Contents

Welcome 1
Resolutions of the Senate 3
Resolutions of the Senate 3
Resolutions of the Faculty 7
Resolutions of the Faculty for coursework awards 7
Part 1: Course enrolment 7
Part 2: Unit of study enrolment 8
Part 3: Studying and Assessment 8
Part 4: Progression, Results and Graduation 9
Part 5: Other 9
Bachelor of Engineering 11
Bachelor of Engineering 11
Course resolutions 11
Bachelor of Project Management 13
Bachelor of Project Management 13
Course resolutions 13
Bachelor of Computer Science and Technology 15
Bachelor of Computer Science and Technology 15
Bachelor of Computer Science and Technology (Advanced) 15
Bachelor of Computer Science and Technology (Honours) 15
Course resolutions 15
Bachelor of Information Technology 17
Bachelor of Information Technology 17
Bachelor of Information Technology (Honours) 17
Course resolutions 17
Combined degrees 19
Bachelor of Engineering and Bachelor of Arts 19
Course resolutions 19
Bachelor of Engineering and Bachelor of Commerce 21
Course resolutions 21
Bachelor of Engineering and Bachelor of Design in Architecture 22
Course resolutions 22
Bachelor of Engineering and Bachelor of Laws 23
Course resolutions 23
Bachelor of Engineering and Bachelor of Medical Science 24
Course resolutions 24
Bachelor of Engineering and Bachelor of Project Management 26
Course resolutions 26
Bachelor of Engineering and Bachelor of Science 27
Course resolutions 27
Bachelor of Engineering and Bachelor of Science 29
Double degree course resolutions 29
Bachelor of Information Technology and Bachelor of Arts 31
Course resolutions 31
Bachelor of Information Technology and Bachelor of Commerce 32
Course resolutions 32
Bachelor of Information Technology and Bachelor of Laws 33
Course resolutions 33
Bachelor of Information Technology and Bachelor of Medical Science 35
Course resolutions 35
Bachelor of Information Technology and Bachelor of Science 37
Course resolutions 37
Engineering, IT and Project Management 39
Undergraduate Degree Tables.
Flexible First Year Stream 39
School of Aeronautical, Mechanical and Mechatronic Engineering 41
Aeronautical Engineering stream 43
Aeronautical (Space) Engineering stream 47
Mechanical Engineering stream 51
Mechanical (Biomedical) Engineering stream 55
Mechanical (Space) Engineering stream 59
Mechatronic Engineering stream 63
Mechatronic (Space) Engineering stream 67
School of Chemical and Biomolecular Engineering 71
Chemical and Biomolecular Engineering stream requirements 71
Civil Engineering 75
Project Engineering and Management (Civil) stream 79
Civil Engineering Combined with Design in Architecture 83
Project Management Stream Tables 85
School of Electrical and Information Engineering 89
Electrical Engineering (Bioelectronics) stream 91
Electrical Engineering (Computer) stream 93
Electrical Engineering stream 95
Electrical Engineering (Power) stream 97
Software Engineering stream 99
Electrical Engineering (Telecommunications) stream 101

Units of study 103
  Engineering and Information Technology Undergraduate units of study 103
  Engineering and Information Technologies undergraduate units of study 104
  School of Aerospace, Mechanical and Mechatronic Engineering 104
  School of Chemical and Biomolecular Engineering 117
  School of Civil Engineering 123
  School of Electrical and Information Engineering 129
  School of Information Technologies 134
  School of Information Technologies (Honours units) 140
  Common Engineering Faculty units of study 141

Advanced Engineering and Faculty Elective options 145

School of Information Technologies Stream Tables 147
  Bachelor of Computer Science and Technology 147
  Bachelor of Computer Science and Technology (Advanced) 151
  Bachelor of Information Technology 155

Postgraduate Research 161
  Research degree resolutions 161

Master of Philosophy 163
  Master of Philosophy 163
  Course resolutions 163
  Part 1: Preliminary 163
  Part 2: Admission requirements 163
  Part 3: Candidature 163
  Part 4: Requirements 164
  Part 5: Enrolment and progression 164
  Part 6: Examination 164
  Part 7: Other 164

Postgraduate coursework 167
  Conversion Master's Programs 167
  Coursework degree rules 168

Master of Engineering 169
  Course rules 170
  Graduate Certificate in Engineering 170
  Graduate Diploma in Engineering 170
  Master of Engineering 170
  Course resolutions 170

Project Management 173
  Graduate Certificate in Project Management 173
  Graduate Diploma in Project Management 173
  Master of Project Management 173
  Course resolutions 175

Information Technology 177
  Graduate Certificate in Information Technology 177
  Graduate Diploma in Information Technology 177
  Master of Information Technology 177
  Course Resolutions 177

Information Technology Management 181
  Graduate Certificate in Information Technology Management 181
  Graduate Diploma in Information Technology Management 181
  Master of Information Technology Management 181
  Course resolutions 181

Graduate Diploma in Computing 183
  Graduate Diploma in Computing 183
  Course resolutions 183

Master of Professional Engineering 185
  Course rules 186
  Master of Professional Engineering 186
  Course resolutions 186

Graduate Diploma in Engineering (Professional Engineering) 189
  Graduate Diploma in Engineering (Professional Engineering) 189
  Course resolutions 189

School of Aerospace, Mechanical and Mechatronic Engineering 191
  Master of Engineering specialisations 191

School of Chemical and Biomolecular Engineering 197
  Master of Engineering specialisations 197

School of Chemical and Biomolecular Engineering 199
  Master of Professional Engineering specialisations 199

School of Civil Engineering 201
  Master of Engineering specialisations 201

School of Civil Engineering 203
  Master of Professional Engineering specialisations 203

School of Electrical and Information Engineering 209
  Master of Engineering specialisations 209
Contents

School of Electrical and Information Engineering 213
Engineering
Master of Professional Engineering specialisations. 213

School of Civil Engineering (Project Management Group) 221

School of Information Technologies 225

Units of study 233
Engineering and Information Technologies 233
Postgraduate Units of Study
Engineering and Information Technologies postgraduate units of study
School of Aerospace, Mechanical and Mechatronic Engineering 233
School of Chemical and Biomolecular Engineering 242
School of Civil Engineering 248
School of Electrical and Information Engineering 259
School of Information Technologies 267
General units offered by the Faculty 272

Index by alpha code 277

Index by name 285
Welcome to the Faculty of Engineering and Information Technologies at the University of Sydney.

Our faculty has a long, proud history since 1883 producing many distinguished graduates who have made significant contributions to infrastructure developments both here and overseas. They have also played major roles in stimulating the Australian economy through inspirational technological developments.

Engineers and information technology professionals create new structures, systems and products to support the growth of communities and they rely on an understanding of mathematics and science as well as knowledge of business and legal processes. Our graduates receive a well-rounded understanding of the fundamentals and have acquired design and research skills in preparation for them to lead innovation and shape our future.

The attributes of our graduates include being able to:

- create new knowledge and understanding through the process of research and inquiry
- use information effectively
- work independently and sustainably in a way that is informed by openness, curiosity and a desire to meet new challenges
- hold personal values and beliefs consistent with their role as responsible community members, and
- recognise and value communication as a tool for negotiating and creating new understanding, interacting with others, and furthering their own learning.

The faculty has strong research and education links with Australian and global industry through our foundations, world-leading research centres and outstanding alumni. These relationships are energised through collaborative research, consulting projects and industry and community-relevant teaching programs.

The combination of our degrees with those of Science, Commerce, Medical Science, Arts and Law also provide exciting and flexible pathways to suit the needs of our diverse student population.

We hope that you enjoy your educational journey at the University of Sydney and that this will stimulate a rich and lasting relationship with us.

Professor Archie Johnston  FTSE, FAICD
Dean, Faculty of Engineering and Information Technologies
November 2011
Welcome
Resolutions of the Senate

The Senate Resolutions for the Faculty of Engineering and Information Technologies must be read in conjunction with the appropriate Resolutions for the Faculty of Engineering and Information Technologies the individual Course resolutions and rules.

Resolutions of the Senate

1 Degrees, diplomas and certificates of the Faculty of Engineering and Information Technologies

(1) With the exception of the Doctor of Engineering and the Doctor of Philosophy, The Senate, by authority of the University of Sydney Act 1989 (as amended), provides and confers the following degrees, diplomas and certificates, according to the rules specified by the Faculty of Engineering and Information Technologies. The Doctor of Engineering and the Doctor of Philosophy are provided and conferred according to the rules specified by the Senate and the Academic Board.

(2) This list is amended with effect from 1 January, 2012. Degrees, diplomas and certificates no longer open for admission will be conferred by the Senate according to the rules previously specified by the Faculty.

2 Degrees

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title &amp; stream</th>
<th>Abbreviation</th>
<th>Credit points</th>
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<td>DEng</td>
<td>Published work</td>
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<tr>
<td>HB000</td>
<td>Doctor of Philosophy</td>
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<td>HC052</td>
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<tr>
<td>Aerospace Engineering</td>
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<td>Environmental Fluids</td>
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<td>Network Engineering</td>
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<td>Software Engineering</td>
<td>MPE(Computer Science)</td>
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<td>Master of Project Management</td>
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For internal use by University of Sydney staff only.
### Resolutions of the Senate

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<th>Abbreviation</th>
<th>Credit points</th>
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<td><strong>Civil Engineering (Geotechnical)</strong></td>
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<td><strong>Computer Engineering</strong></td>
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<td><strong>Electrical Engineering</strong></td>
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<td><strong>Electrical Engineering (Bioelectronics)</strong></td>
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<td><strong>Electrical Engineering (Telecommunications)</strong></td>
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<td></td>
<td><strong>Mechanical Engineering (Biomedical)</strong></td>
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<td></td>
<td><strong>Mechanical Engineering (Space)</strong></td>
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<td><strong>Mechatronic Engineering</strong></td>
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<tr>
<td></td>
<td><strong>Mechatronic Engineering (Space)</strong></td>
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<td></td>
<td><strong>Project Engineering and Management (Civil)</strong></td>
<td>BE(ProjectEngineeringandManagement)(Civil)</td>
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<td><strong>Bachelor of Project Management (Civil Engineering Science)</strong></td>
<td>BPM(Civil Engineering Science)</td>
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<td></td>
<td><strong>Bachelor of Project Management (Software)</strong></td>
<td>BPM(Software)</td>
<td>144</td>
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<td></td>
<td><strong>Bachelor of Project Management (Built Environment)</strong></td>
<td>BPM(Built Environment)</td>
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<td><strong>Software Engineering</strong></td>
<td>BE(Software)</td>
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<td>HH041</td>
<td><strong>Bachelor of Information Technology</strong></td>
<td>BIT</td>
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<tr>
<td></td>
<td><strong>Computer Science</strong></td>
<td>BIT(ComputerScience)</td>
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<td></td>
<td><strong>Information Systems</strong></td>
<td>BIT(InformationSystems)</td>
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</tbody>
</table>

*may be awarded with honours following a further year of study.

