of data collection, problem formulation and analysis.
18.063 Management/Economics  S1 L/T4
Prerequisites: 5.072, 18.020.
Introduction: objectives of a company, measures of performance, need for economic decisions.
Cost information: sources of costs, fixed and variable, overheads, break-even analysis.
Management: historical background, Industrial psychology, motivation, frustration and conflict, Industrial relations, union and arbitration structures, Industrial and commercial law, liability of employers, contracts, trade practices, patents. Marketing, sales forecasting, advertising ethics.

18.803 Optimization  S1 L2T1
Prerequisite: 10.022. Co-requisite: 18.503.

Servicing Subjects

18.121 Production Management  F L3T0
18.131 Operations Research

Graduate Study

18.061G Industrial Experimentation I  C3
Design of experiments with reference to industrial problems; planning experiments; significance testing; simple comparative experiments, accelerated experiments; fatigue testing, tool life testing; economic aspects of experimental design; analysis of variance of randomized block, latin square and factorial experiment designs.

18.062G Industrial Experimentation II  C3
Regression analysis; use of orthogonal polynomials in regression analysis and analysis of variance; confounding in factorial design; response surfaces and determination of optimum conditions.

18.073G Ergonomics  C2

18.074G Industrial Management  C3
Technical aspects: objectives of an enterprise or organisation, measures of overall performance, interim comparisons; monitoring performance, feedback and control, use of quality and inventory control, study work, accounting reports, corporate planning, use of forecasts, market surveys, operations research.
Organisational aspects: organisational structures, defining authority and responsibility; communication in organisations, information systems; the personnel function, selection, training and development, appraisal.
Human aspects: changing management styles, influence of ownership, technology, social attitudes, composition of the workforce, company size, organised labour; psychological factors, motivation, conflict situations, job satisfaction, leadership, adapting to change; industrial relations, trade unions and arbitration system structures, problems and cases; industrial democracy, participation in ownership and management.

18.084G Industrial Applications of Probability Theory  C4

18.171G Inspection and Quality Control  C3
Economics of measurement; advanced measuring and inspection methods; non-destructive testing; quality control systems; sampling by attributes and variables; standardization; case studies; process capability and variability; machine tools acceptance testing; alignment procedures.

Brief review of N.C. systems and manual programming. Requirements of a high level language designed specifically for programming N.C. machine tools. Languages available and their use on mainframe, mini or
microcomputer, e.g. APT, ADAPT, FANAPT, UNIAPT, MICRO APT, etc. Detailed study of the structure and use of 'Automatic Programmed Tools' (APT) language including overview of language, basic APT grammar, part program structure, geometry statements, motion statements, macro commands, postprocessors, diagnostics.

18.261G Computer Automation C3

Computer architecture including central processor, random-access memory, read only memory, input/output ports, peripherals, and the relationships between each. A systematic study of the requirements for interfacing computers to the real world. Machine code, assembly language, and high level languages such as BASIC or FORTRAN with a comparison of each for particular applications. Development of small computer system for machine tool control, automated inspection, supervision, stock control, etc.

18.271G Theory of Machine and Forming Processes C3


18.272G Technology of Machining and Forming Processes C3

Selected topics from: Machine tool vibration; designs of machine tool elements; economics of machining and forming, numerical and adaptive control of machine tools; design of dies and cutting tools for strength and wear resistance; automation.

18.370G Design of Work Systems C3

Historical review: Selection and organisation of workforces throughout history, effects of technology, use of deprived groups, characteristics and aspirations of the modern workforce. The physical workplace: Applications of ergonomics to workplace and handtool design. Control of the environment, safety and health considerations, legislation and other influences. Planning work loads: Estimating times for tasks, allocation of work among groups, assembly work by fixed position or by production line. Production line balancing. Group technology systems. Avoiding or allowing for fatigue. Interaction with machines: Machine-controlled processes, machine interference, queuing, optimisation of the man-machine system. Interaction with others: Co-ordination of work within groups, critical path scheduling; workplace arrangements to foster communication and avoid isolation. Quality of work life: Job enrichment and job enlargement. Worker participation in planning. Autonomous work groups and socio-technical systems. Trends towards industrial democracy.

18.371G Factory Design and Layout C3

Production Requirements: Processes, machines and storage: optimum factory size, multiple factories. Plant Location: Single and multiple factories and warehouses; location models and economic analysis.
18.571G Operations Research I  C6

The formulation and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models, and simulation. These techniques are applied to situations drawn from industrial fields, for example, production planning and control. Practical problems of data collection, problem formulation and analysis.

18.574G Operations Research II  C3


18.579G Case Studies in Operations Research  C3

Problems confronting management are seldom in the form of clear cut textbook type exercises; rather they are often ill-structured and ambiguous. A variety of such problems in operations research/management science is considered with emphasis on the common pitfalls that arise in solving real world problems and the comparison of different strategies for solution. Students are expected to prepare written reports on certain cases considered suitable for submission to management.

18.580G Operations Research  C6

The formulating and optimization of mathematical models. The development of decision rules. Some techniques of operations research such as mathematical programming, queuing theory, inventory models, replacement and reliability models, and simulation. These techniques are applied to situations drawn from industrial fields, for example, production planning and inventory control. Practical problems of data collection, problem formulation and analysis.

18.671G Decision Theory  C2

Theories of choice, value, risk, and uncertainty for the individual and for multi-person situations. Statistical decision theory, Bayes and minimax rules.

18.673G Energy Modelling, Optimization and Energy Accounting  C3

The analysis of energy systems using computer models. Applications of such models range from policy analysis at government level to investment analysis within individual industries. Covers both the formulation of energy models and the techniques used to obtain optimized solutions, with examples from actual studies. Effects of uncertainty and the use of energy accounting as an analytical tool.

18.675G Economic Decisions in Industrial Management  C3

General aspects: the economic objective, the single-period investor’s model, economic criteria, the mathematics of finance. Deterministic models: project evaluation using discounted cash flow analysis; capital structure; debt and equity financing; cost of capital and the minimum acceptable rate of return; taxation; inflation and its effects. Probabilistic models: multiple objectives and multi-attribute value systems based on means and variances of cash flows.

18.681G Engineering Economic Analysis  C3

Price-output decisions under various competitive conditions. The time-value of money, net present worth and DCF rate of return, and their application in the selection and replacement of processes and equipment. Construction and optimization of particular models, e.g., replacement, capital rationing. Measures of profitability.

18.761G Simulation in Operations Research  C3


18.763G Variational Methods in Operations Research  C2

The variational problem and its history. The modern formulations. Mathematical Theory. Application to a wide range of problem areas such as production and inventory control, advertising, machine maintenance and natural resource utilization.

18.764G Management of Distribution Systems  C2

Prerequisite: 18.503.

The distribution system: single depot location, multi-depot location, vehicle scheduling, vehicle loading, fleet size, case studies.

18.765G Optimization of Networks  C2

Prerequisite: 18.551.


18.770G Stochastic Control  C2


18.772G Information Processing Systems in Organizations  C2

The place of operations research in information processing systems. Computer hardware and software. Data structures and data manipulation techniques. Typical structures of suites of programs. The life cycle of information processing systems. System design. Applications packages with emphasis on systems for production and inventory control. Major problems in information processing systems.
**18.773G Optimal Control in Operations Research**

Brief survey of dynamic optimization techniques. Introduction to the calculus of variations and the maximum principle for both continuous and discrete systems. Applications to operations research problems drawn from the areas of production and inventory control, machine maintenance, investment and natural resource utilization.

**18.774G Applied Stochastic Processes**

Examples of stochastic processes, basic concepts and Markov chains. Renewal theory. Applications to queues, inventory replacement, risk, business and marketing. Markov decision processes.

**18.775G Networks and Graphs**

Basic concepts. Application of Hamiltonian paths, Euler cycles, trees, planar graphs, dominating and independent sets to operations research problems. Shortest route algorithms. Concept of maximum flow in a network applied to transportation assignment and scheduling problems.

**18.776G Production and Inventory Control**

Basic inventory replenishment models, continuous stock review, periodic re-ordering and base stock models, with deterministic, probabilistic, and dynamic demands. Variations of the basic models to include additional features (e.g., demand dependent on delivery time). Costs of the complete system in practice: Production smoothing models. Forecasting techniques. Optimum stock locations in multistage systems. Practical inventory surveys and control systems.

**18.777G Time Series Forecasting**


**18.778G Scheduling and Sequencing**


**18.779G Game Theory**


**18.780G Production Control**

Corporate objectives and organization. The production environment. The detailed mechanics of control of jobbing production and its extension to repetition batch and continuous production. Manufacturing organization and controls, functions, inter-relationship and information flow. Relevance to computerized control. Introduction to inventory control, and the analysis of some typical engineering planning decisions.

**18.862G Linear Programming**


**18.863G Nonlinear Programming**


**18.864G Applied Geometric Programming**

Optimization concepts developed for function of polynomial form. Solution techniques for such problems. Sensitivity of solution. Applications of geometric programming to problems from engineering and operations research.

**18.871G Mathematics for Operations Research**


**18.874G Dynamic Programming**


**18.875G Geometric Programming**

The geometric programming theory is developed for convex and non-convex mathematical programs. The theory is applied to polynomial and posynomial programming. As projects actual polynomial and posynomial programs will be solved.

**18.876G Advanced Mathematics for Operations Research**

A survey of mathematical ideas which are of value in operations research. Topics will be selected from the following areas: set theory, real analysis, matrix theory, topology, function spaces, linear operator theory, inequalities, stability, complex analysis, convex analysis, distribution theory, group theory and measure-theoretic probability theory.

**18.877G Large-scale Optimization**

18.878G Industrial Applications of Mathematical Programming  

18.879G Mathematical Programming Analysis  
Co-requisites: 18.871G; Linear Programming section of 18.571G. 
Methods for the analysis of mathematical programs. Analysis of the properties of linearity, separability, convexity, quasi-convexity and duality, providing the basis for the conversion of mathematical programs to potentially simpler formulations. Includes the areas of geometric programming, convex programming and quasi-convex programming.

18.909G Project  
18.918G Research Project  
18.936G Research Project  
18.960G Seminar (Production Engineering)  
18.965G Seminar (Industrial Management)  
18.967G Advanced Topic in Production Engineering*  
18.968G Advanced Topic in Production Engineering*  
18.969G Advanced Topic in Production Engineering*  
18.970G Seminar (Operations Research)  
18.977G Advanced Topic in Operations Research*  
18.978G Advanced Topic in Operations Research*  
18.979G Advanced Topic in Operations Research*  

Nuclear Engineering

Undergraduate Study

23.051 Nuclear Power Technology  
Atomic nuclei, radioactivity, neutron reactions, fissile and fertile materials, nuclear conversion and breeding cycles, plutonium. Criticality requirements, heat removal, control and safety of nuclear reactors. The thermal, hydraulic and structural aspects of gas and liquid cooled thermal reactors and liquid metal cooled fast breeder reactors. The status of fusion research and development. The technology, safety, economics and environmental impact of nuclear fuel cycles, from mining, through concentration, fabrication and burnup to waste disposal. Comparative assessment of nuclear, fossil and alternative energy systems in local and global contexts.

Graduate Study

Not all subjects are available in any one year.

23.013G Neutron Transport and Diffusion  
Neutron and nuclear reactions, the formation of neutron spectra in infinite multiplying media, transport and diffusion theories, and their application to the analysis of heterogeneous reactor lattices.

23.014G Fewgroup Reactor Theories  
The derivation and use of fewgroup reactor models for the macroscopic analysis of finite reactor criticality, burnup and control.

23.015G Multigroup Reactor Theories  
A selection of topics from general reactor theory, variational principles, perturbation theory, and multigroup transport theory, for the general problem of three-dimensional fine scale neutron flux distribution analysis.

*Subjects which allow the presentation of special topics, particularly by visiting academics.
The derivation and application of point reactor kinetic models to the study of macroscopic power reactor dynamics, stability and control, and the development of general space-time kinetic models.

Matrix theory and matrix computations required for the numerical solution of problems in neutronics, fluid dynamics, structural mechanics, etc, arising in the analysis and prediction of nuclear power system performance.

The mathematics of random processes applied to fluctuation phenomena in nuclear reactors, and the practical application of noise analysis techniques to reactor monitoring, control, and parameter estimation.

The utilization of nuclear energy, the thermodynamics of nuclear power systems and applications, and the study of nuclear fuel cycles.

The principles of nuclear power cost estimation for various reactor types and applications, the comparative evaluation of nuclear power systems, and the problem of reactor strategy.

The theory and application of function and functional minimization techniques to problems of design, control and operation of nuclear reactors and associated nuclear fuel supply complexes.

The theory and technology of uranium enrichment by the diffusion, ultracentrifuge and nozzle processes; the economics of enrichment within the nuclear reactor fuel cycle, in relation to optimal reactor strategy and resources utilization.

Mathematical methods, partial differential equations, special functions, and numerical methods for digital computation, relevant to Nuclear Engineering.
Undergraduate Study

27.173 Remote Sensing Applications† S2 L1T2
Principles and technical aspects of remote sensing. Forms of available imagery, their utility and facilities for their interpretation. Application of remote sensing for the assessment and mapping of land properties, resources and land use. Applications in resource and environmental management.

27.295 Physical Geography for Surveyors S1 L2T2
Fundamentals of physical geography. Landscapes of Australasia. Techniques of landscape appraisal. Laboratory classes to support the above, including map analysis, air photo interpretation and examination of soil properties. There is a compulsory one-day excursion.

Graduate Study

27.901G Geomorphology for Hydrologists S2 L1½T1½

Surveying

Undergraduate Study

29.001 Surveying I S1 L3T1½

29.002 Surveying II S2 L2T3
Traversing: fieldwork, computation and adjustment. Principles of levelling, levels and associated equipment, field and reduction procedures, testing and adjustment of levels. Vertical staff tacheometry: principles, field and reduction procedures for stadia, self-reducing tacheometers. Survey methods for detail and contour surveys.

29.003 Surveying III S1 L2½T2½

29.004 Surveying IV S2 L2T2½
Co-requisites: 29.003, 29.151.
Setting out surveys. Calculation and setting out of horizontal circular curves and transition curves. Principles and calculation of vertical curves, sight distance. Determination of areas of irregular figures, trapezoidal and Simpson's rules. Volume determination from spot heights, contours and cross-sections, mass haul diagrams. Route surveys for roads, railways, waterways, pipe and transmission lines. Adjustments of theodolite and level.

29.005 Surveying V S1 L3T2
Prerequisite: 29.003
Electronic distance measurement principles, applications and instruments, propagation of electromagnetic waves, meteorological and geometric corrections, field procedures, instrumental errors and their calibration. Calibration of linear scales. Precise angle measurement, observations and reduction procedures, sources of error and their testing.

29.006 Surveying VI S2 L2T1
Prerequisite: 29.003.
Error theory, expression of uncertainty, testing of observations, applications to design and analysis of surveys. Precise levelling; equipment, field procedures. Project surveys, integrated surveys, surveys for large structures, precise surveys for deformation, measurement and setting out machinery, mining and tunnel surveys, hydrographic surveys.

Note: Electronic Calculators.

Students enrolled in the surveying courses are required to equip themselves with an electronic calculator. Advice on the purchase of this equipment is given to students at the commencement of their course.

†Offered subject to availability of staff.
29.031 Electronic Distance Measurement  S2 L2T1

Prerequisite: 29.005.

Short range instruments: sources of error, field and computational methods of calibration, baseline design. Long range instruments: laser and microwave distance meters, sources of error, calibration, precise measurement techniques, geometric and atmospheric corrections. Properties of reflectors. Power sources.

29.032 Precise Surveys in Industry and Engineering  S2 L2T1

Prerequisite: 29.006.

Review of survey problems in industry and engineering. Setting-out of large structures: network design, measurements, methods of height transfer, optical plumbing, examples and accuracy requirements. Surveys for measurement of deformation and settlement: design of control network and stations, observation and adjustment techniques, detection of movement, electric measurement of small changes in length, height and inclination. Close-range indoor surveys: optical scanning, special equipment and techniques, auto-collimation, laser interferometry.

29.033 Characteristics of Modern Theodolites and Levels  S2 L2T1

Prerequisite: 29.006.

Construction features, sources of error and methods of testing modern optical surveying instruments. Topics selected from: circle and micrometer graduation errors, coded circles, calibration and behaviour of bubbles, automatic compensator systems, axis wobble, temperature effects.

29.034 Mine Surveying  S1 L2T1

Prerequisite: 29.006.


29.035 History of Surveying  S2 L1T2

Historical development of geodesy, astronomy, cartography, photogrammetry, and geophysics. History of general surveying: mathematical aids, optics, instruments, electronic aids for surveyors. Selected topics from history of surveying and land law in Australia.

29.121 Electronics for Surveyors  S2 L1T1

Prerequisite: 1971.


29.150 Introduction to Computer Programming  S1 L1T1

Computer components and functions. Program design and flow charting. Algorithm development and coding using a high level language. Computer output diagnostics, program documentation.

29.151 Survey Computations I  S1 L2T2


29.152 Survey Computations II  S1 L2T2

Prerequisite: 29.151.


29.153 Adjustment of Control Surveys  S2 L1½T1½

Prerequisite: 29.212.


29.161 Hydrographic Surveying I  S1 L3

Prerequisite: 29.006.

Introduction, theory of echo sounder, sounding techniques, visual fixing, electronic position fixing, tides, tidal streams, tidal datums, ocean currents, acoustic and wire sweeps.

29.162 Hydrographic Surveying II  S2 T3

Prerequisite: 29.161.

Practical training: undertake a hydrographic survey requiring establishment of horizontal and vertical shore control, preparation of plotting sheets, control marking, bathymetry, equipment calibration, tidal observations and reductions, linking in. Static display of other equipment. Lectures on nature of seabed, wind waves, the survey report. Discussions on practical surveying tasks or topics of current interest. A harmonic analysis of 12 days of tidal data.

29.173 Project  S1 or S2 T3

Prerequisite: High standard in the chosen topic area normally required; permission of project supervisor.

Theoretical or practical investigation of a selected topic under the guidance of a supervisor, with a report of a high academic standard required. Topic may be one suggested by the School or by the individual student based on his experiences.

29.174 Major Project  F L0T3 or S2 T6

Prerequisite: High standard in the chosen topic area normally required; permission of project supervisor.

An elective subject involving a detailed investigation of a selected or assigned topic under the guidance of a supervisor, with a report of a high academic standard required. Topic may be one suggested by the School or by the individual student based on his experiences.
29.191 Survey Camp I

Co-requisites: 29.001, 29.002.

A one-week field camp equivalent to 42 contact hours. A series of field surveying tasks designed to consolidate the current year's work and serve as an introduction to the following year's work. Tasks include traversing, levelling, stadia and detail survey measurements for the production of a large-scale plan. Calculations, preparation of plans and reports.


A one-week field camp equivalent to 42 contact hours. A series of field surveying tasks designed to consolidate the current year's work and serve as an introduction to the following year's work. Surveys for the design of a road alignment, determination of dam capacity and methods of point fixation. Calculations, preparation of plans and reports.

A two-week field camp equivalent to 84 contact hours. Survey projects designed to consolidate course work. Field astronomy, triangulation, trigonometric levelling, photogrammetric control and cadastral survey.

Co-requisite: 29.195.

Two weeks of office computations equivalent to 84 contact hours. Preparation of comprehensive individual reports based on field survey tasks completed in Survey Camp III.

29.211 Geodesy I

S2 L3T1


Prerequisite: 29.211.


29.212 Geodesy II

S1 L2T1

Prerequisite: 29.211.

Topics from: advanced geodetic techniques and instrumentation-principles and applications; variations in geodetic position with time; earth satellite orbits; geoid solutions from gravimetry; earth's gravity field from satellite orbits; extension of gravity into unsurveyed regions.

Prerequisite: 29.212.


Uses of field astronomy. The solar system, the celestial sphere and the astronomical triangle. Time systems and time keeping. Latitude by circum-polar, circum-elongation and sun observations. Simultaneous determination of latitude and longitude by extra meridian methods. Prediction of observation programs. Evaluation of precision of results. Introduction to the determination of azimuth.

Determination of azimuth from circum polar, circum-elongation and sun observations. Simultaneous determination of latitude and longitude by the position line method. Prediction of observation programs. Evaluation of precision of results.

Topics selected from: geodetic astronomical methods, daylight star observations, meridian and equal altitude methods, variation in star co-ordinates, sun dials, celestial methods in navigation.

29.491 Survey Camp
A one-week field camp for students studying 29.441, Surveying for Engineers.

29.511 Photogrammetry I
Prerequisite: 29.151.

29.512 Photogrammetry II
Prerequisite: 29.511.

29.513 Photogrammetry III
Prerequisite: 29.512.

29.514 Principles of Remote Sensing
Prerequisite: 29.513.

29.631 Land Inventory I
Prerequisite: 29.511.

29.632 Land Inventory II

29.651 Land Development I
Prerequisite: 29.650.

29.652 Land Development II
Prerequisite: 29.651.

29.653 Land Development III
Prerequisite: 29.652.
Design and studio project for a neighbourhood development. Constraint and site analysis: preparation of maps for land use and vegetation, surface and soils, drainage and terrain, slopes, climate and aspect, composite maps. Structure plan: residential precincts, schools, commercial areas, industrial areas, active and passive recreation, pedestrian ways and road hierarchy. Plan of detailed lot layout: consideration of access, grades, drainage, drainage reserves, parks, and pedestrian ways. Engineering design and plans: catchment details, longitudinal and cross-sections, drainage layout and longitudinal sections, flow schedule with calculations, longitudinal sections of kerb profiles.

29.654 Land Development IV
Prerequisite: 29.653.

29.661 Cadastral Surveying and Land Law I
Prerequisite: 29.660.
The legal system in NSW as it affects the land surveyor. Forms of titles: Old System titles, Torrens titles and Crown lands titles. Land law: legislation, real and personal property, interests and estates in land, riparian rights and conveyancing. The status of roads in NSW. Maritime law. The operation of the cadastral in NSW, an historical introduction, the role of the boundary surveyor and boundary control.

29.662 Cadastral Surveying and Land Law II
Prerequisite: 29.661.
Practical and legal aspects of cadastral surveying in NSW including: survey and title searching; survey investigation; re-determination of
artificial and natural boundaries; related statutes, regulations and case law; the preparation of plans for title surveys; and subdivisions under the Strata Titles Act, 1973 as amended.

29.663 Cadastral Surveying and Land Law III
Prerequisite: 29.662.
The relationship between land information systems, title and deed registration, cadastral surveying and the cadastre. Forms and components of land tenure and cadastral systems. Aspects related to the definition of the cadastre: cadastral mapping, integrated surveys and methods of defining land parcels.