**may be awarded with honours in an integrated program**

### 3 Combined degrees

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title &amp; stream</th>
<th>Abbreviation</th>
<th>Credit points</th>
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<tbody>
<tr>
<td>HH016</td>
<td><strong>Bachelor of Engineering/Bachelor of Arts</strong></td>
<td>BE/BA</td>
<td>240</td>
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<tr>
<td>HH014</td>
<td><strong>Bachelor of Engineering/Bachelor of Commerce</strong></td>
<td>BE/BCom</td>
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<td>HH046</td>
<td><strong>Bachelor of Engineering/Bachelor of Design in Architecture</strong></td>
<td>BE/BDesArch</td>
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<tr>
<td>HH018</td>
<td><strong>Bachelor of Engineering/Bachelor of Laws</strong></td>
<td>BE/LLB</td>
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<tr>
<td>HH021</td>
<td><strong>Bachelor of Engineering/Bachelor of Medical Science</strong></td>
<td>BE/BMedSci</td>
<td>240</td>
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<tr>
<td>HH015</td>
<td><strong>Bachelor of Engineering/Bachelor of Science</strong></td>
<td>BE/BSc</td>
<td>240</td>
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<tr>
<td>HH047</td>
<td><strong>Bachelor of Information Technology/Bachelor of Arts</strong></td>
<td>BIT/BA</td>
<td>240</td>
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<tr>
<td>HH042</td>
<td><strong>Bachelor of Information Technology/Bachelor of Commerce</strong></td>
<td>BIT/BCom</td>
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<tr>
<td>HH051</td>
<td><strong>Bachelor of Information Technology/Bachelor of Laws</strong></td>
<td>BIT/LLB</td>
<td>288</td>
</tr>
<tr>
<td>HH048</td>
<td><strong>Bachelor of Information Technology/Bachelor of Medical Science</strong></td>
<td>BIT/BMedSci</td>
<td>240</td>
</tr>
<tr>
<td>HH049</td>
<td><strong>Bachelor of Information Technology/Bachelor of Science</strong></td>
<td>BIT/BSc</td>
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</tr>
<tr>
<td>HH063</td>
<td><strong>Bachelor of Engineering/Bachelor of Project Management</strong></td>
<td>BE/BPM</td>
<td>240</td>
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</tbody>
</table>

*may be awarded with honours following a further year of study

**may be awarded with honours in an integrated program**

### 4 Graduate diplomas

<table>
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<th>Code</th>
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<th>Abbreviation</th>
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<tr>
<td>HF041</td>
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<td>GradDipComp</td>
<td>48</td>
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<tr>
<td>HF044</td>
<td><strong>Graduate Diploma in Engineering</strong></td>
<td>GradDipEng</td>
<td>36</td>
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<tr>
<td>HF045</td>
<td><strong>Graduate Diploma in Engineering (Professional Engineering)</strong></td>
<td>GradDipEng(ProfEng)</td>
<td>48</td>
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<tr>
<td>HF042</td>
<td><strong>Graduate Diploma in Information Technology</strong></td>
<td>GradDipIT</td>
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<tr>
<td>HF043</td>
<td><strong>Graduate Diploma in Information Technology Management</strong></td>
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<tr>
<td>HF023</td>
<td><strong>Graduate Diploma in Project Management</strong></td>
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<td>Abbreviation</td>
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<tr>
<td>HF046</td>
<td>Graduate Diploma in Project Leadership</td>
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5 Graduate certificates

<table>
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<th>Abbreviation</th>
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<tr>
<td>HG025</td>
<td>Graduate Certificate in Information Technology</td>
<td>GradCertIT</td>
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<td>HG026</td>
<td>Graduate Certificate in Information Technology Management</td>
<td>GradCertITM</td>
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<td>HG006</td>
<td>Graduate Certificate in Project Management</td>
<td>GradCertPM</td>
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<tr>
<td>HG028</td>
<td>Graduate Certificate in Project Leadership</td>
<td>GradCertPL</td>
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</tbody>
</table>
Resolutions of the Faculty of Engineering and Information Technologies for coursework awards

These resolutions apply to all undergraduate and postgraduate coursework award courses in the Faculty, unless specifically indicated otherwise. Students enrolled in postgraduate research awards should consult the resolutions for their course. These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the resolutions for the course of enrolment, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Part 1: Course enrolment

1 Enrolment restrictions

(1) Except as with the permission of the Dean an undergraduate student shall satisfy the following enrolment requirements.

(a) No more than 54 credit points in semester one and two combined;
(b) No more than 30 credit points in either semester one or two;
(c) No more than 12 credit points in the summer session and 6 credit points in the winter session;
(d) For a student on the ‘at risk’ register, no more than 24 credit points in either semester one or two;
(e) In the first year of an Engineering, Bachelor of Project Management or Engineering/Combined degree a student must enrol on a full-time basis with a minimum of 24 credit points per semester;
(f) In subsequent years of an Engineering, Bachelor of Project Management or Engineering/Combined degree a student must enrol on a full-time basis with a minimum of 18 credits per semester unless the student has completed a total of 153 credit points toward the degree;
(g) In first year, a student may only enrol in level 1000 units of study;
(h) In second year, a student may only enrol in level 1000 and/or level 2000 units of study;
(i) A student shall enrol in any core units of study for which he or she was qualified to enrol in any previous year and for which credit has not yet been gained.

2 Flexible First Year

(1) Undergraduate students entering first year may choose to undertake the Flexible First Year program, instead of choosing a particular degree or stream. Two types of Flexible First Year program are available:

(a) Students planning on entering Aeronautical, Mechanical (Biomedical), Chemical and Biomedical, Civil, Project Engineering and Management (Civil), Mechanical, Aeronautical (Space) or Mechanical (Space) Engineering streams can enrol in program A as set out in the Bachelor of Engineering Flexible First Year table of units of study. Students in this program undertake a common set of units in semester one. They can then transfer to a stream in semester two or at the end of the year. The semester two enrolment will consist of common units and a choice of core or elective units for the stream that students plan to undertake in later years.

(b) Students planning on entering Electrical, Electrical (Bioelectronics), Electrical (Computer), Electrical (Power), Electrical (Telecommunications), Mechatronics, Mechatronics (Space), Software Engineering or the Bachelor of Computer Science and Technology or Bachelor of Information Technology degrees can enrol in program B as set out in the Bachelor of Engineering Flexible First Year table of units of study. Students in this program undertake a common set of units in semester one. They can then transfer to a stream or degree in semester two or at the end of the year. The semester two enrolment will consist of common units and a choice of core or elective units for the stream or degree that students plan to undertake in later years.

(c) Transfer into the Bachelor of Project Management is not part of the flexible first year program.

(2) Students gaining entry to any of the combined degree courses may also choose to undertake the Flexible First Year program.

(3) Those students who have met the requirements for first year entry (ATAR cut-off) into a particular degree and stream will be guaranteed a place in second year in that stream or degree even though they choose the Flexible First Year program. Students attaining high average marks in the Flexible First Year program will be eligible to apply for second year entry into higher ATAR cut-off degrees or streams. See transfer requirements in the table shown below. These conditions for entry into a second year specialist degree or stream will also apply for combined degree candidates.

(4) Transfer from Flexible First Year into streams or degrees will be assessed based on either of the following two conditions:

(a) Students have met the ATAR requirement for the degree or stream at the time of initial enrolment; or

(b) Students have achieved an average mark as shown in the following requirements table. For Program A the average mark is based on the performance in first year units of study. For Program B, the average mark is based on performance in first year, first semester units of study.

(5) Degree/stream transfer table

<table>
<thead>
<tr>
<th>Degree/Stream</th>
<th>Flexible entry program</th>
<th>AAM requirement</th>
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<tr>
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<tr>
<td>BE(Aero)(Space)</td>
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<td>BE(Civil)</td>
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</tr>
<tr>
<td>BE(Electrical)(Telecom)</td>
<td>B</td>
<td>65</td>
</tr>
<tr>
<td>BE(Mechanical)</td>
<td>A always allowed</td>
<td></td>
</tr>
<tr>
<td>BE(Mech)(Biomedical)</td>
<td>A</td>
<td>70</td>
</tr>
<tr>
<td>BE(Mech)(Space)</td>
<td>A</td>
<td>75</td>
</tr>
<tr>
<td>BE(Mechatronics)</td>
<td>B</td>
<td>70</td>
</tr>
</tbody>
</table>
3 Transferring Streams or Degrees

(1) Students admitted to specific undergraduate Engineering or IT single degrees or streams wishing to transfer between these degrees or streams need to apply to the head of the school supervising the degree or stream. Students will be assessed based on the above Flexible First Year average mark criteria but will also be required to show that they have met progression requirements in their current degree or stream as specified by the school and that they will able to complete the new stream in the normal time period.

(2) Students who wish to transfer between BE, BCST or BIT degrees and the BPM degree or students who wish to transfer between any of the faculty's undergraduate combined degrees or any other course outside the administration of the Faculty must apply to the Universities Admissions Centre or International Office as appropriate.

(3) Students admitted to specific postgraduate degrees or streams wishing to transfer between degrees or streams managed by the faculty need to apply to the Director of the Graduate School of Engineering. Students will be assessed based on their progress in their current degree or stream and that they will able to complete the new stream in the normal time period.

4 Time limits

(1) Unless the course rules specify differently:
   (a) A student must complete all the requirements for a coursework doctorate, within ten calendar years of first enrolment;
   (b) A student must complete all the requirements for a combined BE, single or combined BIT, and BCST within ten calendar years of first enrolment;
   (c) A student must complete all the requirements for a single (non combined) BE or BMP within the lesser of 16 enrolled semesters or ten calendar years of first enrolment;
   (d) A student must complete all the requirements for a graduate certificate within two calendar years of first enrolment;
   (e) A student must complete all the requirements for a graduate diploma within four calendar years of first enrolment;
   (f) A student must complete all the requirements for a master's degree within six calendar years of first enrolment.

(2) Periods of suspension, exclusion or lapsed candidature will be added to maximum completion times except that no completion time will exceed 10 years from first enrolment.

(3) Credit will not be granted for recognised prior learning older than 10 years at the time of first enrolment.

5 Suspension, discontinuation and lapse of candidature

The Coursework Rule specifies the conditions for suspending or discontinuing candidature, and return to candidature after these events. The Rule also defines the circumstances when candidature is deemed to have lapsed. Students should pay careful attention to the significant dates in these processes and their effect on results and financial liability. Students seeking to suspend, discontinue or apply for a return to candidature after a lapse must apply to the Dean of Engineering and IT for permission, supplying detailed reasons and evidence to support the request.

6 Credit for previous study

(1) Conditions for the granting of credit for previous study are in accordance with the Coursework Rule, except:
   (a) the maximum credit that may be granted to the Bachelor of Engineering degree, Bachelor of Engineering/Combined degrees, Bachelor of Information Technology degree or Bachelor of Information Technology/Combined degrees is 96 credit points;
   (b) the maximum credit that may be granted to the Bachelor of Computer Science and Technology or Bachelor of Science and Technology (Advanced) or Bachelor of Project Management is 48 credit points; and
   (c) where Course resolutions make other specifications.