29.664 Modern Title Concepts
Prerequisite: 29.662.

29.700 Professional Orientation
Introduction to the total field of surveying activities and their relationship to associated disciplines. Introduction to geodesy and position fixing from celestial bodies. Map projections and co-ordinates. Introduction to the use of aerial photographs. Maps and aerial photographs and their application to resource surveys. Role of consulting surveyor. Brief introduction to cadastral, engineering and land development surveys. Mining and hydrographic surveys. Includes a visit to several surveying establishments.

29.701 Seminar I
Basic writing and speaking, introduction to the literature of the profession. Oral presentation by individual students on assigned topics in selected areas of surveying.

29.702 Seminar II
Effective writing and speaking, increased emphasis on research of literature. Oral presentation by individual students on assigned topics in selected areas of surveying.

29.703 Seminar III
Effective communication. Technical writing for comprehension. Additional speaking experiences. Invited speakers on current areas of interest in surveying. Student critique of course.

29.704 Management I

29.705 Management II
Prerequisite: 29.704.

29.800 Survey Draughting
Fundamentals of survey draughting. Abbreviations, symbols, sizes of drawing sheets, layout of drawing sheets, lines, letters, numerals, scales, projection and sectioning, dimensioning, architectural drawing, engineering survey and design drawings.

29.801 Cartography I

29.802 Cartography II
Cartographic technology: characteristics of base materials, drawing techniques, scribing techniques, symbol and type preparation, photomechanical methods, screens and masks, colour registration, proofing methods, principles of lithography. Planning, costing and organizing cartographic work.

29.803 Mapping Technology
Prerequisite: 29.512.
Production of base maps from aerial photographs, rectification theory, photographic mosaics, differential rectification and orthophotomaps. Cartographic completion of photomaps. Automation of cartographic processes, data collection and processing, plotting software and hardware, digital terrain models.
Graduate Study

29.101G Aspects of Electromagnetic Distance Measurement SS L2T1 C3

29.102G Characteristics of Optical Surveying Instrumentation SS L2T1 C3
Sources of error in modern optical surveying instruments. Methods of testing and calibration. Observational techniques for reducing effects of errors. Developments in circle reading and level sensing systems. Design of instrument testing facilities.

29.103G Precise Engineering Surveys SS L2T1 C3
Techniques and instrumentation for precise surveys. Applications in industry and engineering: deformation and settlement surveys, surveys for large constructions, optical tooling, special measurement problems.

29.106G Special Topic in Surveying A C3
A special subject to be lectured on by visiting professors or other visiting staff. Details of syllabus and lecturer to be communicated to the Higher Degree Committee on each occasion when the subject runs.

29.107G Special Topic in Surveying B C3
A special subject taken by an individual student or a small group of students by private study in conjunction with tutorial sessions with the member(s) of staff in charge of the subject.

29.151G Adjustment of Observations SS L2T1 C3

29.171G Mathematical Methods I — Numerical Analysis SS L2T1 C3
Topics from real analysis, computational error theory, curve fitting by orthogonal polynomials, trigonometrical and exponential series, time series and quadrature.

29.172G Mathematical Methods II — Statistical Theory of Survey Observations SS L2T1 C3
Advanced application to survey observations of frequency distributions, moments, minimum variance, unbiased estimation, central limit theorem, analysis of variance and statistical testing. Outlying observations.

29.173G Mathematical Methods III — Spherical Harmonics SS L2T1 C3
Two dimensional Fourier Series. Theorems of vector field theory. The solution of Laplace's equation in spherical coordinates. Spherical harmonics.

29.174G Mathematical Methods IV — Theory of Survey Adjustment SS L2T1 C3
Matrices, multivariate normal, distribution of quadratic forms, five standard problems of Tienstra, geometrical interpretation of Least squares adjustment, free net adjustment and generalised matrix algebra. Solution of large sets of equations. Confidence ellipses.

29.175G Mathematical Methods V — Collocation SS L2T1 C3
Fundamental assumptions. The covariance function and its modelling. The solution and theoretical accuracy. Interpolation, filtering, prediction and transformation by collocation. Applications in physical geodesy.

29.201G Geodetic Methods SS L2T1 C3

29.202G Earth and Ocean Dynamics SS L2T1 C3

29.203G Gravimetric Geodesy SS L2T1 C3
29.204G Geodetic Refraction SS L2T1 C3


29.205G Satellite Geodesy SS L2T1 C3


29.206G Advanced Geodetic Instrumentation SS L2T1 C3

Developments in: distance measuring instruments; Strainmeters; Tiltmeters, Optical-angle measurement instruments; Gravity measurements; Gravity gradiometers; Inertial navigation systems; Gravity measurements at sea; Tide gauges; Ocean pressure measurement; Bathymetry; Positioning on deep-ocean floor; Radio Doppler; Satellite laser ranging; global positioning system; Drag-free satellite technology; long base-line microwave interferometry and Satellite altimetry.

29.207G Doppler Positioning SS L2T1 C3

Introduction to Doppler positioning using the NNSS satellite system. The use of point positioning, translocation and short arc techniques. Review of available hardware. Majority voting; general and specialised reduction techniques. Computing techniques associated with the integration of Doppler positions into terrestrial network. Introduction to the Global Positioning System (GPS).

29.314G Geodetic Astronomy SS L3T3 C6


29.516G Mathematical Model of the Imaging Process SS L3T0 C3


29.517G Stereophotogrammetry SS L2T1 C3


29.518G Analytical Photogrammetric Orientation SS L3 C3

Prerequisite: Prior knowledge of FORTRAN computer programming is assumed.


29.519G Photogrammetric Instrumentation SS L2T1 C3


29.520G Photogrammetric Production Processes SS L1½T1½ C3


29.521G Control Extension A SS L3 C3

Prerequisite: 29.517G or consent of the instructor.


29.522G Control Extension B SS L3 C3

Prerequisite: 29.518G.


29.601G Remote Sensing Principles and Procedures S1 L2T1 and S2 L1½T1½ C6

29.602G  Mass Appraisal Methods  SS L2T1 C3


29.603G  Statutory Controls of Land Development  SS L2T1 C3

Detailed examination of the subdivision and development process in N.S.W., with particular emphasis on the statutory procedures and controls at the local government level. The Local Government Appeals Tribunal and its major relevant decisions. Local Government and land development law. Case studies in land development.

29.604G  Land Information Systems  SS L2T1 C3

Land information as maps and records. Methods of data collection. Integrated surveys and coordinate systems. Legal boundaries. Land tenure. Identifiers. Computerisation of land information. Data input methods. Data storage methods. Data processing and manipulation, including management, searching, existing data base languages, and interactive data editing. Data output, including computer graphics, line printer maps, and digital plotters.

29.605G  Ground Investigations for Remote Sensing  S1 L2T1 C3

The spectral, temporal and spatial characteristics of various surfaces, and the available sensors to effect maximum differentiation. Ground and image comparisons. Instruments available for field measurements. Field investigation procedures including positioning and sampling considerations.

29.706G  Survey Management  SS L2T1 C3

Introduction to management accounting. Information systems and accounting, balance sheets, income statements, accounting reports, costing, budgets and capital investment decisions.

29.707G  Quantitative Management Methods  SS L2T1 C3

Detailed analysis of operations research methods and discounted cash flow techniques as they apply to mapping, surveying and development projects. Various case studies and their solutions will be examined.

29.909G  Project  C9

See Section on Graduate Study earlier in this book for details of research areas in the School.

29.918G  Research Project  C18

See Section on Graduate Study earlier in this book for details of research areas in the School.

29.936G  Research Project  C36

See section on 'Graduate Study earlier in this book for details of research areas in the School.

Biomedical Engineering

Graduate Study

32.010G  Biomedical Engineering Practice  S1 L2½ C2

Introduction to clinical situations in hospitals. Presentation of guest lectures by eminent people working in this field. Lecture topics include cardiology, neurology, orthopaedics, rehabilitation, etc. Visits to various biomedical engineering units.

32.012G  Biomedical Statistics  S1 L2½ T1½ C4

Statistical assessment of normal and diseased states. Statistical relationships between multiple variables used to assess disease; analysis of variance, regression, factor analysis, discriminant analysis. Progression of diseases over time. Diagnosis and assessment of treatments. Experimental design and sampling. Computation methods.

32.018G  Research Project  C18

32.020G  Radiation Physics  S2 L2T2 C4

Sources, effects and uses of various types of radiation on human tissues. Ultrasonic, X-ray and nuclear radiations are included together with ultraviolet, infrared, laser, microwave and longer wavelength electromagnetic effects. Precautions in using these radiations are stressed.

32.030G  Research Project  C30

32.101G  Mathematical Modelling for Biomedical Engineers  S1 L3T1 C4

Model formulation and validation, solution of ordinary and partial differential equations by analytical and numerical techniques.
32.311G Mass Transfer in Medicine  
S2 L2T2 C4

Material and energy balances, modelling of intrabody mass transfer, elementary treatment of diffusion, convection, hydraulic permeability and osmosis in biological and synthetic membranes. Applications to hemodialysis, blood oxygenators and artificial livers.

32.321G Fluid Mechanics for Artificial Organs  
S2 L2T2 C4

Fundamentals of biological fluid flow by way of the governing equations. Kinematics and dynamics, viscous and inertial flow, boundary layers, separation, physiological flows (cardiac, vascular, pulmonary, urinary etc.) and flow in artificial organs.

32.331G Biocompatibility  
S2 L2 C2

Interaction of biological fluids and cells with foreign surfaces, in vitro tests to assess biocompatibility and thrombogenicity, current status of biocompatible materials as applied to hemodialysis, hemofiltration, membrane oxygenation and prosthetic devices.

32.500G Computing for Biomedical Engineers  
S1 L2T1 C3

Program design and documentation, printer plotting, computer graphics, editing (XEDIT/MODIFY), KCL and procedure files. Overview of computers in biomedical engineering. Microprocessors and their capabilities. Assessment of hospital computing requirements and evaluation of computer packages.

32.510G Introductory Biomechanics  
S1 L2T1 C3

Replaces 5.490G.

The principles of the mechanics of solid bodies: force systems; kinematics and kinetics of rigid bodies; stress-strain relationships; stress analysis of simple elements.

32.511G Mechanics of the Human Body  
S2 L2T2 C4

Prerequisite: 32.510G or equivalent.

Replaces 5.493G.

Statics and dynamics of the musculoskeletal system: mathematical modelling and computer simulation, analysis of pathological situations.

32.521G Biomechanics of Physical Rehabilitation  
S1 L2T2 C4

Prerequisite: 32.510G or equivalent.

Replaces 5.495G.

The application of biomechanics principles to the areas of: performance testing and assessment, physical therapy, design of rehabilitation equipment, design of internal and external prostheses and orthoses.

32.531G Mechanical Properties of Biomaterials  
S1 L2T2 C4

Prerequisite: 32.510G or equivalent.

Replaces 5.494G.

The physical properties of materials having significance to biomedical engineering: human tissues; skin; soft tissues; bone; metals; polymers and ceramics: the effects of degradation and corrosion.

32.611G Medical Instrumentation  
S2 L2T1 C3

Prerequisite: 6.651 or equivalent.

A critical survey of the theory and practical applications of medical transducers and electromedical equipment in common use in hospitals and research laboratories.

32.621G Biological Signal Analysis  
S1 L3 C3

Digital computer methods of extracting information from biological signals using filtering and averaging, expectation density functions, correlation functions, spectral analysis and other techniques. Methods of constructing models of biological systems.

32.701G Dynamics of the Cardiovascular System  
S1 L2T1 C3

Structure of the heart; organization of the mammalian vasculature; mechanical, electrical and metabolic aspects of cardiac pumping, the fluid mechanics of blood vessels.

Town Planning

Undergraduate Study

36.411 Town Planning  
S1 L2T1

Introduction to the purpose, scope and application of planning.