Part 2: Unit of study enrolment

7 Cross-institutional study

(1) Provided permission has been obtained in advance, the Dean may permit a student to complete a unit of study at another institution and have that unit credited to the student's course requirements, provided that:
   (a) the resolutions of the student's course of enrolment do not specifically exclude cross-institutional study; and
   (b) the unit of study content is not taught in any corresponding unit of study at the University; or
   (c) the student is unable, for good reason, to attend a corresponding unit of study at the University.

8 International exchange

The faculty encourages students to participate in international exchange programs, unless specified otherwise in the resolutions for a particular course. Students must apply to the Head of the relevant School of Engineering and IT to obtain approval for their planned enrolment while on exchange. This guarantees that the units completed externally will be correctly matched to the core requirements of their Course.

Part 3: Studying and Assessment

9 Attendance

(1) Students are required to be in attendance at the correct time and place of any formal or informal examinations. Non attendance on any grounds insufficient to claim special consideration will result in the forfeiture of marks associated with the assessment. Participation in a minimum number of assessment items may be a requirement of any unit of study.

(2) Students are expected to attend a minimum of 90% of timetabled activities for a unit of study, unless granted exemption by the Dean or Head of School most concerned. The Dean or Head of School most concerned may determine that a student fails a unit of study because of inadequate attendance. Alternatively, at their discretion, they may set additional assessment items where attendance is lower than 90%.

10 Special consideration for illness, injury or misadventure

Special consideration is a process that affords equal opportunity to students who have experienced circumstances that adversely impact their ability to adequately complete an assessment task in a unit of study. The Coursework Rule provides full details of the University policy and procedures.
11 Concessional pass

In this Faculty the grade PCON (Concessional Pass) is not awarded.

12 Re-assessment

The Faculty does not offer opportunities for re-assessment other than on the grounds of approved special consideration.

Part 4: Progression, Results and Graduation

13 Satisfactory progress

The faculty will monitor students for satisfactory progress towards the completion of their award course. In addition to the common triggers used to identify students not meeting academic progression requirements (as defined by the Progression requirements of the Coursework Rule), students must pass any unit of study identified in the course resolutions as being critical to progression through the course.

14 Award of the bachelor’s degree with honours

Honours is available to meritorious students as either appended honours or integrated honours. Admission, requirements and award for the honours courses are in accordance with the relevant course resolutions.

15 Weighted average mark (WAM)

(1) WAMS are used by the University as one indicator of performance. For example, WAMS can be used in assessing admission to and award of honours, eligibility for prizes and scholarships, or assessing progress through a course. The University WAM is calculated using the following formula:

\[
WAM = \frac{\text{sum}(Wc \times Mc)}{\text{sum}(Wc)}
\]

where \(Wc\) is the unit of study credit points \(x\) the unit weighting and \(Mc\) is the mark achieved for the unit. The mark used for units with a grade AF and DF is zero. Pass/ fail units and a grade of DNF or credited units from other institutions are not counted.

(2) For undergraduate students in Engineering and IT courses, the weightings are 0 for 1000 level units, 2 for 2000 level units, 3 for 3000 level units and 4 for 4000 level or above units. For postgraduate students in Engineering and IT courses, the weighting is 1 for all units of study.

16 Faculty of Engineering and Information Technologies specific Weighted Average Mark Indicators.

(1) Intermediate/ Senior Weighted average mark (ISWAM)
The Faculty of Engineering and Information Technologies uses an Intermediate/ Senior Weighted average mark (ISWAM) to determine eligibility for entry to undergraduate Honours pathways or programs. ISWAM is calculated by applying the university WAM formula to all Level 2000 and Level 3000 units of study only. An ISWAM of 65 is required for entry to Honours pathways in the Faculty of Engineering and Information Technologies.

(2) Honours Weighted Average Mark (HWAM)

(a) HWAM is the honours weighted average mark for Bachelor of Engineering undergraduate courses. HWAM is calculated by applying the university WAM formula, with the additional condition that research thesis units of study are given double weighting of 8.

(b) The HWAM is used for honours assessment in Bachelor of Engineering degrees including combined degrees. All units of study attempted in a Bachelor of Engineering single or combined degree are included in the calculation regardless of whether they are core Bachelor of Engineering program units or not.

Part 5: Other

17 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Students who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering

Bachelor of Engineering

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH000</td>
<td>Bachelor of Engineering</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

1. The Bachelor of Engineering is available in the following streams:
   a. School of Aerospace, Mechanical and Mechatronic Engineering
      i. Aeronautical Engineering
      ii. Aeronautical Engineering (Space)
      iii. Mechanical Engineering
      iv. Mechanical Engineering (Biomedical)
      v. Mechanical Engineering (Space)
      vi. Mechatronic Engineering
      vii. Mechatronic Engineering (Space)
   b. School of Chemical and Biomolecular Engineering
      i. Chemical and Biomolecular Engineering
   c. School of Civil Engineering
      i. Civil Engineering
      ii. Civil Engineering (Construction Management)
      iii. Civil Engineering (Environmental)
      iv. Civil Engineering (Geotechnical)
      v. Civil Engineering (Structures)
      vi. Project Engineering and Management (Civil)
   d. School of Electrical and Information Engineering
      i. Electrical Engineering
      ii. Electrical Engineering (Bioelectronics)
      iii. Electrical Engineering (Computer)
      iv. Electrical Engineering (Power)
      v. Electrical Engineering (Telecommunications)
      vi. Software Engineering

2. Completion of a stream is a requirement of the course.

4 Admission to candidature

1. Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

2. In addition, applicants who have completed the requirements of a Bachelor of Science or equivalent qualification, with a minimum WAM of 50, may apply for admission to the Bachelor of Engineering.

5 Requirements for award

1. The units of study that may be taken for the course are set out in the Bachelor of Engineering Flexible First Year table of units of study, and the tables of units of study for the specialised stream in the degree.

2. To qualify for the award of the pass degree, a candidate must successfully complete 192 credit points, comprising:
   a. core and elective units of study relating to the specialist stream, as prescribed by the table of units of study for the stream; and
   b. any additional free electives units of study as may be necessary to gain credit to complete the award.
6 Requirements for the Honours degree

(1) Honours is available to meritorious candidates who complete an alternative set of units of study in the final year of the program. Admission to the honours program is by permission of the program coordinator after the completion of third year. Admission to the honours program is by permission of the program coordinator after the completion of the necessary pre-requisites of the Honours Thesis and any other applicable progression requirements. Admission requires an ISWAM of at least 65.

(2) To qualify for the award of the honours degree a candidate must complete the requirements for the pass degree and the following additional requirements:
   (a) any additional Honours units as shown in the table of units for the degree specialisation;
   (b) achieve a minimum Honours Weighted Average Mark (HWAM) of 65; and
   (c) complete the requirements within a time limit of 5 years for a single Bachelor of Engineering degree or complete the requirements within a time limit of 6 years for a combined Engineering degree.

(3) The grade of honours will be determined by the HWAM.

(4) In exceptional circumstances the head of the relevant school may recommend to the Dean that the conditions for the award of honours be varied.

7 Award of the degree

(1) The Bachelor of Engineering is awarded in the grades of either Pass or Honours. The Bachelor of Engineering honours degree is awarded in classes ranging from First Class to Second Class, Division Two. The various classes of honours are awarded on the basis of a candidate’s HWAM.

<table>
<thead>
<tr>
<th>Description</th>
<th>HWAM Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Class I</td>
<td>75 &lt;= HWAM</td>
</tr>
<tr>
<td>Honours Class II (Division 1)</td>
<td>70 &lt;= HWAM &lt; 75</td>
</tr>
<tr>
<td>Honours Class II (Division 2)</td>
<td>65 &lt;= HWAM &lt; 70</td>
</tr>
<tr>
<td>Honours not awarded</td>
<td>HWAM &lt; 65</td>
</tr>
</tbody>
</table>

(2) A candidate who does not meet the requirements for the award of honours, but who has otherwise satisfied the requirements of the Bachelor of Engineering shall graduate with the pass degree.

8 University Medal

A student with an HWAM of 85 or above and who meets the criteria for Honours may be awarded a university medal. The medal is awarded at the discretion of the Faculty to the highest achieving student in each stream who in the opinion of the Faculty has an outstanding academic record, in accordance with the Coursework Rule.

9 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Project Management

Bachelor of Project Management
These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH059</td>
<td>Bachelor of Project Management</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Completion of a stream is a requirement of the Bachelor of Project Management course unless it is taken as part of a combined degree program. The streams available are:
   (a) Civil Engineering Science
   (b) Built Environment
   (c) Software

4 Admission to candidature

(1) Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

5 Requirements for award

(1) To qualify for the award of the pass degree, a candidate must successfully complete 144 credit points, comprising:
   (a) The core units of study as set out in the Bachelor of Project Management unit of study table;
   (b) The units of study specified for the relevant stream of the degree and
   (c) Any additional elective units of study that are applicable to the Bachelor of Project Management; and/or a maximum of 12 credit points of free electives; as may be necessary to gain credit to complete the requirements of the degree.

6 Requirements for the Honours degree

(1) Honours is available to meritorious candidates who complete an additional year of full-time study, after the completion of the pass degree. Part-time study is permitted if the Head of School is satisfied the candidate cannot undertake full-time study.

(2) To qualify for admission to the honours year a candidate should:
   (a) have qualified for, or been awarded, the pass degree or an equivalent degree from another university, including a stream or major in the intended area of study;
   (b) have a ISWAM of at least 65; and
   (c) have the permission of the relevant Head of School.

(3) To qualify for the award of the honours degree a candidate must complete 48 credit points of honours units of study from the Honours Table, as prescribed by the Head of School. The honours mark is determined by calculating a WAM from the 48 credit points of honours level units of study.

7 Award of the degree

(1) The Bachelor of Project Management is awarded in the grades of either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Third Class as below:

<table>
<thead>
<tr>
<th>Description</th>
<th>HWAM Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Class I</td>
<td>80 &gt;= HWAM</td>
</tr>
<tr>
<td>Honours Class II (Division 1)</td>
<td>75 &lt;= HWAM &lt; 80</td>
</tr>
<tr>
<td>Honours Class II (Division 2)</td>
<td>70 &lt;= HWAM &lt; 75</td>
</tr>
</tbody>
</table>

For internal use by University of Sydney staff only.
<table>
<thead>
<tr>
<th>Description</th>
<th>HWAM Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Class III</td>
<td>65 ≤ WAM &lt; 70</td>
</tr>
<tr>
<td>Honours not awarded</td>
<td>WAM &lt; 65</td>
</tr>
</tbody>
</table>

(2) Candidates for the award of the Honours degree who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

8 University Medal

A student with an honours mark of 90 or above and a minimum ISWAM of 80 may be awarded a university medal. The medal is awarded at the discretion of the Faculty to the highest achieving student in each stream who in the opinion of the Faculty have an outstanding academic record, in accordance with the Coursework Rule.

9 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2012 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Computer Science and Technology

Bachelor of Computer Science and Technology
Bachelor of Computer Science and Technology (Advanced)
Bachelor of Computer Science and Technology (Honours)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH043</td>
<td>Bachelor of Computer Science and Technology</td>
</tr>
<tr>
<td>HH043</td>
<td>Bachelor of Computer Science and Technology (Advanced)</td>
</tr>
<tr>
<td>HH044</td>
<td>Bachelor of Computer Science and Technology (Honours)</td>
</tr>
<tr>
<td>HH044</td>
<td>Bachelor of Computer Science and Technology (Advanced) (Honours)</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is available in full time or part-time according to candidate choice.

3 Admission to candidature

(1) Admission to these courses is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

(2) Candidates for the Bachelor of Science at the University of Sydney may apply to transfer their candidature to the Bachelor of Computer Science and Technology, or the Advanced degree, providing that the applicant has completed 1000-level units of study in mathematics and computer science equivalent to the those specified in the Bachelor of Computer Science and Technology table of units.

4 Requirements for award

(1) The units of study that may be taken for the degrees are set out in the table of units of study: Bachelor of Computer Science and Technology.

(2) To qualify for the award of the Bachelor of Computer Science and Technology, a candidate must successfully complete 144 credit points, comprising:
   (a) core units of study for a Computer Science stream or an Information Systems stream as shown in the units of study tables for this course;
   (b) 18 credit points of selected Mathematics and Statistics units, with at least six credit points at 2000-level or above;
   (c) a maximum of 54 credit points of elective units of study for either stream;
   (d) and ensuring
      (i) no more than 72 credit points in junior (1000-level) units of study; and
      (ii) at least 36 credit points in 3000-level or above.

(3) To qualify for the award of the Bachelor of Computer Science and Technology (Advanced), a candidate must successfully complete 144 credit points specified in the Bachelor of Computer Science and Technology above, except:
   (a) a minimum of 12 credit points of 2000-level core and recommended elective units are at the Advanced level; and
   (b) a minimum of 12 credit points of 3000-level core and recommended elective units are at the Advanced level.

5 Streams

(1) Completion of a stream is a requirement of the course. Candidates have the option of completing up to two streams. Candidates must follow the progression of study as prescribed by the table of units of study for the stream. Units of study counted towards one stream may not count toward any other stream completed. The streams available are:
   (a) Computer Science
   (b) Information Systems.
6 Progression rules

Candidates for the Bachelor of Computer Science and Technology (Advanced) must maintain a credit average in each year of enrolment. If this level of result is not achieved, candidates will be transferred to the Bachelor of Computer Science and Technology degree program with full credit for units of study already completed.

7 Requirements for the Honours degree

1. Honours is available to meritorious candidates who complete an additional year of full-time study, after the completion of the pass degree. Part-time study is permitted if the Head of School is satisfied the candidate cannot undertake full-time study.

2. To qualify for admission to the honours year a candidate should:
   (a) have qualified for, or been awarded, the pass degree or an equivalent degree from another university, including a stream or major in the intended area of study;
   (b) have a ISWAM of at least 65; and
   (c) have the permission of the relevant Head of School.

3. To qualify for the award of the honours degree a candidate must complete 48 credit points of honours units of study from the Honours Table, as prescribed by the Head of School. The honours mark is determined by calculating a WAM from the 48 credit points of honours level units of study.

4. Candidates qualified to enrol in two honours streams may either:
   (a) complete the honours courses in the two streams separately and in succession; or
   (b) complete a joint honours course, equivalent to an honours course in a single stream, in the two streams.

5. A joint honours course shall comprise such parts of the two honours courses as may be decided by the Head of School.

8 Award of the degree

1. The Bachelor of Computer Science and Technology and the Bachelor of Computer Science and Technology (Advanced) are awarded in the grades of either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Third Class as below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Honours Mark Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Class I</td>
<td>$80 \leq WAM $</td>
</tr>
<tr>
<td>Honours Class II (Division 1)</td>
<td>$75 \leq WAM &lt; 80 $</td>
</tr>
<tr>
<td>Honours Class II (Division 2)</td>
<td>$70 \leq WAM &lt; 75 $</td>
</tr>
<tr>
<td>Honours Class III</td>
<td>$65 \leq WAM &lt; 70 $</td>
</tr>
<tr>
<td>Honours not awarded</td>
<td>WAM &lt; 65</td>
</tr>
</tbody>
</table>

2. Candidates for the award of the Honours degree who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

9 University Medal

A student with an honours mark of 90 or above and a minimum ISWAM of 80 may be awarded a university medal. The medal is awarded at the discretion of the Faculty to the highest achieving students who in the opinion of the Faculty have an outstanding academic record, in accordance with the Coursework Rule.

10 Transitional provisions

1. These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

2. Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Information Technology

Bachelor of Information Technology (Honours)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH041</td>
<td>Bachelor of Information Technology</td>
</tr>
<tr>
<td>HH045</td>
<td>Bachelor of Information Technology (Honours)</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Admission to candidature

(1) Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

(2) Applicants from other Engineering and Information Technologies or Science degree programs at the University of Sydney who have completed at least 48 credit points may be permitted to transfer to the Bachelor of Information Technology degree if their mark averaged over all attempted units of study is 70 or greater.

4 Requirements for award

(1) The units of study that may be taken for the courses are set out in the Bachelor of Information Technology units of study table.

(2) To qualify for the award of the pass degree, a candidate must successfully complete 192 credit points, comprising:

(a) a minimum of 144 credit points of core and selected core units of study in the chosen stream; and

(b) 18 credit points of selected Mathematics and Statistics units, with at least six credit points at 2000-level or above; and

(c) 30 credit points of elective units of study;

(d) and ensuring:

(i) no more than 72 credit points in junior (1000-level) units of study, and

(ii) at least 84 credit points in 3000-level or above units of study.

5 Streams

(1) Completion of a stream is a requirement of the course. Candidates have the option of completing up to two streams. Candidates must follow the progression of study as prescribed by the table of units of study for the stream. The streams available are:

(a) Computer Science

(b) Information Systems.

6 Progression rules

Candidates must maintain a credit average in 1000 and 2000-level core units. If this level of result is not achieved, candidates will be transferred to the Bachelor of Computer Science and Technology degree program with full credit for units of study already completed.

7 Requirements for the Honours degree

(1) Honours is available to meritorious candidates who complete an alternative set of units of study in the final year of the program. Candidates shall complete the requirements for the honours course full-time over two consecutive semesters. Part-time study is permitted if the Head of Department/ Discipline/ Program Coordinator is satisfied the candidate cannot undertake full-time study.

(2) Admission to the honours program is by permission of the program coordinator after the completion of third year. Admission requires an ISWAM of at least 65 in units of study completed to that point.

(3) To qualify for the award of the honours degree a candidate must complete the requirements for the pass degree but include the alternative 24 credit point honours pathway described in the table of units for the degree, 24 credit points in 4000 or 5000-level selected core units.
of study and achieve a Computer Science Honours Result of 65 or above. Completion of the degree is required in the minimum standard full time duration. The honours mark will be determined by calculating the WAM in all 4000 and 5000-level units completed.

4. Candidates qualified to enrol in two honours courses may either:
   (a) complete the honours courses in the two streams separately and in succession; or
   (b) complete a joint honours course, equivalent to an honours course in a single stream, in the two streams.

5. A joint honours course shall comprise such parts of the two honours courses as may be decided by the Dean.

8 Award of the degree

1. The Bachelor of Information Technology is awarded in the grades of either Pass or Honours. The honours degree is awarded in classes ranging from First Class to Third Class as below:

<table>
<thead>
<tr>
<th>Description</th>
<th>Honours Mark Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Honours Class I</td>
<td>80 &lt;= WAM</td>
</tr>
<tr>
<td>Honours Class II (Division 1)</td>
<td>75 &lt;= WAM &lt; 80</td>
</tr>
<tr>
<td>Honours Class II (Division 2)</td>
<td>70 &lt;= WAM &lt; 75</td>
</tr>
<tr>
<td>Honours Class III</td>
<td>65 &lt;= WAM &lt; 70</td>
</tr>
<tr>
<td>Honours not awarded</td>
<td>WAM &lt; 65</td>
</tr>
</tbody>
</table>

2. A candidate who does not meet the requirements for the award of honours but who have otherwise satisfied the requirements of the Bachelor of Information Technology shall graduate with the pass degree.

9 University Medal

A student with an honours mark of 90 or above and a minimum ISWAM of 80 may be awarded a university medal. The medal is awarded at the discretion of the Faculty to the highest achieving students who in the opinion of the Faculty have an outstanding academic record, in accordance with the Coursework Rule.

10 Course transfer

1. Candidates may apply to the Dean for permission to transfer candidature to the Bachelor of Computer Science and Technology. There is no WAM requirement for candidates wishing to transfer to the standard Bachelor of Computer Science and Technology degree.

2. Candidates enrolled in the Bachelor of Information Technology who have satisfied the requirements of the Bachelor of Science, Bachelor of Science (Advanced), Bachelor of Computer Science and Technology or Bachelor of Computer Science and Technology (Advanced) may elect to transfer to such degree with the permission of the faculty.

11 Transitional provisions

1. These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

2. Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Combined degrees

Bachelor of Engineering and Bachelor of Arts

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>HH016</td>
<td>Bachelor of Engineering and Bachelor of Arts</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Streams available for the Bachelor of Engineering are listed under the course resolution for the Bachelor of Engineering.

(2) Completion of a stream is a requirement of the Bachelor of Engineering.

4 Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Arts and Social Sciences shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Engineering are set out in the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies.

(2) The units of study that may be taken for the Bachelor of Arts are set out in Table A from the Faculty of Arts and Social Sciences Tables of units of study.

(3) To qualify for the award of the combined degree, a candidate must complete 240 credit points.

(4) For the Bachelor of Engineering a candidate must complete all units of study prescribed in the table of units for the Bachelor of Engineering stream the candidate is pursuing.

(5) For the Bachelor of Arts a candidate must complete a total of 84 credit points from Table A, including:

(a) a major from Table A;

(b) a minimum 54 credit points of 2000/3000 level units of study.

7 Majors

Completion of a Table A major is a requirement of the Bachelor of Arts component of the combined degree. The list of Table A majors is specified in the resolutions of the Faculty of Arts and Social Sciences.

8 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Engineering or Bachelor of Arts. The Bachelor of Arts Honours program may be completed part time over two years with permission of the administering department or program.

(2) Admission and award requirements for honours in the Bachelor of Engineering and are listed in the resolution for the Bachelor of Engineering degree. Admission and award requirements for honours in the Bachelor of Arts are listed in the resolutions of the Faculty of Arts and Social Sciences.

9 Award of the degrees

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Engineering and the Bachelor of Arts are awarded in the grades of either Pass or Honours. The Bachelor of Engineering honours degree is awarded in classes ranging from First Class to Second Class, and the Bachelor of Arts honours degree is awarded in classes ranging from First Class to Second Class, according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and Faculty of Arts and Social Sciences.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Engineering (Honours) but who have otherwise satisfied the requirements of the Bachelor of Engineering shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Arts (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

10 Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Engineering or the Bachelor of Arts in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to candidature for that course and completion in accordance with the resolutions governing that degree.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who
(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Commerce

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<thead>
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<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>HH014</td>
<td>Bachelor of Engineering and Bachelor of Commerce</td>
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</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

1. Streams available for the Bachelor of Engineering are listed under the course resolution for the Bachelor of Engineering.
2. Completion of a stream is a requirement of the Bachelor of Engineering.