The urban planning process. Objectives and means of planning cities. Levels of planning and types of plans: state environmental policies,

Chemical Engineering and Industrial Chemistry

Undergraduate Study

48.302 Fuels and Energy S2 L3 T1
A servicing subject for students in Electrical Engineering which deals with sources and properties of fuels (with particular emphasis on coal, crude oil and natural gas), principles of combustion including combustion calculations and the technology of boilers and other fuel plant. A variety of alternative energy sources are discussed and the national and global energy situation reviewed.

Biotechnology

Graduate Study

42.211G Principles of Biology S1 L3 C3
Characteristics of living systems, including a functional treatment of cytology, metabolism, bioenergetics, structure, function and characteristics of single and multicellular systems; growth; cell division; reproduction; heredity and evolution.

42.212G Principles of Biochemistry S1 L3 C3
A condensed treatment of biochemistry comprising the following aspects: the elemental and molecular composition of living organisms; the chemistry and roles of the biological elements and molecules; the thermodynamics and enzymatic catalysis of metabolism; catabolic, anabolic, amphibolic and anaplerotic processes, with emphasis on hydrolysis and synthesis of polymers, glycolysis and gluconeogenesis of glucose, β-oxidation and synthesis of fatty acids, deamination and decarboxylation of amino acids, the tricarboxylic acid cycle, electron transport and oxidative phosphorylation; metabolic regulation and integration.

42.214G Biotechnology S2 L2T1
The selection, maintenance and genetics of industrial organisms; metabolic control of microbial synthesis, fermentation kinetics and models of growth; batch and continuous culture; problems of scale-up and fermentor design; control of the microbial environment, computer/fermentor interactions. Industrial examples will be selected from: antibiotic and enzyme production, alcoholic beverages, single cell protein (SCP), microbial waste disposal and bacterial leaching.

Tutorial/practical sessions include: problem solving, instrumentation, continuous culture techniques, and mathematical modelling and simulation of industrial processes.

Anatomy

Undergraduate Study

70.011C Introductory Anatomy S1 L2T4 C6
Introduction to gross anatomy, based on a study of dissected specimens. Musculoskeletal, cardiovascular, respiratory, gastrointestinal, genito-urinary and nervous systems. General topographical and surface anatomy. Normal variations including those related to sex and age (childhood, adolescence, maturity and senescence).

70.306 Functional Anatomy I S1 L2T4
Prerequisites: 70.011A, 70.011C.
Introduces fundamental issues in the morphology and dynamics of human movement systems, including physical properties of bone, muscle and connective tissue; biomechanics, movement analysis and neuromuscular control. These basic principles are applied to a detailed study of musculoskeletal components of head and neck and upper limb. Emphasis on modern analytical techniques and findings. Tutorials include detailed limb and joint dissections plus intensive study of surface and radiological anatomy.
Pathology

Graduate Study

72.402G Principles of Disease Processes S1 L3 C3

Prerequisite: 73.111 or equivalent, 70.011C or equivalent.

For MBiomedE students only.

The reaction of cells to injury, the inflammatory reaction; necrosis-vascular changes and infarction; reparative processes; fracture healing; neoplasia; reaction to implants; specific processes requiring prosthetic assistance.

Physiology and Pharmacology

Undergraduate Study

73.111 Physiology 1A F L2T4 C12

Introduction to fundamental physiological principles — basic cellular function in terms of chemical and physical principles, and operation of the various specialized systems in the body: for example, the cardiovascular system, the respiratory system, the gastrointestinal system, the kidney, the endocrine system and the nervous system.

Division of Postgraduate Extension Studies

Graduate Study

97.001G Linguistics and Written and Spoken Communication S1 L2T1 C2

The course covers important aspects of recent work in the study of language, including the theory of linguistic structures, speech and language processes in the human body, and language in society.

De Saussure revisited; language in the human body: the speaker; language in the human body: the hearer; writing and speaking; the Chomskian revolution; the aftermath; language in society; variation theory; language learning; language planning; lexicography today; the history of linguistics.

The course is designed to increase understanding of the nature of communication and of the ways in which various aspects of language contribute to the expression of our meanings. It also offers guidance on the collection of data and its presentation either through speech in lectures and talks or through writing in reports and articles.

97.002G Basic Information Theory F L1T2 C6


97.003G Human Transinformation F L1T2 C6

Review of transfer functions, feedback and statistical tests. Measurement of information and coding, entropy, codes and relevant coding theorems. Human information source and sink characteristics, language, Markov and Zipf, transinformation models of ear and eye. The channel, Baye’s theorem, entropy and equivocation in human context. Multivariate systems in the human group context, stochastic model in the time domain.

97.004G The Psychology of Communication S1 L2T1 C3

The basic communication process analysed in terms of Source, Medium/Message, Respondent and Effects. A social context theory of communication relating the influence of groups, roles, social class, power, status etc on communication. Attitude change through communication. Statistics and statistical analyses in the experimental study of communication.

97.005G Audio and Video Equipment — Capabilities and Applications S2 L2T2 C4

Aims to give an understanding of the characteristics of equipment used in sound recording and broadcasting, television and printing with some reference to mechanical detail. Topics: audio systems; testing of audio equipment; microphones and loudspeakers, amplifiers; sound transmission; level control, recording and reproduction; studio acoustics; sound mixing; editing and effects. Television scanning, television signals, camera tubes and cameras; television receivers and picture monitors; basic concepts of colour television; the PAL colour television system; switching, mixing and processing of television signals; lighting equipment; studio floor equipment, digital signal processing equipment. Printing processes; letterpress, gravure and lithography. Photography.

97.007G Audio and Video Signals in Communication S1 L1T2 C3


97.008G The Body in Communication S2 L1T2 C2

97.010G Basic Fortran F L1 C2
Introduction to computer programming using FORTRAN and BASIC for people with no computer experience and no mathematical training beyond High School mathematics. Practice at programming and debugging, with problems taken from both data processing and scientific applications. Input and Output FORMAT statements; Nested DO loops; Arithmetic statement functions; Matrix arrays; Implied DO loops; Function subprograms and subroutine programs; Sorting and merging techniques; Common Storage; Communicating with peripherals of microcomputer; program planning and debugging.

97.012G Project S2 T5 C5

97.013G Presentation of Information S1 L1T2 C3

97.014G Thesis F C18

97.015G Programming in Basic S1 L1T2 C2
A brief introduction to programming, programming in BASIC on common microcomputers and Cyber 171, definition of programming problems using flowcharts, error diagnosis and debugging techniques, tab function, nested subroutines and FOR NEXT loops, sorting and comparison of strings and arrays, operations on 2-dimensional arrays, plotting, memory limitations.

97.031G Linguistics and Written and Spoken Communication C1
As for 97.001G (lectures only).

97.032G Basic Information Theory C1
As for 97.002G (lectures only).

97.034G Psychology of Communication C2
As for 97.004G (lectures only).

97.035G Audio Video Equipment C2
As for 97.0075 (lectures only).

97.037G Audio Video Signals in Communication C1
As for 97.007G (lectures only).

97.038G The Body in Communication C1
As for 97.008G (lectures only).

97.043G Presentation of Information C1
As for 97.013G (lectures only).

97.046G Introduction to Microprocessor Systems C2
Review of semiconductor technologies and their development. Digital logic and integrated circuit devices. Codes. Microprocessors and their bus signals. Fundamental computer cycles and internal operations. Programmer's model of a microcomputer system. Instruction sets and simple machine language programs. Semiconductor memory devices and their interfacing. Interfacing and programming of serial and parallel input. Output devices and the connection of a variety of special purpose functions to these, such as displays, analog converters, etc. Description of software development tools including monitors, assemblers, EPROM programmers and higher level languages. An overview of magnetic tape recording, floppy disks, cathode ray tube raster scan displays and keyboards.

97.345G Active and Adaptive Circuits C3
Financial Assistance to Students

The scholarships and prizes listed below are available to students whose courses are listed in this handbook. Each faculty handbook contains in its Financial Assistance to Students section the prizes and scholarships available within that faculty. The General Information section of the Calendar contains a comprehensive list of scholarships and prizes offered throughout the University.

Scholarships

Undergraduate Scholarships

As well as the assistance mentioned earlier in this Handbook (see General Information: Financial Assistance to Students), there are a number of scholarships available to students. What follows is an outline only. Full information may be obtained from Room G20, located on the Ground Floor of the Chancellery.

Unless otherwise indicated in footnotes, applications for the following scholarships should be made to the Registrar by 14 January each year. Please note that not all of these awards are available every year.

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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</thead>
<tbody>
<tr>
<td>Bursary Endowment Board*</td>
<td>$150 pa</td>
<td>Minimum period of approved degree/combined degree course</td>
<td>Merit in HSC and total family income not exceeding $4000</td>
</tr>
</tbody>
</table>

*Apply to The Secretary, Bursary Endowment Board, PO Box 460, North Sydney 2060 immediately after sitting for HSC.
### Undergraduate Scholarships (continued)

<table>
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<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>General (continued)</strong></td>
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<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need</td>
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<tr>
<td>Girls' Realm Guild</td>
<td>Up to $1500 pa</td>
<td>1 year renewable for the duration of the course subject to satisfactory progress and continued demonstration of need</td>
<td>Available only to female students under 35 years of age enrolling in any year of a full-time undergraduate course on the basis of academic merit and financial need</td>
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</table>

### Engineering

**Electrical Engineering**
- **The Tyree Electrical Company Pty Ltd**
  - Up to $6370 over 4 years
  - 1 year renewable for the duration of the course, subject to satisfactory progress
  - Eligibility for admission to the full-time degree course in Electrical Engineering

**Mechanical Engineering**
- **The Fox Manufacturing Company**
  - Up to $1500 pa
  - 1 year renewable for the duration of the course, subject to satisfactory progress
  - Eligibility for admission to the full-time degree course in Mechanical Engineering

- **James Howden & Co Australia Pty Ltd**
  - Up to $400 pa
  - 1 year
  - Permanent residence in Australia and eligibility for admission to the full-time degree course in Mechanical Engineering

**Surveying**
- **The Institution of Surveyors, NSW Division**
  - Under review. Further details from Student Records and Scholarships Office.
  - Permanent residence in Australia and eligibility for admission to the full-time degree course in Surveying
# Graduate Scholarships

Application forms and further information are available from the Student Records, located on the Ground Floor of the Chancellery. Information is available on additional scholarships which may become available from time to time, mainly from funds provided by organizations sponsoring research projects.