4 Cross faculty management

1. Candidates in this combined degree will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.
2. The Deans of the Faculty of Engineering and Information Technologies and The University of Sydney Business School shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

1. The units of study that may be taken for the Bachelor of Engineering are set out in the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies.
2. The units of study that may be taken for the Bachelor of Commerce are set out in the Table of undergraduate units of study from The University of Sydney Business School.
3. To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points.
4. For the Bachelor of Engineering, candidates must complete all units of study prescribed in the table of units for the Bachelor of Engineering stream the candidate is pursuing.
5. For the Bachelor of Commerce, candidates must complete 96 credit points of units of study selected from the Table of undergraduate units of study from The University of Sydney Business School including:

(a) 36 credit points of core units of study (30 junior credit points and six senior credit points); and
(b) a major; and
(c) at least 48 credit points at 2000 and/or 3000 levels.

7 Majors

Completion of a major is a requirement of the Bachelor of Commerce component of the combined degree. The majors available and requirements are outlined in the resolutions for the Bachelor of Commerce.

8 Requirements for the Honours degree

1. Honours is available to meritorious candidates, in either or both the Bachelor of Engineering or Bachelor of Commerce. The Bachelor of Commerce Honours program may be completed part time over two years with the permission of The University of Sydney Business School.
2. Admission and award requirements for honours in the Bachelor of Engineering are listed in the resolution for the Bachelor of Engineering degree. Admission and award requirements for honours in the Bachelor of Commerce are listed in the resolutions of The University of Sydney Business School.

9 Award of the degrees

1. Candidates will be awarded a separate testamur for each degree completed.
2. The Bachelor of Engineering and the Bachelor of Commerce are awarded in the grades of either Pass or Honours. The Bachelor of Engineering honours degree is awarded in classes ranging from First Class to Second Class, and the Bachelor of Commerce honours degree is awarded in classes ranging from First Class to Third Class, according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and The University of Sydney Business School.
3. Candidates who do not meet the requirements for the award of the Bachelor of Engineering (Honours) but have otherwise satisfied the requirements of the Bachelor of Engineering shall graduate with the pass degree.
4. Candidates for the award of the Bachelor of Commerce (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

10 Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Engineering or the Bachelor of Commerce in accordance with the resolutions governing that degree. Transfer from a combined degree to the Bachelor of Commerce is also conditional on the student having met the entry requirements of the Bachelor of Commerce in force at the time of their enrolment in the combined degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

11 Transitional provisions

1. These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
2. Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Design in Architecture

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1. Course codes

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<tbody>
<tr>
<td>H1046</td>
<td>Bachelor of Engineering and Bachelor of Design in Architecture</td>
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</tbody>
</table>

2. Attendance pattern

The attendance pattern for this course is full time only.

3. Streams

(1) The Bachelor of Engineering is available only in the Civil Engineering stream in this combined degree program. Completion of a stream is a requirement of the Bachelor of Engineering.

(2) Streams available for the Bachelor of Design in Architecture are listed under the course resolution for the Bachelor of Design in Architecture. Completion of a stream is not a requirement of the course. Candidates may transfer between streams in the Bachelor of Design in Architecture.

4. Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Architecture, Design and Planning shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5. Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6. Requirements for award

To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points in accordance with the unit of study tables for the Civil Engineering combined with Design in Architecture degree.

7. Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Engineering or the Bachelor of Design in Architecture.

8. Award of the degrees

(2) Admission and award requirements for honours in the Bachelor of Engineering are listed in the resolution for the Bachelor of Engineering degree. Admission and award requirements for honours in the Bachelor of Design in Architecture are listed in the resolutions of the Faculty of Architecture, Design and Planning.

9. Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Engineering or the Bachelor of Design in Architecture in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

10. Transitional provisions

(1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Laws

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>HH018</td>
<td>Bachelor of Engineering and Bachelor of Laws</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

Completion of a stream is a requirement of the Bachelor of Engineering. Streams available for the Bachelor of Engineering are listed under the course resolution for the Bachelor of Engineering.

4 Cross-faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies until the end of the semester in which they complete the requirements for the Bachelor of Engineering. They will then be under the supervision of the Faculty of Law.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Law shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for this combined degree are set out in the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies and in the Faculty of Law Undergraduate Table.

(2) To qualify for the award of the pass degrees in the combined program, a candidate must complete 288 credit points, comprising:

   (a) 144 credit points of units of study from the table of units for the Bachelor of Engineering, appropriate to the stream the candidate is pursuing; and

   (b) 144 credit points of Law units of study, of which 48 credit points are Combined Law compulsory units of study for years 1, 2 and 3 and are credited towards the requirements for both the Bachelor of Engineering and the Bachelor of Laws.

(3) Requirements for the Bachelor of Engineering

To qualify for the award of the Bachelor of Engineering, candidates must complete 192 credit points comprising:

   (i) 48 credit points of Combined Law compulsory units of study for Years 1, 2, and 3; and

   (ii) 144 credit points of units of study from the table of units for the Bachelor of Engineering, appropriate to the stream the candidate is pursuing.

(4) Requirements for the Bachelor of Laws

To qualify for the award of the Bachelor of Laws, candidates must complete 144 credit points taken from the Faculty of Law Undergraduate Table, comprising:

   (i) 102 credit points of compulsory units of study; and

   (ii) 42 credit points of elective units of study, of which a maximum of 36 credit points are taken from Part 1 and a minimum of 6 credit points are taken from Part 2.

7 Progression rules

(1) Candidates in a combined law program must successfully complete LAWS1006 Foundations of Law before enrolling in any other Bachelor of Laws units of study.

(2) Candidates are required to complete the Bachelor of Laws units of study in the order listed in the Faculty of Law Undergraduate Table.

(3) Except with permission of the Dean of the Faculty of Law, candidates must complete the requirements for the Bachelor of Engineering before proceeding to Year Five of the Bachelor of Laws.

8 Requirements for the Honours degree

(1) Both the Bachelor of Engineering and the Bachelor of Laws may be awarded with honours.

(2) Honours in the Bachelor of Engineering is available to meritorious students who complete an alternative set of units in the final year of the program.

(3) Honours in the Bachelor of Laws is available to meritorious students who complete an alternative set of units of study in the final year of the program.

(4) The admission and award requirements for honours in either Engineering or Law are listed in the resolutions of the Bachelor of Engineering and Bachelor of Laws respectively.

9 Award of the degrees

(1) The Bachelor of Engineering and Bachelor of Laws are awarded in the grades of either Pass or Honours.

(2) Honours in the Bachelor of Engineering is awarded in First or Second Class in accordance with the resolutions of the Bachelor of Engineering.

(3) Honours in the Bachelor of Laws is awarded in First Class or Second Class in accordance with the resolutions of the Bachelor of Laws.

10 Course transfer

A candidate may withdraw from the combined degree program and elect to transfer to the Bachelor of Engineering, by written application to the Faculty of Engineering and Information Technologies, and complete the requirements in accordance with the resolutions governing that degree at the time of transfer. Candidature in the Bachelor of Laws will cease in these circumstances.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature on or after 1 January, 2011.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Medical Science

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1. Course codes

<table>
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<th>Code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>HH021</td>
<td>Bachelor of Engineering and Bachelor of Medical Science</td>
</tr>
</tbody>
</table>

2. Attendance pattern

The attendance pattern for this course is full time only.

3. Streams

(1) Streams available for the Bachelor of Engineering are listed under the course resolution for the Bachelor of Engineering.

(2) Completion of a stream is a requirement of the Bachelor of Engineering.

4. Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Science shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5. Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6. Progression rules

General progression rules for the combined degree are covered by the resolutions of the Faculty of Engineering and Information Technologies.

7. Requirements for award

(1) The units of study that may be taken for the Bachelor of Engineering are set out in the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies.

(2) The units of study that may be taken for the Bachelor of Medical Science are listed in Table IV for the Bachelor of Medical Science from the Faculty of Science.

(3) To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points.

(4) For the Bachelor of Engineering, candidates must complete all units of study prescribed in the table of units for the Bachelor of Engineering stream the candidate is pursuing, noting that the mathematics requirement for this degree will also satisfy the mathematics requirements for the Bachelor of Medical Science.

(5) For the Bachelor of Medical Science a candidate must complete 102 credit points of units including:

(a) A minimum of 30 credit points from junior Science units of study, including:

(i) 12 credit points from Mathematics; and
(ii) 12 credit points from Chemistry; and
(iii) MBLG1001/1901 Introductory Molecular Biology and Genetics.

(b) 48 credit points from intermediate Science units of study, comprising:

(i) 36 credit points of BMED240X units from Table IVB for the Bachelor of Medical Science; and
(ii) MBLG2X71 Molecular Biology and Genetics A; and
(iii) MBLG2X72 Molecular Biology and Genetics B.

(c) A minimum of 24 credit points of senior Science units of study selected from the subject areas of Anatomy/ Histology, Biology (Genetics), Biochemistry, Cell Pathology, Histology, Immunology, Infectious Diseases, Microbiology, Neuroscience, Nutrition & Metabolism, Pharmacology, Physiology and Virology.

8. Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Engineering or Bachelor of Medical Science. Honours requires the completion of an alternative set of units in the final year of the Bachelor of Engineering degree and of one additional full time year of study for the Bachelor of Medical Science degree. The Resolutions of the Faculty of Science allow for part time honours in certain circumstances.

(2) Admission and award requirements for honours in the Bachelor of Engineering are listed in the resolution for the Bachelor of Engineering degree. Admission and award requirements for honours in the Bachelor of Medical Science are listed in the resolutions of the Faculty of Science.

9. Award of the degrees

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Engineering and the Bachelor of Medical Science are awarded in the grades of either Pass or Honours. The Bachelor of Engineering honours degree is awarded in classes ranging from First Class to Second Class, and the Bachelor of Medical Science honours degree is awarded in classes ranging from First Class to Third Class, according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and the Faculty of Science.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Engineering (Honours) but who have otherwise satisfied the requirements of the Bachelor of Engineering shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Medical Science (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

(5) If the senior Science units of study completed by a candidate to satisfy section 7(5)(c) form a Science Table 1 major, the candidate shall have that major recorded on the Bachelor of Medical Science testamur at the completion of the degree.

10. Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Engineering or the Bachelor of Medical Science in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.
11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.

(2) Candidates who commenced their candidature prior to 1 January, 2012 may complete the requirements in accordance with the resolutions in force at the time of their commencement.