<table>
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<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
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<tbody>
<tr>
<td><strong>University of New South Wales</strong></td>
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<tr>
<td>Postgraduate Scholarships</td>
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<tr>
<td><strong>Commonwealth Postgraduate Research Awards</strong></td>
<td>Living allowance of $4620 pa. Other</td>
<td>1-2 years for a Masters and 3-4</td>
<td>Applicants must be honours graduates (or equivalent). Applications to Registrar by 31 October (30 November in special circumstances).</td>
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<tr>
<td></td>
<td>allowances may also be paid.</td>
<td>years for a PhD degree</td>
<td></td>
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<tr>
<td><strong>Commonwealth Postgraduate Course Awards</strong></td>
<td></td>
<td>1-2 years; minimum duration of</td>
<td>Preference is given to applicants with employment experience. Applicants must be graduates or scholars who will graduate in the current academic year, and who have not previously held a Commonwealth Postgraduate Award. Applications to Registrar by 30 September (in special circumstances applications will be accepted until 30 November).</td>
</tr>
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<td></td>
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<td>course</td>
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<tr>
<td><strong>Australian-American Educational Foundation Travel Grant</strong></td>
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<td>Applicants must be graduates, senior scholars or post-doctoral Fellows. Applications close 30 September.</td>
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<tr>
<td><strong>Australian Federation of University Women</strong></td>
<td>Amount varies, depending on award</td>
<td>Up to 1 year</td>
<td>Applicants must be female graduates who are members of the Australian Federation of University Women</td>
</tr>
</tbody>
</table>

*Application forms are available from The Secretary, Department of Education, AAEF Travel Grants, PO Box 826, Woden, ACT 2606.*
### Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>The British Council Academic Links and Interchange Scheme†</td>
<td>Cost of travel to UK</td>
<td></td>
<td>Applicants must be either senior or junior academic staff. Preference will be given to activities likely to lead to further collaboration through joint research, publication, and/or teaching programs. Applications may be made at any time and should be submitted to the Registrar.</td>
</tr>
<tr>
<td>The Caltex Woman Graduate of the Year</td>
<td>$5000 pa for further studies in USA, UK, Northern Europe or in special cases Australia. There are no special allowances for travel or accommodation for married graduates.</td>
<td>2 years</td>
<td>Applicants must be female graduates who will have completed a University degree or diploma this year and who are Australian citizens or have resided in Australia for at least seven years. Selection is based on scholastic and literary achievements, demonstrable qualities of character, and accomplishments in cultural and/or sporting/recreational activities.</td>
</tr>
<tr>
<td>Commonwealth Scholarship and Fellowship Plan</td>
<td>Varies for each country. Generally covers travel, living, tuition fees, books and equipment, approved medical expenses. Marriage allowance may be payable.</td>
<td>Usually 2 years, sometimes 3</td>
<td>Applicants must be graduates who are Commonwealth citizens or British Protected Persons, and who are not older than 35 years of age. Applications close with Registrar by 1 October.</td>
</tr>
<tr>
<td>Sam Cracknell Memorial</td>
<td>Up to $3000 pa payable in fortnightly instalments</td>
<td>1 year</td>
<td>Prior completion of at least 2 years of a degree or diploma course and enrolment in a full-time course during the year of application; academic merit; participation in sport both directly and administratively; and financial need.</td>
</tr>
<tr>
<td>The English-Speaking Union (NSW Branch)</td>
<td>$5000</td>
<td></td>
<td>Applicants must be residents of NSW or ACT. Awarded to young graduates to further their studies outside Australia.</td>
</tr>
<tr>
<td>Gowrie Scholarship Trust Fund</td>
<td>Maximum $2000 pa in Australia, and $2750 if tenable overseas</td>
<td>2 years</td>
<td>Applicants must be members of the Forces or children of members of the Forces who were on active service during the 1939-45 War.</td>
</tr>
</tbody>
</table>

†Application forms available from The British Council, PO Box 88, Edgecliff, NSW 2077.
### Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Harkness Fellowships of the Commonwealth Fund of New York*</td>
<td>Living and travel allowances, tuition and research expenses, health insurance, book and equipment and other allowances for travel and study in the USA</td>
<td>12-21 months</td>
<td>Candidates must be either: 1. Members of the Australian or a State Public Service or semi-government Authority. 2. Staff or graduate students at an Australian university. 3. Individuals recommended for nomination by the Local Correspondents. The candidate will usually have an honours degree or equivalent, or an outstanding record of achievement, and be not more than 36 years of age. Applications close July.</td>
</tr>
<tr>
<td>Frank Knox Memorial Fellowships at Harvard University</td>
<td>Stipend of $4000 pa plus tuition fees</td>
<td>1, sometimes 2 years</td>
<td>Applicants must be British subjects and Australian citizens, who are graduates or near graduates of an Australian University.</td>
</tr>
<tr>
<td>Nuffield Foundation Commonwealth Travelling Fellowships†</td>
<td>Living and travel allowances</td>
<td>1 year</td>
<td>Australian citizens usually between 25 and 35 who are graduates preferably with higher degrees and who have at least a year's teaching or research experience at a university. Applications close by February.</td>
</tr>
<tr>
<td>The Rhodes Scholarship**</td>
<td>Approximately £4000 stg pa</td>
<td>2 years, may be extended for a third year</td>
<td>Unmarried male and female Australian citizens, between the ages 19 and 25 who have been domiciled in Australia at least 5 years and have completed at least 2 years of an approved university course. Applications close in early September each year.</td>
</tr>
<tr>
<td>Rothmans Fellowships Award‡</td>
<td>$14000 pa</td>
<td>1 year, renewable up to 3 years</td>
<td>The field of study is unrestricted. Applications close early September each year.</td>
</tr>
</tbody>
</table>

*Application forms must be obtained from the Australian representative of the Fund, Mr L. T. Hinde, Reserve Bank of Australia, Box 3947, GPO, Sydney, NSW 2001. These must be submitted to the Registrar by 24 July.

**Applications to Mr H. McCredie, Secretary of the NSW Committee, University of Sydney, NSW 2006.

†Applications to the Secretary, The Nuffield Foundation Australian Advisory Committee, PO Box 783, Canberra City 2601.

‡Applications to The Secretary, Rothmans University Endowment Fund, University of Sydney, NSW 2006.
## Graduate Scholarships (continued)

<table>
<thead>
<tr>
<th>Donor</th>
<th>Value</th>
<th>Year/s of Tenure</th>
<th>Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harold G. Conde Memorial Fellowship</td>
<td>$5120 plus allowances</td>
<td>1 year. Renewable</td>
<td>Applicants should be honours graduates permanently domiciled in Australia. The Fellowship is for graduate study or research in a field related to the electricity industry.</td>
</tr>
<tr>
<td>University Fellowships in Highway Engineering</td>
<td>$4620 pa plus allowances</td>
<td>Course Work: 1 year Research: 1 year, renewable</td>
<td>The Fellowship enables scholars to complete a Master of Engineering Science Course in Highway Engineering, or alternatively undertake research leading to a Master of Engineering or PhD degree.</td>
</tr>
<tr>
<td>Australian Institute of Nuclear Science and Engineering Studentships</td>
<td>Single students $5105 pa</td>
<td>1-3 years</td>
<td>Applicants must be graduates in Nuclear Science or Engineering. At least one quarter of the period of tenure must be spent at the Institute at Lucas Heights, NSW.</td>
</tr>
<tr>
<td></td>
<td>Dependent spouse allowance $2220 pa, $520 for each dependent child, plus some University expenses</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Institute of Nuclear Science and Engineering Research Fellowship†</td>
<td>$15000-$19000 pa plus certain travel and supporting grants</td>
<td>Minimum of 2 years. Maximum of 3 years</td>
<td>To enable graduates holding a PhD degree or similar qualification to undertake graduate work in Nuclear Science and Engineering.</td>
</tr>
<tr>
<td>The Joseph Barling Fellowship</td>
<td>Not less than $10000 less fees</td>
<td>Maximum of 3 years</td>
<td>Candidates should be electrical engineering graduates of the University of New South Wales (in special circumstances mechanical and industrial engineering graduates may apply). The Fellowship is for full-time study for the award of the degree of Master of Business Administration, Master of Public Administration or Doctor of Philosophy at the University. Applications close 30 November.</td>
</tr>
<tr>
<td>Shell Scholarship in Science or Engineering</td>
<td>Approximately £4000 stg pa plus travelling expenses</td>
<td>2 years, sometimes 3</td>
<td>Applicants must be unmarried, male, Australian citizens, under 25 years of age, with at least 5 years, domicile in Australia and who are completing the requirements for an honours degree in Science or Engineering. The successful candidate will undertake 2 years' graduate study towards the award of a higher degree at a British university.</td>
</tr>
</tbody>
</table>

†Applications to The Registrar, or AINSE Private Mail Bag, Sutherland 2232.
Prizes

Undergraduate University Prizes

Prizes which are not specific to any School are listed under General. All other prizes are listed under the Faculty or Schools in which they are awarded. Information regarding the establishment of new prizes may be obtained from the Examinations Section located on the Ground Floor of the Chancellery.

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>General</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sydney Technical College Union Award</td>
<td>50.00</td>
<td>Leadership in the development of student affairs, and academic proficiency</td>
</tr>
<tr>
<td></td>
<td></td>
<td>throughout the course</td>
</tr>
<tr>
<td>University of New South Wales Alumni Association</td>
<td></td>
<td>Statuette</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Achievement for community benefit — students in their final or graduating</td>
</tr>
<tr>
<td></td>
<td></td>
<td>year</td>
</tr>
<tr>
<td><strong>Faculty of Engineering and Applied Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institution of Engineers, Australia</td>
<td>Medal and 100.00</td>
<td>The most proficient final year (or last 2 years part-time) student in the Bachelor of Engineering (or Bachelor of Science (Engineering)) Degree courses offered by the following Schools: Civil Engineering Electrical Engineering Mechanical and Industrial Engineering Chemical Engineering Mining Engineering Textile Technology (Engineering option only)</td>
</tr>
<tr>
<td>The John Fraser Memorial Award</td>
<td>130.00</td>
<td>Excellence in the first year or equivalent part-time years of a bachelor's degree course offered by the Faculty of Engineering</td>
</tr>
<tr>
<td><strong>School of Civil Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Australian Conservation Foundation</td>
<td>50.00</td>
<td>Outstanding performance in subjects which develop environmental management concepts</td>
</tr>
<tr>
<td>Australian Welding Institute</td>
<td>30.00</td>
<td>Best design using a welding process for students in Years 2, 3 or 4</td>
</tr>
</tbody>
</table>
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Civil Engineering (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The Association of Consulting Structural Engineers of New South Wales</td>
<td>100.00</td>
<td>General proficiency — Structures in the Bachelor of Engineering degree course in Civil Engineering</td>
</tr>
<tr>
<td>BMI Ltd Systems Engineering</td>
<td>50.00</td>
<td>8.301 Systems Engineering</td>
</tr>
<tr>
<td>Chamber of Manufacturers of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Crawford Munro Memorial</td>
<td>150.00</td>
<td>Highest proficiency in 8.582 Water Resources II taken for the first time</td>
</tr>
<tr>
<td>Department of Civil Engineering Materials Staff</td>
<td>50.00</td>
<td>Best aggregate mark in the subjects 8.273 Civil Engineering Materials II and 8.274 Civil Engineering Materials III</td>
</tr>
<tr>
<td>Dillingham Australia Pty Ltd</td>
<td>100.00</td>
<td>Academic and professional excellence shown in the field of Construction Estimating</td>
</tr>
<tr>
<td>Hornibrook</td>
<td>100.00</td>
<td>Proficiency in Engineering Construction and Management</td>
</tr>
<tr>
<td>James Hardie Co Pty Ltd</td>
<td>100.00</td>
<td>Highest proficiency in 8.571 Hydraulics I taken for the first time</td>
</tr>
</tbody>
</table>
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Civil Engineering (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural Bank of NSW</td>
<td>50.00</td>
<td>Outstanding performance in 8.673 Planning and Management II</td>
</tr>
<tr>
<td>Water Board Gold Medal</td>
<td>Medal</td>
<td>Public Health Engineering</td>
</tr>
<tr>
<td><strong>School of Electrical Engineering and Computer Science</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austral Crane</td>
<td>37.50</td>
<td>Bachelor of Engineering degree course in Electrical Engineering, Year III</td>
</tr>
<tr>
<td></td>
<td>37.50</td>
<td>Power or Control elective</td>
</tr>
<tr>
<td>Chamber of Manufacturers of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Electricity Supply Engineers Association of New South Wales</td>
<td>40.00</td>
<td>Overall performance including proficiency in Electric Power Distribution in third year full-time or equivalent part-time degree course.</td>
</tr>
<tr>
<td>J. Douglas Maclurcan</td>
<td>40.00</td>
<td>Control Systems</td>
</tr>
<tr>
<td></td>
<td>book</td>
<td></td>
</tr>
<tr>
<td></td>
<td>order</td>
<td></td>
</tr>
<tr>
<td>The Wilfred Holmes Memorial Award</td>
<td>120.00</td>
<td>A student eligible to enter the final year of the degree course and who is deemed to be in necessitous circumstances</td>
</tr>
<tr>
<td><strong>School of Mechanical and Industrial Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlas Copco</td>
<td>100.00</td>
<td>General proficiency in Bachelor of Engineering course in Mechanical Engineering</td>
</tr>
</tbody>
</table>
## Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Mechanical and Industrial Engineering (continued)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austral Crane</td>
<td>75.00</td>
<td>Full-time Year III Mechanical Engineering</td>
</tr>
<tr>
<td>Babcock Aust Ltd</td>
<td>30.00</td>
<td></td>
</tr>
<tr>
<td>Chamber of Manufacturers of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>CSR Limited</td>
<td>50.00</td>
<td></td>
</tr>
<tr>
<td>Ford Motor Co of Aust Ltd</td>
<td>75.00</td>
<td></td>
</tr>
<tr>
<td>David Carment Memorial</td>
<td>350.00 and medal</td>
<td>Highest proficiency in final year of Naval Architecture course</td>
</tr>
<tr>
<td>The Computer-Based Engineering Design</td>
<td>75.00</td>
<td>Best undergraduate or graduate thesis making a contribution to Computer-Based Engineering Design in the School of Mechanical and Industrial Engineering</td>
</tr>
<tr>
<td>Harbin Polytechnical Alumni Association</td>
<td>100.00</td>
<td>Subject selected by Head of School</td>
</tr>
<tr>
<td>Jeremy Hirschhorn</td>
<td>20.00</td>
<td>Theory of Machines</td>
</tr>
<tr>
<td>Royal Institution of Naval Architects</td>
<td>50.00</td>
<td>Bachelor of Engineering or Bachelor of Science (Engineering) degree course in Naval Architecture, final year or stage</td>
</tr>
<tr>
<td>Staedtler (Pacific) Pty Ltd</td>
<td>100.00 (open order)</td>
<td>General proficiency in Bachelor of Engineering Course in Mechanical Engineering, Year II</td>
</tr>
<tr>
<td><strong>Department of Industrial Engineering</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Austral Crane</td>
<td>75.00</td>
<td>Bachelor of Engineering degree course in Industrial Engineering, Year 3</td>
</tr>
<tr>
<td>Chamber of Manufactures of New South Wales</td>
<td>15.00</td>
<td>Subject selected by Head of School</td>
</tr>
</tbody>
</table>