(3) Candidates who have completed some, but not all, of the intermediate core units listed in Table IV prior to 1 January 2012 should consult the transitional provisions in the resolutions for the Bachelor of Medical Science degree, for information on completion of the required 36 credit points of BMED240X units.
Bachelor of Engineering and Bachelor of Project Management

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
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<tbody>
<tr>
<td>HH063</td>
<td>Bachelor of Engineering and Bachelor of Project Management combined degree</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Completion of an Engineering stream is a requirement of the combined degree program. Completion of a Project Management stream is not a requirement for the combined degree. The Engineering streams available are the same as those available for Bachelor of Engineering, BE.

4 Admission to candidature

(1) Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

5 Requirements for award

(1) To qualify for the award of the pass degree, a candidate must successfully complete 240 credit points, comprising:
(a) The core units of study as set out in the Bachelor of Project Management unit of study table;
(b) The units of study specified for the relevant stream of Engineering and
(c) Any additional elective units of study as may be necessary to gain credit to complete the requirements of the degree.

6 Requirements for Honours

(1) Honours in Engineering is available in the combined degree to meritorious candidates who complete additional Honours level Research projects during the final year of the program. The rules covering award of Honours for Engineering are listed in the resolutions for the Bachelor of Engineering degree, BE.
(2) Honours in Project Management is available to meritorious candidates who complete an additional year of full-time study, after the completion of the combined degree. The rules for Honours in Project Management are detailed in the resolutions for the Bachelor of Project Management degree, BPM.

9 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.
(2) Candidates who commenced prior to 1 January, 2012 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Science

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<tbody>
<tr>
<td>HH015</td>
<td>Bachelor of Engineering and Bachelor of Science</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Streams available for the Bachelor of Engineering are listed in the course resolution for the Bachelor of Engineering. Completion of a stream is a requirement of the Bachelor of Engineering.

(2) The Bachelor of Science degree is available in the following streams:

   (a) Advanced

   (b) Advanced Mathematics.

(3) Completion of a stream is not a requirement of the Bachelor of Science. Candidates wishing to transfer between streams should contact the Faculty student office.

4 Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Science shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Engineering are set out in the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies.

(2) The units of study that may be taken for the Bachelor of Science are listed in Table 1 from the Faculty of Science.

(3) To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points, comprising:

   (a) a minimum of 144 credit points of units of study prescribed for the Bachelor of Engineering stream the candidate is pursuing; and

   (b) 96 credit points of Science units of study, including one major in a Science subject area.

(4) Candidates completing the Bachelor of Science in the Advanced or the Advanced Mathematics stream must include as part of the above requirements:

   (a) a minimum of 54 credit points of intermediate or senior Science units of study, of which at least 36 credit points shall be completed at either the Advanced level or as Talented Student Program (TSP) units of study; and

   (b) a minimum of 24 credit points of senior Science units of study at either the Advanced level or as TSP units in a single Science subject area.

7 Majors

Completion of a major is a requirement of the Bachelor of Science component of the combined degree. The list of majors available in the Bachelor of Science is specified in the course resolutions for the Bachelor of Science.

8 Progression rules

(1) Candidates enrolled in the Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) are required to maintain a minimum average mark of 65 in all intermediate and senior units of study in Science subject areas in each year of enrolment. Failure to maintain the required average will result in candidates being transferred to the Bachelor of Science in their next year of enrolment with full credit for the units of study completed.

(2) Candidates enrolled in the Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) who fail to achieve an average mark of 65 across all Science units of study attempted in their final year but have otherwise completed all the requirements of the degree will be awarded the Bachelor of Science.

(3) General progression rules for the combined degree are covered by the resolutions of the Faculty of Engineering and Information Technologies.

9 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Engineering or Bachelor of Science. Honours requires the completion of an alternative set of units in the final year of the Bachelor of Engineering degree and of one additional full time year of study for the Bachelor of Science degree. The Science honours course may be undertaken part time over two years if the Faculty of Science is satisfied the candidate cannot undertake honours full time.

(2) Admission and award requirements for honours in the Bachelor of Engineering are listed in the resolution for the Bachelor of Engineering degree. Admission and award requirements for honours in the Bachelor of Science are listed in the resolutions of the Faculty of Science.

10 Award of the degree

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Engineering and the Bachelor of Science are awarded in the grades of either Pass or Honours. The Bachelor of Engineering honours degree is awarded in classes ranging from First Class to Second Class, and the Bachelor of Science honours degree is awarded in classes ranging from First Class to Third Class, according to the rules specified in the Resolutions of the Bachelor of Engineering and the Faculty of Science.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Engineering (Honours) but who have otherwise satisfied the requirements of the Bachelor of Engineering shall graduate with the pass degree.
(4) Candidates for the award of the Bachelor of Science (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

11 Course transfer

A candidate may abandon the combined program and elect to complete the either the Bachelor of Engineering or the Bachelor of Science in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

12 Transitional provisions

(1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Engineering and Bachelor of Science

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Double degree course resolutions

1 Course codes

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<tr>
<th>Code</th>
<th>Course title</th>
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</thead>
<tbody>
<tr>
<td>HH000</td>
<td>Bachelor of Engineering</td>
</tr>
<tr>
<td>LH000</td>
<td>Bachelor of Science</td>
</tr>
</tbody>
</table>

2 Admission to candidature for the Bachelor of Science after partial completion of the Bachelor of Engineering

(1) A student, at the end of second or third year of candidature for the Bachelor of Engineering, may be admitted to candidature for the Bachelor of Science, to complete the Bachelor of Science degree, if:
   (a) all units of study attempted in the Bachelor of Engineering degree to date have been completed with a grade of pass or better;
   (b) at least 96 credit points from units of study in the Bachelor of Engineering degree have been completed, of which no more than 12 credit points are from units of study with the grade of pass (concessional);
   (c) the candidate is qualified to enrol in a major in a Science area;
   (d) for admission to the advanced streams, the candidate satisfies the relevant requirements in the course resolution for the Bachelor of Science degree.

(2) After completion of the Bachelor of Science, the candidate will return to complete the Bachelor of Engineering according to the resolutions for that degree.

3 Attendance pattern

The attendance pattern for the Bachelor of Science is full time over one year, or part time over two years, according to candidate choice.

4 Streams

(1) The Bachelor of Science degree is available in the following streams:
   (a) Advanced
   (b) Advanced Mathematics.

(2) Completion of a stream is not a requirement of the Bachelor of Science. Candidates wishing to transfer between Science streams should contact the Faculty student office.

5 Cross faculty management

(1) Candidates in this double degree program will be under the supervision of the Faculty of Engineering and Information Technologies for the period of Bachelor of Engineering degree enrolment, and under the supervision of the Faculty of Science for the Bachelor of Science enrolment.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Science shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Engineering are set out in the Flexible First Year table of units of study, and the tables of units of study for the specialised streams from the Faculty of Engineering and Information Technologies.

(2) The units of study that may be taken for the Bachelor of Science are listed in Table 1 from the Faculty of Science. The Dean of the Faculty of Science may permit a candidate of exceptional merit who is admitted to the Talented Student Program (TSP) to undertake a unit or units of study within the Faculty other than those specified in the tables.

(3) To qualify for the award of the Bachelor of Science in the double degree program, a candidate must successfully complete a total of 48 credit points, including:
   (a) a minimum of 42 credit points of intermediate/senior units of study in Science subject areas; and
   (b) a major in a Science area.

(4) Candidates completing the Bachelor of Science in the Advanced stream must include as part of the above requirements:
   (a) a minimum of 24 credit points of senior Science units of study at the Advanced level or as TSP units in a single Science subject area.

(5) Candidates completing the Bachelor of Science in the Advanced Mathematics stream must include as part of the above requirements:
   (a) a major in Mathematics, Statistics or Financial Mathematics and Statistics;
   (b) a minimum of 12 credit points of intermediate units of study at either the advanced level or as TSP units in the Science subject areas of Mathematics and Statistics;
   (c) a minimum of 24 credit points of senior Science units of study at the Advanced level or as TSP units in the Science subject areas of Mathematics and Statistics.

7 Majors

Completion of a major is a requirement of the Bachelor of Science. The list of majors available in the Bachelor of Science is specified in the course resolutions for the Bachelor of Science.

8 Progression rules

(1) The requirements for Bachelor of Science must be completed in one year of full-time study or two years of part-time study. Candidates who complete at least 42 but less than 48 credit points in the prescribed time limits may, in the following year of enrolment in the Bachelor of Engineering, complete the remaining credit points to satisfy the requirements of the Bachelor of Science. Candidates who complete less than 42 credit points will resume their candidature in the Bachelor of Engineering in the following semester of enrolment.

(2) Candidates enrolled in the Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) are required to maintain a minimum average mark of 65 in all intermediate and senior units of study in Science. Failure to maintain the required average will result in candidates being transferred to the Bachelor of Science.

(3) General progression rules for the combined degree are covered by the resolutions of the Faculty of Engineering and Information Technologies.

9 Requirements for the Honours degree

(1) Honours in the Bachelor of Science is available to merititorious candidates who complete an additional year of full time study, after the completion of the pass degree. Part time study over two years may be permitted if the Faculty is satisfied the candidate cannot undertake honours full time. Admission, requirements and award of honours are according to the Resolutions of the Faculty of Science.

(2) Candidates for the Bachelor of Science (Honours) must suspend their candidature in the Bachelor of Engineering.
On completion of the requirements of the Bachelor of Science (Honours) degree, candidates will be eligible to resume their enrolment toward the Bachelor of Engineering degree according the Faculty of Engineering and Information Technologies course resolutions for the degree. Alternatively, honours in the Bachelor of Science may be undertaken after successful completion of both the Bachelor of Science and Bachelor of Engineering degrees.

(3) Admission and award requirements for honours in the Bachelor of Engineering are listed in the resolution for the Bachelor of Engineering degree.

10 Award of the degree

(1) Candidates will be awarded a separate testamur for the Bachelor of Science and the Bachelor of Engineering.

(2) The Bachelor of Science is awarded with the grade Pass or Honours. The honours degree is awarded in classes ranging from First Class to Third Class, according to the rules specified in the Resolutions of the Faculty of Science.

(3) Candidates for the award of the Bachelor of Science (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

11 Course transfer

Candidates may abandon the Bachelor of Science degree at any stage and resume their enrolment in the Bachelor of Engineering. Completion of the Bachelor of Science in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

12 Transitional provisions

(1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Information Technology and Bachelor of Arts

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<th>Code</th>
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<tbody>
<tr>
<td>HH047</td>
<td>Bachelor of Information Technology and Bachelor of Arts</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Streams

(1) Completion of a stream is a requirement of the Bachelor of Information Technology. The streams available and requirements are outlined in the resolutions for the Bachelor of Information Technology.

(2) Candidates wishing to transfer between streams should contact the Faculty student office.

4 Cross-faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Arts and Social Sciences shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Information Technology are set out in the Bachelor of Information Technology units of study table.

(2) The units of study that may be taken for the Bachelor of Arts are set out in Table A from the Faculty of Arts and Social Sciences Tables of units of study.

(3) To qualify for the award of the combined Bachelor of Information Technology and Bachelor of Arts degree, a candidate must successfully complete a total of 240 credit points.

(4) For the Bachelor of Information Technology a candidate must complete 144 credit points of core and 12 credit points of elective units selected from the table of units for the Bachelor of Information Technology stream the candidate is pursuing.

(5) For the Bachelor of Arts a candidate must complete a total of 84 credit points from Table A, including:

(a) a major from Table A;

(b) a minimum 54 credit points of 2000/3000 level units of study.

7 Majors

Completion of a Table A major is a requirement for the Bachelor of Arts. The majors available and requirements are outlined in the resolutions of the Faculty of Arts.

8 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Information Technology or the Bachelor of Arts. Honours requires the completion an alternative set of units in the final year of the Bachelor of Information Technology degree and of one additional full time year of study for the Bachelor of Arts degree. The Bachelor of Arts Honours program may be completed part time over two years with permission of the administering department or program.

(2) Admission and award requirements for honours in the Bachelor of Information Technology are listed in the resolution for the Bachelor of Information Technology degree.

Admission and award requirements for honours in the Bachelor of Arts are listed in the resolutions of the Faculty of Arts and Social Sciences.

9 Award of the degrees

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Information Technology and the Bachelor of Arts are awarded in the grade of either Pass or Honours. The honours degrees are awarded in classes ranging from First Class to Third Class according to the rules specified in the course resolutions for the Bachelor of Information Technology and the Resolutions of the Faculty of Arts and Social Sciences.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Information Technology (Honours) but who have otherwise satisfied the requirements of the Bachelor of Information Technology shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Arts (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

10 Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Information Technology or the Bachelor of Arts in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Information Technology and Bachelor of Commerce

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions), Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<td>HH042</td>
<td>Bachelor of Information Technology and Bachelor of Commerce</td>
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</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Completion of a stream is a requirement of the Bachelor of Information Technology. The streams available and requirements are outlined in the resolutions for the Bachelor of Information Technology.

(2) Candidates wishing to transfer between streams should contact the Faculty student office.

4 Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and The University of Sydney Business School shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Information Technology are set out in the Bachelor of Information Technology units of study table.

(2) The units of study that may be taken for the Bachelor of Commerce are set out in the Table of undergraduate units of study from The University of Sydney Business School.

(3) To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points.

(4) For the Bachelor of Information Technology a candidate must complete 144 credit points of core units selected from the table of units for the Bachelor of Information Technology stream the candidate is pursuing.

(5) For the Bachelor of Commerce a candidate must complete 96 credit points selected from the Table of undergraduate units of study from The University of Sydney Business School including:

(a) 36 credit points of core units of study (30 junior credit points and six senior credit points); and

(b) a major; and

(c) at least 48 credit points at 2000 and/or 3000 levels.

7 Majors

Completion of a major is a requirement for the Bachelor of Commerce. The majors available and requirements are outlined in the resolutions for the Bachelor of Commerce.

8 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Information Technology or the Bachelor of Commerce. Honours requires the completion an alternative set of units in the final year of the Bachelor of Information Technology degree and of one additional full-time year of study for the Bachelor of Commerce degree. The Bachelor of Commerce Honours program may be completed part time over two years with the permission of The University of Sydney Business School.

(2) Admission and award requirements for honours in the Bachelor of Information Technology are listed in the course resolution for the Bachelor of Information Technology degree. Admission and award requirements for honours in the Bachelor of Commerce are listed in the resolutions of The University of Sydney Business School.

9 Award of the degrees

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Information Technology and the Bachelor of Commerce are awarded in the grades of either Pass or Honours. The honours degrees are awarded in classes ranging from First Class to Third Class according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and The University of Sydney Business School.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Information Technology (Honours) but who have otherwise satisfied the requirements of the Bachelor of Information Technology shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Commerce (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

10 Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Engineering or the Bachelor of Commerce in accordance with the resolutions governing that degree. Transfer from a combined degree to the Bachelor of Commerce is also conditional on the student having met the entry requirements of the Bachelor of Commerce in force at the time of their enrolment in the combined degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

11 Transitional provisions

(1) These resolutions apply to candidates who commenced their candidature after 1 January, 2011 and candidates who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Information Technology and Bachelor of Laws

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<tr>
<td>HH051</td>
<td>Bachelor of Information Technology and Bachelor of Laws</td>
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</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Completion of a stream is a requirement of the Bachelor of Information Technology in this combined degree. The streams available are:
   (a) Computer Science
   (b) Information Systems

(2) The table of units for the Bachelor of Information Technology specifies the units required for each stream.

4 Cross-faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies until the end of the semester in which they complete the requirements for the Bachelor of Information Technology. They will then be under the supervision of the Faculty of Law.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Law shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for this combined degree are set out in the Bachelor of Information Technology units of study table and in the Faculty of Law Undergraduate Table.

(2) To qualify for the award of the pass degrees in the combined program, a candidate must complete 288 credit points, comprising:
   (a) 144 credit points of Law units of study, of which 48 credit points are Combined Law compulsory units of study for years 1, 2 and 3 and are credited towards the requirements for both the Bachelor of Information Technology and the Bachelor of Laws; and
   (b) 144 credit points of core units of study from the table of units for the Bachelor of Information Technology, appropriate to the stream the candidate is pursuing.

(3) Requirements for the Bachelor of Information Technology:

To qualify for the award of the Bachelor of Information Technology, a candidate must complete 192 credit points comprising:
   (a) 48 credit points of Combined Law compulsory units of study for Years 1, 2 and 3;
   (b) 144 credit points of core units of study from the table of units for the Bachelor of Information Technology, appropriate to the stream the candidate is pursuing, ensuring:
      (i) no more than 72 credit points of junior (1000 level) units of study, and
      (ii) at least 84 credit points of 3000-level or above units of study; and
      (iii) at least 18 credit points of Mathematics and Statistics units of study, of which at least six credit points must be 2000 level or above.

(4) Requirements for the Bachelor of Laws

To qualify for the award of the Bachelor of Laws, a candidate must complete 144 credit points taken from the Faculty of Law Undergraduate Table, comprising:
   (i) 102 credit points of compulsory units of study; and
   (ii) 42 credit points of elective units of study, of which a maximum of 36 credit points are taken from Part 1 and a minimum of 6 credit points are taken from Part 2.

7 Progression rules

(1) Candidates in a combined law program must successfully complete LAWS1006 Foundations of Law before enrolling in any other Bachelor of Laws units of study.

(2) Candidates are required to complete the Bachelor of Laws units of study in the order listed in the Faculty of Law Undergraduate Table.

(3) Except with the permission of the Dean of the Faculty of Law, candidates must complete the requirements for the Bachelor of Information Technology before proceeding to Year Five of the Bachelor of Laws.

8 Requirements for the Honours degree

(1) Both the Bachelor of Information Technology and the Bachelor of Laws may be awarded with honours.

(2) Honours in the Bachelor of Information Technology is available to meritous students who complete an alternative set of units in the final year of the program.

(3) Honours in the Bachelor of Laws is available to meritous students who complete an alternative set of units of study in the final year of the program.

(4) The admission and award requirements for honours in either Information Technology or Law are listed in the resolutions of the Bachelor of Information Technology and Bachelor of Laws respectively.

9 Award of the degrees

(1) The Bachelor of Information Technology and Bachelor of Laws are awarded in the grades of either Pass or Honours.

(2) Honours in the Bachelor of Information Technology is awarded in classes ranging from First Class to Third Class in accordance with the resolutions of the Bachelor of Information Technology.

(3) Honours in the Bachelor of Laws is awarded in First Class or Second Class in accordance with the resolutions of the Bachelor of Laws.

10 Course transfer

A candidate may withdraw from the combined program and elect to transfer to the Bachelor of Information Technology, by written application to the Faculty of Engineering and Information Technologies, and complete the requirements in accordance with the resolutions governing that degree at the time of transfer.
Candidature in the Bachelor of Laws will cease in these circumstances.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature on or after 1 January, 2011.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Bachelor of Information Technology and Bachelor of Medical Science

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<tbody>
<tr>
<td>HH048</td>
<td>Bachelor of Information Technology and Bachelor of Medical Science</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is available in full time or part time.

3 Streams

Completion of a stream is a requirement for the Bachelor of Information Technology. The streams available and requirements are outlined in the resolutions for the Bachelor of Information Technology.

4 Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Science shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Progression rules

General progression rules for the combined degree are covered by the resolutions of the Faculty of Engineering and Information Technologies.

7 Requirements for award

(1) The units of study that may be taken for the Bachelor of Information Technology are set out in the Bachelor of Information Technology units of study table.

(2) The units of study that may be taken for the Bachelor of Medical Science are listed in Table IV for the Bachelor of Medical Science from the Faculty of Science.

(3) To qualify for the award of the pass degree, a candidate must successfully complete 240 credit points.

(4) For the Bachelor of Information Technology a candidate must complete 144 credit points of in accordance with the Bachelor of Information Technology Table, consisting of all Core units of study together with additional Selected Core units for the Bachelor of Information Technology stream the candidate is pursuing, noting that:

(a) The mathematics requirement for this degree will also satisfy the mathematics requirements for the Bachelor of Medical Science; and

(b) The core INFO1XXX requirement for this degree will also satisfy the computer science requirements for the Bachelor of Medical Science degree.

(5) For the Bachelor of Medical Science a candidate must complete 120 credit points of units comprising:

(a) a minimum 48 credit points from junior Science units of study, including:
   - (i) 12 credit points from Mathematics; and
   - (ii) 12 credit points from Chemistry; and
   - (iii) 12 credit points from Computer Science; and
   - (iv) 6 credit points from Biology; and
   - (v) MBLG1001/1901 Introductory Molecular Biology & Genetics.

(b) 48 credit points from intermediate Science units of study comprising

   (1) 36 credit points of BMED240X units from Table IVB for the Bachelor of Medical Science; and

   (2) MBLG2X71 Molecular Biology and Genetics A; and

   (3) MBLG2X72 Molecular Biology and Genetics B

(c) A minimum of 24 credit points of senior Science units of study selected from the subject areas of Anatomy, Biology (Genetics), Biochemistry, Cell Pathology, Histology, Immunology, Infectious Diseases, Microbiology, Neuroscience, Nutrition and Metabolism, Pharmacology, Physiology and Virology.

8 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Information Technology or Bachelor of Medical Science. Honours requires the completion an alternative set of units in the final year of the Bachelor of Information Technology degree and of one additional full time year of study for the Bachelor of Medical Science degree. The Resolutions of the Faculty of Science allow for part time honours in certain circumstances.

(2) Admission and award requirements for honours in the Bachelor of Information Technology are outlined in the resolution for the Bachelor of Information Technology degree. Admission and award requirements for honours in the Bachelor of Medical Science are listed in the resolutions of the Faculty of Science.

9 Award of the degrees

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Information Technology and the Bachelor of Medical Science are awarded in the grades of either Pass or Honours. The honours degrees are awarded in classes ranging from First Class to Third Class according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and Faculty of Science.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Information Technology (Honours) but who have otherwise satisfied the requirements of the Bachelor of Information Technology shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Medical Science (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree.