164
### Undergraduate University Prizes (continued)

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>R. E. Jefferies Memorial</td>
<td>250.00</td>
<td>Performance in final year/stage of Bachelor of Engineering degree course in Industrial Engineering</td>
</tr>
<tr>
<td>TRW Australia Ltd</td>
<td>20.00</td>
<td>Bachelor of Science (Engineering) degree course in Industrial Engineering, Stage 6</td>
</tr>
</tbody>
</table>

### School of Surveying

<table>
<thead>
<tr>
<th>Prize</th>
<th>Value</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Board of Surveyors Medal</td>
<td>Medal</td>
<td>Bachelor of Surveying degree course, Final Year</td>
</tr>
<tr>
<td>R. S. Mather Memorial</td>
<td>75.00</td>
<td>Most outstanding student in Geodesy</td>
</tr>
</tbody>
</table>

### Graduate University Prizes

#### School of Civil Engineering

<table>
<thead>
<tr>
<th>Donor/Name of Prize</th>
<th>Value $</th>
<th>Awarded for</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institute of Advanced Motorists</td>
<td>20.00</td>
<td>Traffic Planning and Control</td>
</tr>
<tr>
<td>Wabco Aust Pty Ltd</td>
<td>400.00</td>
<td>Most distinguished graduate in the Master of Engineering Science degree course in Highway Engineering</td>
</tr>
</tbody>
</table>
Faculty of Engineering

Staff

Comprises Schools of Civil Engineering, Electrical Engineering and Computer Science, Mechanical and Industrial Engineering, Nuclear Engineering, and Surveying; and Centre for Biomedical Engineering.

Dean
Professor N. L. Svensson

Chairman
Associate Professor C. A. Stapleton

Executive Assistant to Dean
H. Harrison

Professor of Transport Engineering
Vacant

Professor of Civil Engineering
Harold Rupert Vailentine, BE Syd., MS Iowa, ASTC, FIEAust

Professor of Civil Engineering and Head of Department of Water Engineering
Thomas Grandin Chapman, BSc Leeds, PhD S’ton., FIEAust, MACS

Executive Assistant to Head of School
Dr J. J. Somervaille

Senior Administrative Officer
Robert William Prior

Honorary Visiting Professor
James Macquarie Antill, BE Syd., ME N.S.W., FIEAust, FI Arb, FI Arb A, AMAusIMM

Honorary Associates
Desmond Ford Glynn, BCE Melb., MIEAust, MASCE
Alexander Wargon, MSc Harv., CE, FIEAust, FASCE, MNZIE

School of Civil Engineering

Professor of Civil Engineering, Head of School and of Department of Engineering Construction and Management
Ronald William Woodhead, BE Syd., ME N.S.W., FIEAust, FAIB, MASCE, MAIC, MIQ

Professor of Civil Engineering and Head of Department of Civil Engineering Materials
Ian Kenneth Lee, BCE MEngSc PhD Melb., FIEAust, MASCE

Professor of Civil Engineering and Head of Department of Structural Engineering
Hilary Max Irvine, ME Cant., CE Caltech., PhD Auck., MNZIE

Professor of Civil Engineering and Head of Department of Civil Engineering Materials

Department of Civil Engineering Materials

Includes Soil Mechanics, Rock Mechanics, Concrete Technology, Plastics and Timber, Pavement Engineering, Continuum and Statistical Mechanics, Metals and Welding Technology.
Associate Professors
Owen Graeme Ingles, BA MSc Tas., CEng, CChem, FRIC, MIEAust, MinstF
Somusundaram Valliappan, BE Annam., MS Northeastern, PhD Wales, MASCE
Geoffrey Baldwin Welch, BE Syd., ME N.S.W., CEng, MICE, FIIEAust

Senior Lecturers
William Henry Cogill, MSci(Eng) Cape T., MSc Camb., PhD N.S.W., FIIEAust, MICE
David John Cook, BE W.Aust., MSci PhD Calg., MIEAust
Bruce John Francis Patten, BE, PhD N.S.W., DIC Lond.
Brian Shackel, BE Sheff., MEngSc PhD N.S.W., MIEAust, MASCE
John Maurice Wheatley, MA PhD Camb., CEng, FI.M, FausWI, MWeldl (Lond)
William Otho Yandell, ME PhD N.S.W., MIEAust

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Arthur William Manton-Hall, BE MEngSc N.S.W., MIEAust
Harry Taylor, BSc(Eng) Birm., DipNAAC Syd.
Weeks White, BSc BE Syd., MIEAust
Stephen Ross Yeomans, BSc PhD N.S.W., CEng, MIM

Professional Officers
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Nam Lim, BE Hanyang, MSc N.S.W.
Ghodratollah Tameddoni, BEngAg Tehran, DrAgSc Gembloux

Analyst/Programmer
Damian McGuckin, BSc BE Syd

Department of Structural Engineering


Associate Professors
Horace Joseph Brettle, BE Syd., PhD N.S.W., DIC, ASTC, FIIEAust
Robert Alexander Frisch-Fay, DiplEng Bud., ME N.S.W., MIEAust
Algis Peter Kabaila, MEngSc PhD N.S.W., FRMTC, MIEAust, MASCE
Victor Andrada Pulmano, BScCE Philippines, MEng A.I.T. PhD Northwestern
B. Vijaya Rangan, BE Madr., PhD I.I.S. B'lore., MASCE, MIEAust, MEIndia
Rupert Whitfield Trail-Nash, BE W.Aust., PhD Brist., CEng, MIEAust, MRAeS

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Peter Stephen Balint, DiplEng Bud., ME N.S.W., MIEAust
Donald John Fraser, MEngSc PhD N.S.W., ASTC
Alexander Cuthbert Heaney, BE MEngSc Melb., PhD Wat., MIEAust, MASCE, AMICE
Peter Walder Kneen, BE Melb., PhD Wat., MIEAust, IASS
Ian James Somervaille, BE PhD N.S.W., ASTC

Lecturers
Raymond Ian Gilbert, BE PhD N.S.W., MIEAust
Raymond Eric Lawther, BE PhD N.S.W.

Tutor
Maurice Delahaye Attard, BE N.S.W.

Professional Officer
John Wesley Carrick, BE N.S.W.
Department of Water Engineering


Associate Professors
Ian Cordery, ME PhD N.S.W., MIEAust
Douglas Neil Foster, BE Syd., MIEAust
Bernard William Gould, BE Tas., ME N.S.W., MIEAust
David Trehella Howell, BE Syd., ME N.S.W., MIEAust, MAIAS
David Herbert Pilgrim, BE PhD N.S.W., FIEAust
Keith Kingsford Watson, BE Syd., ME PhD DSc N.S.W., FIEAust

Senior Lecturers
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Peter John Bliss, BE N.S.W., MSc Lond., DIC, ASTC, MIEAust
Colin Raymond Dudgeon, ME N.S.W., MIEAust, MASCE
Trevor Regis Fietz, ME N.S.W.
John Robert Learmonth, BE Syd., ME N.S.W.
David Keith Robinson, BSc BE PhD N.S.W., MIEAust, MACS
David Lyon Wilkinson, BE Syd., PhD N.S.W., MIEAust

Lecturer
Michael Clarence Dunne, BSc PhD Adel.

Professional Officers
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Clement Edward Quintlan, GradDip N.S.W., ASTC, MIEAust
Andrzej Waldemar Raczkowski, Mgrinz T.U. Warsaw, MIEAust
Colin John Wingrove, BSc MEngSc N.S.W.

School of Electrical Engineering and Computer Science

Professor of Electrical Engineering – Systems and Control and Head of School
Neville Waller Rees, BSc PhD Wades, FIEAust

Professor of Electrical Engineering – Communications
Antoni Emil Karbcwiak, DSc(Eng) Lond., CEng, FIEAust, FTS, FIREE, MIEE, SMIEEE

Professor of Computer Science
Murray William Allen, BE Adel., PhD Syd., CEng, FIREE, MIEE, SMIEEE

Tyree Professor of Electrical Engineering – Electric Power Engineering
Frederic John Evans, BSc BE Syd., Hon. DSc Liège, CEng, SMIEEE, FIEE, FIEAust

Visiting Professor – Solid State Electronics
Louis Walter Davies, AO, BSc Syd., DPhil Oxf., FTS, SMIEEE, FinstP, FAIP, FIREE, FAA

Professor of Electrical Engineering – Electronics
Vacant

Professor of Electrical Engineering
Vacant

Executive Assistant to Head of School
Colin Arthur Stapleton, BSc BE Syd., CEng, MIEAust, MIEE, SMIEEE

Senior Administrative Officer
Halsey George Phillips
Staff: Engineering

Administrative Assistant
Robyn Christine Horwood, BA DipEd N.S.W.

Tutors
Bruce Richard Clarke, BE N.S.W.
Michael Ian Jones, BE N.S.W.
Nasaat Mansour, BE N.S.W.
David Russell Milway, BSc BE N.S.W.
Peter John Samson, BE N.S.W.
Rodney John Savage, BE Darling Downs I.A.E.,
DipEd Kuring-gai C.A.E., MIEEE
Geoffrey Robert Whale, BE N.S.W.

Professional Officers
Peter Ivanov, BSc MEngSc N.S.W.
Jeffrey Stanley Skebe, BS Case W.R., MEngSc N.S.W.

Analyst/Programmer
Kevin Frank Hill, BE N.S.W.

Department of Computer Science

Associate Professors
Alan Dunworth, BSc PhD Manc., SMIEEE, FIEEE
John Lions, BSc Syd., PhD Camb., MACS

Senior Lecturers
Graham Barry McMahon, BSc Syd., PhD N.S.W., MACS, MACM, MASOR
Peter Clive Maxwell, MSc Auck., PhD A.N.U., MIEEE
Kenneth Arthur Robinson, BSc BE Syd.

Lecturers
Paul William Baker, BE PhD N.S.W.
David Athol Carrington, BSc N.S.W.
Ian James Hayes, BSc N.S.W.
Graham Reginald Hellestrand, BSc N.S.W.
Leslie Charles Hill, BE N.S.W., MIEAust
Philip George McCrae, BE PhD N.S.W.
Jeffrey Michael Tobias, BSc N.S.W.

Professional Officers
Serge Poplavsky, DipIng Bratislava, ME N.S.W.
Keith William Tilmuss, BSc(Tech) MEngSc N.S.W.

Department of Communications

Associate Professors
Warwick Harvey Holmes, BSc BE MEngSc Syd., PhD Camb.,
SMIEEE, MIEEE, MAES
The Bao Vu, BE PhD Adel., SMIEEE

Senior Lecturers
Pak Lim Chu, ME PhD N.S.W., MIEEE
Edward Henry Fooks, BSc PhD Lond., CEng, MIEEE, MIEEE
Thomas Leslie Hooper, BSc Syd., MSc N.S.W., CEng,
MIEEE, MIEEE, MIEEE
Israel Korn, MSc DSc Technion, Haifa, SMIEEE
Christopher John Elliott Phillips, BSc BE PhD Syd., CEng, MIEEE, MIEEE, MИIEEE
Robert Radzyner, BE MEng., MEngSc PhD N.S.W., SMIEEE,
MIEEE, MIEEE
Ramauls Anthony Zakarevicius, BSc BE MEngSc PhD Syd.,
MIEAust, MIEEE, MIEEE

Lecturers
Po Sheun Chung, MS III., PhD Camb., CEng, MIEEE, MIEEE
William John Dewar, MSc(Eng) Ou., PhD N.S.W.
Harold Leslie Humphries, BSc BE BSc Syd., MIEAust, MIEE
Roland Alexander Sammut, BSc N.S.W., PhD A.N.U.

Professional Officers
Douglas Hamilton Irving, BE N.S.W.
Kirill Poronnik, BE N.S.W., ASTC, MIEEE
Trevor Wayne Whitbread, BE N.S.W.

Department of Electric Power Engineering

Associate Professors
Garth Claud Dewsnip, MEE Melbourne, CEng, FIEE, MIEAust
Gordon William Donaldson, BE Qld., BSc MA Oxst., CEng,
SMIEEE, MIEEE, MIEAust
Gregory Joseph Johnson, MSc Syd., CEng, SMIEEE, MIEEE,
FIEEE, MAIP, AAIP, AInstP
Ian Francis Morrison, BSc BE PhD Syd., CEng, MIEAust, MIEEE

Senior Lecturers
Trevor Robert Blackburn, BSc Adel., PhD Flin., GAIP
Harry Harrison, BSc BE Syd., ME N.S.W., MIEAust
Ronald Edward James, BSc(Eng) PhD Lond., CEng., MIEEE,
MIMechE, AESEA
Hugh Ronald Outhred, BSc BE PhD Syd., AMIEEE

Lecturers
Colin Grantham, BSc PhD N'cfe.(U.K.)
Darmawan Sutanto, BSc PhD W.Aust.

Professional Officers
Joseph Rhine Kinard, BA Flia.S.U., MS Mass., MIEEE, MOSA
Edward Douglas Spooner, ME N.S.W.
Department of Solid-State Electronics

Senior Lecturers
Henry Stanley Blanks, BSc ME Syd., PhD N.S.W., CEng, SMIEEE, FIREE, SMIES, MIQA
Martin Andrew Green, BE MEngSc Qld., PhD McMaster.
John Alan Richards, BE PhD N.S.W., MIEEE, MIEE
Richard Vaughan, BSc BE PhD Syd.

Project Scientist
Chee Yee Kwok, BSc BE PhD N.S.W., MIEEE

Department of Systems and Control

Associate Professors
John Barry Miller, BE PhD N.S.W., FIREE, MIEEE
Colin Arthur Stapleton, BSc BE Syd., CEng, MIEEE, MIAust
Keith Eugene Tait, BE BSc N.Z., PhD N.S.W., MIAust

Senior Lecturers
Peter Thomas Bason, ME PhD N.S.W., MIEEE, MIEE
Reginald Frederick Brown, BEng Liv., PhD N.S.W., CEng, MIEEE
Felix Lewin, BSc BE Syd.
David Harold Mee, BSc BE Syd., PhD London, DIC, MIEEE
Darrell Williamson, BSc ME N'cle. (N.S.W.), PhD Harv., MIEEE

Lecturers
Branco George Callier, BSc BE PhD N.S.W.
David James Clements, BSc Qld., ME PhD N'cle. (N.S.W.), MIEEE, MIAM
Kevan Charles Daly, BSc BE PhD N.S.W.

Professional Officers
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Kong Geen Lee, BSc ME N'cle. N.S.W., MIEEE, AMIEEE
Johan Herman Siewerts, BSc N.S.W., ASTC

School of Mechanical and Industrial Engineering

Associate Professor and Head of School
Graham de Vahl Davis, BE Syd., PhD Camb., CEng, FI MechE, FIE Aust, MASME

Professor of Operations Research and Head of Department of Industrial Engineering
George Bennett, BA Syd., PhD N.S.W., ASTC, CEng, FIProfE

Nuffield Professor of Mechanical Engineering and Head of Department of Fluid Mechanics/Thermodynamics
Raymond Alfred Arthur Bryant, ME N.S.W., ASTC, CEng, FI MechE, FIE Aust, MRAeS

Professor of Mechanical Engineering (on leave)
Peter Thomas Fink, CBE, BE Syd., CEng, FTS, FIE Aust, FI MechE, FRAeS, FRINA, MAIAA

Sir James Kirby Professor of Production Engineering
Peter Louis Brennan Oxley, BSc PhD Leeds, CEng, FIProdE, FIE Aust, MIE MechE

Professor of Mechanical Engineering and Head of Department of Agricultural Engineering
Noel Levin Svensson, MIE MechE PhD Melb., CEng, FIE Aust, MIE MechE, MACPSM, MIBME

Executive Assistant to Head of School
Dr J. Y. Harrison.

Senior Administrative Officer
George Dusan, BEc Syd.

Teaching Fellows
Mark John Stewart, BSc(Eng) N.S.W.
Albert Wong, BE N.S.W.

Tutors
Keshaba Nanda Baidya, BTech Indian Inst. of Technology
Fawzy Soliman, BE Syd., MEngSc N.S.W.

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Eric Arthur Carter, BE MEngSc N.S.W., ASTC
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Thomas Done, BA Macq.
Anthony Gordon Harris, BSc Exe.
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Alexander Litvak, Dipl Ing Odessa, MIE Aust
Barrie Clifford Motson, BE N.S.W., ASTC, MIE Aust
Colin Barrington Smith, BE MEng Sc N.S.W., ASTC, MAIRAH, GradilE Aust

Honorary Associate
Cyril Arthur Gladman, BSc(Eng) Lond., ACGI, CEng, FIProdE, MIE MechE, MIED

Department of Agricultural Engineering

Senior Lecturers
Harold Glenn Bowditch, ME N.S.W., ASTC, MIE Aust
Ronald Arthur Dennis, MSc Nott., CEng, MIE MechE
Department of Applied Mechanics

Associate Professor and Head of Department of Applied Mechanics
John Young Harrison, BE Syd., PhD N.S.W., MIEAust

Senior Lecturers
John Edward Baker, MSc Syd., BE MEngSc PhD N.S.W.
Kerry Patrick Byrne, BE MEngSc Qld., BSc Melb., PhD S'ton.
Raymond Albert Vincent Byron, BE Syd., CEng, MRAeS, MAIAA
Jacob Alexander Bruce Cartmel, MSc Cran. I.T., PhD DipEd N.S.W., CEng, SMIEEE, FiMechE, FIEAust, AMSAOrthA
Alexander Eric Churches, BE PhD N.S.W., ASTC
Robin Arthur Julian Ford, BSc(Eng) PhD Lond., ACGI
Eric Joseph Hahn, BE BSc PhD N.S.W., MASME
Edward Colvyn Hind, ME N.S.W., ASTC, MIEAust, MInstMC
Donald Jabez Stephen Mudge, BSc Lond., DipEd N.S.W., CEng, MI MechE, MIEAust, WhSc
Hugh Lithgow Stark, BSc PhD Strath., CEng, MI MechE, MIEAust

Lecturers
John Michael Challen, BE MEngSc Syd., PhD N.S.W., MIEAust
George Crawford, BE BSc N.S.W., ASTC, CEng, FIEAust, MAIE, ARACI
Richard Butler Frost, BE N.S.W., MIEAust
Knut Kjørlefjord, BSc Durh., ME N.S.W., CEng
Jae Lin Woo, BSc Seoul, SM M.I.T., PhD N.S.W.

Department of Fluid Mechanics and Thermodynamics

Includes Aeronautical Engineering and Naval Architecture.

Associate Professors
Richard Douglas Archer, BSc Melb., BE Syd., MS PhD Minn., FBIS, MIEAust, MAIAA, MRAeS
Michael Richard Davis, BSc(Eng) PhD S'ton., CEng, MRAeS, MIEAust, MAAS
Owen Francis Hughes, SB SM(NavArch) M.I.T., PhD N.S.W., MIEAust, MRINA, MSNAME

Senior Lecturers
Lawrence Julian Doctors, BE MEngSc Syd., PhD Mich., MRINA, AMSNAME
Brian Edward Milton, BE PhD N.S.W., MSc Birm., CEng, MIEAust, MRAeS
Graham Lindsay Morrison, BE PhD Melb.
Prabhat Kumar Pal, BME N.C.E., Bengal, BTech I.I.T.
John Arthur Reizes, ME PhD N.S.W., MIEAust
Charles Matthew Sapsford, BSc(Eng) Lond., ME N.S.W., CEng, MI MechE

Lecturers
Donald Wainwright Kelly, BE Syd., PhD Lond.
Eleanora Maria Kopalinsky, BE PhD N.S.W.

Department of Industrial Engineering

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Associate Professor
Michael Geoffrey Stevenson, BSc(Tech) PhD N.S.W., ASTC, CEng, FIEAust, MIProD

Senior Lecturers
Leonard Edward Farmer, BE MEngSc PhD N.S.W., MIEAust
Roger Malcolm Kerr, BSc Lond., DPhil Oxf.
Grier Cheng Lin, DipMechEng P.I.T., Taiwan, PhD N.S.W., MIEAust
Bruce Albert Murtagh, ME Cant., PhD Lond., DIC, CEng, MChemE, MIEAust
Carlton Henry Scott, BSc Qld., PhD N.S.W.
Graham Smith, BE MEngSc PhD N.S.W., ASTC, MIEAust

Lecturers
Daniel Goodridge, DiplingChim L'Aurore, Shanghai, DipIndEng N.S.W.
Philip Mathew, BE N.S.W.

School of Nuclear Engineering

Professor of Nuclear Engineering and Head of School
James Joseph Thompson, BE PhD Syd., FIEAust

Associate Professors
Paul Robert Barrett, MSc PhD Birm., FAIP, MinstP
Zdenek Josef Holy, Dipling Prague, MSc Birm., MEngSc PhD N.S.W., MIEAust

Senior Lecturer
Leslie George Kemeny, BE Syd., MIEAust

Lecturer
Olof Oscar Bils, Dipling Berl., PhD N.S.W.

Professional Officer
Peter Yo Pin Chen, BSc MEngSc ME PhD N.S.W., ASTC
School of Surveying

Professor of Surveying, Head of School and of Department of Geodesy
Peter Vincent Angus-Leppan, BSc(Eng) Rand., PhD DipTP Natal, FISAust, MILS(Natal), MAIC

Professor of Surveying
Vacant

Associate Professor of Surveying and Head of Department of Surveying
George Gordon Bennett, MSurv Melb., PhD N.S.W., RegSurv(NSW), FISAust, MIN

Administrative Officer
Joseph Valentine Fonseka, BA Lond.

Professional Officers
Norman John Brinsden, BE N.S.W.
Colin Edward Wardrop, BSc N.S.W.

Analyst/Programmer
Mohammad Hadi Aghakhani, BSc Sh.U.T. Tehran, MSc Colorado State

Department of Geodesy

Senior Lecturers
Friedrich Karl Brunner, Dipling Dr techn T.U. Vienna
Arthur Harry William Kearsley, BSuv MSurvSc PhD N.S.W., MISAust
Artur Stoiz, BSuv PhD N.S.W., RegSurv(NSW)

Department of Photogrammetry

Includes Land Studies and Cartography.

Associate Professors
John Charles Trinder, BSurv PhD N.S.W., MSc I. T.C. Delft, RegSurv(NSW), MISAust

Senior Lecturer
Bruce Crosby Forster, MSurv Melb., MSc R’dg., PhD N.S.W., MISAust, LS(Vic), MASPNG

Lecturers
Pratap Shivabhai Amin, BSc T.H. Delft, MSc Lond., MISK, CLSEA, ARICS
Leonard Berlin, BSc(LS) Cape T., BSc T.H. Delft
Lynn Charles Holstein, MIS N.Z., DipPhotogram U.C.L., RegSurv(NSW), ARICS
Ian Philip Williamson, BSurv MSurvSc N.S.W., RegSurv(NSW), MISAust

Department of Surveying

Associate Professor
John Stuart Allman, BSuv PhD N.S.W., MAIC

Senior Lecturers
Anthony John Robinson, BSurv MBA PhD N.S.W., RegSurv(NSW), MISAust, MAIC
Jean Marc Rueger. Dipling E. T.H. Zurich, SIA, LS(Switz), MISAust

Lecturers
Sabapathy Ganeshan, BSc Ceyl., MIS Aust
Gregory Justin Hoar, BSurv PhD N.S.W., RegSurv(NSW), MISAust, MAIC, MRIN
John Richard Pollard, BSc Qld., BTech S.A.I.T.

Centre for Biomedical Engineering

Director
Associate Professor Peter Craig Farrell, BE Syd., SM M.I.T., PhD Wash., DSc N.S.W., MASAIO, MISA0

Lecturers
Christopher David Bertram, MA DPhil Oxf.
Klaus Schindhelm, BE PhD N.S.W., MIE Aust

Administrative Assistant
Margaret Anne Cook, BA N.S.W.

Professional Officer
Walter Flicker, BE N.S.W., MIE Aust

Honorary Visiting Fellows
Laurie James Garred, BASc Tor., PhD Minn.
Tibor Timothy Vajda, DDS Bud., FRSM, FACBS

Honorary Associate
Bernard Bloch, MB CRB Wiw., FRCS
Staff

Director
Professor J. E. Andersen

Librarian
Peter Geoffrey Longrigg, BA, P.N.G., DipLib Canberra C.A.E., ALAA

Department of Mining and Mineral Sciences

Professional Officer
Kenneth James Murray, BSc Syd., MSc N.S.W., AMAusIMM

Mechanical Engineering

Lecturers
Llewellyn Ramsay Jones, BSc N.Z., DipAm MEng Sheff., PhD Wales, MIEAust, MIMechE
Ian Lachlan Maclaine-cross, BE Melb., PhD Monash, MIEAust, MAIRAH, MSES
Chakravarti Varadachar Madhusudana, BE Mys., ME I.I.Sc., PhD Monash, MIEAust

W.S. and L.B. Robinson University College

Head of Department of Science
Professor John Everard Andersen, BE Melb., PhD N.S.W., FIEAust, MAusIMM, ARACI

Head of Department of Mining and Mineral Sciences
Professor Leon John Thomas, BSc PhD Birm., CEng, FIEAust, FIMinE, MAusIMM

Mining Engineering

Senior Lecturer
Venkata Satyanarayana Vutukuri, BSc(Eng) Ban., MS Wis., MMGI, AIME, AMAusIMM
### Mineral Science

Senior Lecturer  
Barenya Kumar Banerji, MSc Patna, PhD Leeds, MAusIMM

#### Geology

Senior Lecturer  
Gerrit Neef, BSc Lond., PhD Well., FGS

### Department of Science

#### Chemistry

Lecturer  
Derek Richard Smith, BSc PhD Wales

Senior Tutor  
Robert Edward Byrne, MSc N.S.W., ARACI, AMAusIMM

#### Mathematics

Senior Lecturers  
Zdenek Kviz, DipPhys Brno, CSc RerNatDr Charles, PhD Prague  
Dennis William Trenerry, BSc PhD Adel.

Lecturer  
David Charles Guiney, BSc PhD Adel.

#### Physics

Senior Lecturers  
Robert John Stening, MSc Syd., PhD Qld., DipTertEd N.E., FRMetS, MAIP  
Kenneth Reid Vost, BSc Glas., MSc N.S.W., AMAusIMM
The University of New South Wales  Kensington Campus  1982

Theatres

Biomedical Theatres  E27
Central Lecture Block  E19
Classroom Block (Western Grounds)  H3
Electrical Engineering Theatre  F17
Keith Burrows Theatre  J14
Main Building Theatre  K14
Mathews Theatre  D23
Parade Theatre  E3
Science Theatre  F13
Sir John Clancy Auditorium  C24

Buildings

Affiliated Residential Colleges

New (Anglican)  L6
Shalom (Jewish)  N9
Warrane (Roman Catholic)  M7
Applied Science  F10
Architecture  H14
Arts (Morven Brown)  C20
Banks  F20
Barker Street Gatehouse  N11
Basser College  C18
Biological Sciences  D26
Central Store  B13
Chancellery  C22
Chemistry
Dalton  F12
Robert Heffron  E12
Civil Engineering  H20
Commerce (John Goodsell)  F20
Dalton (Chemistry)  F12
Electrical Engineering  G17
Geography and Surveying  K17
Goldstein College  D16
Golf House  A27
Gymnasium  B5
House at Pooh Corner  N8
International House  C6
John Goodsell (Commerce)  F20
Kanga's House  O14
Kensington Colleges  C17
Basser  C16
Goldstein  D16
Philip Baxter  D14
Main Building  K15
Maintenance Workshop  B13

Mathews  F23
Mechanical and Industrial Engineering  J17
Medicine (Administration)  B27
Math Library  E21
Metallurgy  E8
Morven Brown (Arts)  C20
New College (Anglican)  L6
Newton  J12
Perking Station  H25
Philip Baxter College  D14
Robert Heffron (Chemistry)  E12
Sam Cracknell Pavilion  H8
Shalom College (Jewish)  N9
Sir Robert Webster
(Technology)  G14
Squash Courts  B7
Swimming Pool  B4
Uniserve House  L5
University Regiment  J2
University Union (Roundhouse)—Stage I  E6
University Union (Blockhouse)—Stage II  G6
University Union (Squarehouse)—Stage III  E4
Wallace Wurth School of Medicine  C27
Warrane College (Roman Catholic)  M7
Wool and Pastoral Sciences  B8

General

Academic Staff Office  C22
Accountancy  F20
Admissions  C22
Adviser for Prospective Students  C22
Alumni and Ceremonials  C22
Anatomy  C27
Applied Geology  F10
Applied Science (Faculty Office)  F10
Architecture
(including Faculty Office)  H14
Arts (Faculty Office)  C20
Australian Graduate School of Management  G27
Biochemistry  D26
Biological Sciences (Faculty Office)  D26
Biomedical Library  F23
Biotechnology  D26
Bookshop  G17

Botany  D26
Building  H14
Careers and Employment  C22
Casser's Office  C22
Centre for Biomedical Engineering  A28
Centre for Medical Education Research and Development  C27
Chaplain's  E15a
Chemical Engineering and Industrial Chemistry  F10
Chemistry  E12
Child Care Centres  N8, O14
Civil Engineering  H20
Closed Circuit Television Centre  F20
Commerce (Faculty Office)  F20
Committee in Postgraduate Medical Education  B27
Community Medicine  D26
Computing Services Unit  E21
Drama  D9
Economics  F20
Education  G2
Electrical Engineering and Computer Science  G17
Engineering (Faculty Office)  K17
English  C20
Examinations  C22
Fees Office  C22
Food Technology  F10
French  C20
General Staff Office  C22
General Studies  C20
Geography  C22
German Studies  C20
Graduate School of the Built Environment  H14
Health Administration  C22
History  C20
History and Philosophy of Science  C20
Industrial Arts  C1
Industrial Engineering  J17
Institute of Languages  G14
Institute of Rural Technology  B8b
Kindergarten (House at Pooh Corner/Child Care Centre)  N8
Landscape Architecture  H14
Law (Faculty Office)  E21
Law Library  E21
Librarianship  F23
Library  E21
Lost Property  F20
Marketing  F20
Mathematics  F23
Mechanical Engineering  J17
Medicine (Faculty Office)  B27
Metallurgy  E8
Microbiology  D26
Mining Engineering  K15
Music  B11b
National Institute of Dramatic Art  C15
Nuclear Engineering  G17
Off-campus Housing  C22
Optometry  J12
Organizational Behaviour  F20
Pathology  C27
Patrol and Cleaning Services  F20
Philosophy  C20
Physics  K15
Physical Education and Recreation Centre (PERC)  B5
Physiology and Pharmacology  C27
Political Science  C20
Postgraduate Extension Studies (Closed Circuit Television)  F20
Postgraduate Extension Studies (Radio Station and Administration)  F23
Psychology  F23
Public Affairs Unit  C22
Regional Teacher Training Centre  C27
Russian  C20
Science and Mathematics Course Office  F23
Social Work  G2
Sociology  C20
Spanish and Latin American Studies  C20
Sport and Recreation  E15c
Student Counselling and Research  E15c
Student Health  E15b
Student Records  C22
Students' Union  E4
Surveying  K17
Teachers' College Liaison Office  F15b
Tertiary Education Research Centre  E15d
Textile Technology  G14
Town Planning  K15
University Archives  C22
University Press  A28
University Union (Blockhouse)  G6
Wool and Pastoral Sciences  B8a
Zoology  D26
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For fuller details about the University — its organization, staff membership, description of disciplines, scholarships, prizes, and so on, you should consult the Calendar.

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