(5) If the senior Science units of study completed by a candidate to satisfy section 7(5)(c) form a Science Table 1 major, the candidate shall have that major recorded on the Bachelor of Medical Science testamur at the completion of the degree.
10 Course transfer

A candidate may abandon the combined program and elect to complete either the Bachelor of Informational Technology or the Bachelor of Medical Science in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.

(2) Candidates who commenced their candidature prior to 1 January, 2012 may complete the requirements in accordance with the resolutions in force at the time of their commencement.

(3) Candidates who have complete some, but not all, of the intermediate core units listed in Table IV prior to January 2012 should consult the transitional provisions in the resolutions for the Bachelor of Medical Science degree, for information on completion of the required 36 credit points of BMED240X units.
Bachelor of Information Technology and Bachelor of Science

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HH049</td>
<td>Bachelor of Information Technology and Bachelor of Science</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time only.

3 Streams

(1) Completion of a stream is a requirement of the Bachelor of Information Technology. The streams available and requirements are outlined in the resolutions for the Bachelor of Information Technology.

(2) The Bachelor of Science degree is available in the following streams:
   (a) Advanced
   (b) Advanced Mathematics.

(3) Completion of a stream is not a requirement of the Bachelor of Science. Candidates wishing to transfer between streams should contact the Faculty student office.

4 Cross faculty management

(1) Candidates in this combined degree program will be under the general supervision of the Faculty of Engineering and Information Technologies for the duration of the combined program.

(2) The Deans of the Faculty of Engineering and Information Technologies and the Faculty of Science shall jointly exercise authority in any matter concerned with the combined course not otherwise dealt with in these resolutions.

5 Admission to candidature

Admission to this course is on the basis of a secondary school leaving qualification such as the NSW Higher School Certificate (including national and international equivalents), tertiary study or an approved preparation program. English language requirements must be met where these are not demonstrated by sufficient qualifications taught in English. Special admission pathways are open for mature aged applicants who do not possess a school leaving qualification, educationally disadvantaged applicants and for Aboriginal and Torres Strait Islander people. Applicants are ranked by merit and offers for available places are issued according to the ranking. Details of admission policies are found in the Coursework Rule.

6 Requirements for award

(1) The units of study that may be taken for the Bachelor of Information Technology are set out in the Bachelor of Information Technology units of study table.

(2) The units of study that may be taken for the Bachelor of Science are listed in Table 1 from the Faculty of Science.

(3) To qualify for the award of the combined degree, a candidate must successfully complete 240 credit points, comprising:

(a) units of study from the table of units for the Bachelor of Information Technology stream the candidate is pursuing, and ensuring:
   (i) no more than 72 credit points in junior (1000 level) units of study;
   (ii) at least 84 credit points in 3000-level or above units of study; and

(b) a minimum of 96 credit points Science units of study, including at least 18 credit points of Mathematics and Statistics units of study; and

(c) a major in a Science area listed in Table 1 excluding Computer Science and Information Systems;

(d) and ensuring at least 54 credit points in the intermediate and senior Science units of study.

(4) Candidates completing the Bachelor of Science in the Advanced or the Advanced Mathematics stream must include as part of the above requirements:

(a) a minimum of 54 credit points of intermediate or senior Science units of study, of which at least 36 credit points at either the Advanced level or as Talented Student Program (TSP) units of study; and

(b) a minimum of 24 credit points of senior Science units of study at either the Advanced level or as TSP units in a single Science subject area; and

(c) a minimum of 66 credit points from the intermediate and senior Science units of study.

(5) Candidates completing the Bachelor of Science in the Advanced Mathematics stream must include as part of the above requirements a minimum of 48 credit points of senior units of study in Mathematics and Statistics, including at least 24 credit points of units of study at the Advanced level or as TSP units of study.

7 Majors

Completion of a major is a requirement the Bachelor of Science. The majors available and requirements are outlined in the resolutions for the Bachelor of Science.

8 Progression rules

(1) Candidates enrolled in the Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) are required to maintain a minimum average mark of 65 in all intermediate and senior units of study in Science subject areas in each year of enrolment. Failure to maintain the required average will result in candidates being transferred to the Bachelor of Science in their next year of enrolment with full credit for the units of study completed.

(2) Candidates enrolled in the Bachelor of Science (Advanced) or Bachelor of Science (Advanced Mathematics) who fail to achieve an average mark of 65 across all Science units of study attempted in their final year but have otherwise completed all the requirements of the degree will be awarded the Bachelor of Science.

(3) General progression rules for the combined degree are covered by the resolutions of the Faculty of Engineering and Information Technologies.

9 Requirements for the Honours degree

(1) Honours is available to meritorious candidates, in either or both the Bachelor of Information Technology or the Bachelor of Science. Honours requires the completion of an alternative set of units in the final year of the Bachelor of Information Technology degree and of one additional full time year of study for the Bachelor of Science degree. The Resolutions of the Faculty of Science allow for part time honours in certain circumstances.

(2) Admission and award requirements for honours in the Bachelor of Information Technology are listed in the resolution for the Bachelor of Information Technology degree. Admission and award requirements for honours in the Bachelor of Science are listed in the resolutions of the Faculty of Science.
10 Award of the degree

(1) Candidates will be awarded a separate testamur for each degree completed.

(2) The Bachelor of Information Technology and the Bachelor of Science are awarded in the grades of either Pass or Honours. The honours degrees are awarded in classes ranging from First Class to Third Class according to the rules specified in the Resolutions of the Faculty of Engineering and Information Technologies and Faculty of Science.

(3) Candidates who do not meet the requirements for the award of the Bachelor of Information Technology (Honours) but who have otherwise satisfied the requirements of the Bachelor of Information Technology shall graduate with the pass degree.

(4) Candidates for the award of the Bachelor of Science (Honours) who do not meet the requirements, and who have not already graduated, will be awarded the pass degree merited.

11 Course transfer

A candidate may abandon the combined program and elect to complete the either the Bachelor of Information Technology or the Bachelor of Science in accordance with the resolutions governing that degree. Completion of the abandoned degree in the future will require a new application for admission to that course and completion in accordance with the resolutions governing that degree.

12 Transitional provisions

(1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
The tables in this section give the detailed program requirements for each of the streams of Engineering and Information Technologies. Core, recommended elective and related requirements must be met in order to graduate in a particular stream of Engineering or Information Technology.

Flexible First Year Stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1800</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Engineering Disciplines (Intro) Stream A</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG1801</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Engineering Computing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG1802</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Engineering Mechanics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG1803</td>
<td>6</td>
<td>ENGG1061</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Professional Engineering 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1001</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Semester 1</td>
</tr>
<tr>
<td>Differential Calculus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1002</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1 Semester 1</td>
</tr>
<tr>
<td>Linear Algebra</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1003</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2 Semester 2</td>
</tr>
<tr>
<td>Integral Calculus and Modelling</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1005</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECM1010</td>
<td></td>
<td></td>
<td>Semester 2 Semester 2</td>
</tr>
<tr>
<td>Statistics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PHYS1001</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH 1001/1901, 1002/1902</td>
<td>N PHYS1002, PHYS1901, EDU1017</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Physics 1 (Regular)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students wishing to proceed into the stream of Chemical should replace PHYS1001 with CHEM1101 Chemistry 1A as an alternate core unit. Students wishing to proceed into the stream of Mechanical(Biomedical) Engineering should replace PHYS1001 with BIOL1001 as an alternate core unit.

Alternate units of study

Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their school before enrolling.

Elective unit of study

In addition, a 6 credit point junior level unit of study must be chosen to complete the second semester enrolment. This is a free choice elective unit subject only to enrolment restrictions imposed by faculties on some specific junior level units.

Notes

1. Students wishing to proceed to the degree of Bachelor of Engineering in Chemical and Biomolecular Engineering should complete the first semester of this program and enrol in their chosen specialisation in Semester 2.
2. It is strongly advised that before choosing the second semester elective, students consult the requirements for the specialisation that they plan to enter as an appropriate choice of elective will help with core progression and prerequisite requirements for many areas.

Core units of study for Stream B specialisations

Core units of study for Stream B specialisations in the Engineering areas of Electrical, Electrical(Computer), Electrical (Power), Electrical(Bioelectronics), Electrical(Telecommunications), Mechatronics, Mechatronics (Space), Software and Bachelor of Information Technology or Bachelor of Computer Science and Technology can elect to choose this option.

First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1805</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Professional Engineering and IT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1001</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>Differential Calculus</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Unit of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Summer Main</td>
</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
</tbody>
</table>

**Alternate units of study**

Most units of study offered by the Science Faculty or the School of IT shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions being met. Students considering doing advanced options should seek advice from their school before enrolling.

**Notes**

1. Students in this option will choose their specialisation at the end of Semester 1 and continue in the specialist program or IT degree in Semester 2.
The School of Aerospace, Mechanical and Mechatronic Engineering offers the following Bachelor of Engineering degree streams:

- Aeronautical
- Aeronautical Space
- Mechanical
- Mechanical Biomedical
- Mechanical Space
- Mechatronic
- Mechatronic Space
- Combined degrees with Science, Commerce, Arts, Medical Science, Project Management and Law.
Aeronautical Engineering stream

Candidates for the degree of Bachelor of Aeronautical Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary shall be gained by completing additional credit points of elective units of study as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points.

Core units of study

First year

**AERO1560 Introduction to Aerospace Engineering**
- Credit points: 6
- Assumed knowledge: N MATH1560, MTRX1701, ENGG1800
- Session: Semester 1

**MATH1001 Differential Calculus**
- Credit points: 3
- Assumed knowledge: A HSC Mathematics Extension 1
- Prerequisites: N MATH1011, MATH1901, MATH1906, MATH1111
- Session: Semester 1

**MATH1002 Linear Algebra**
- Credit points: 3
- Assumed knowledge: A HSC Mathematics Extension 1
- Prerequisites: N MATH1902, MATH1012, MATH1014
- Session: Summer Main

**ENGG1801 Engineering Computing**
- Credit points: 6
- Assumed knowledge: N INFO1000, COSC1001, COSC1002, INFO1003
- Session: Semester 1

**ENGG1803 Professional Engineering 1**
- Credit points: 6
- Assumed knowledge: N ENGG1061
- Session: Semester 1

normally taken in Semester 1, students in combined degrees are exempt from this unit.

**MATH1003 Integral Calculus and Modelling**
- Credit points: 3
- Assumed knowledge: A HSC Mathematics Extension 2 or MATH1001 or MATH1901
- Prerequisites: N MATH1013, MATH1903, MATH1907
- Session: Summer Main

**MATH1006 Statistics**
- Credit points: 3
- Assumed knowledge: A HSC Mathematics
- Prerequisites: N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010
- Session: Summer Main

**ENGG1802 Engineering Mechanics**
- Credit points: 6
- Session: Semester 1

**AERO1400 Intro to Aircraft Construction & Design**
- Credit points: 6
- Assumed knowledge: A Some basic skills with engineering workshop hand tools is desireable
- Note: Department permission required for enrolment
- Session: Semester 2

**AMME1550 Dynamics 1**
- Credit points: 6
- Session: Semester 2

PHYS1001 is an acceptable alternative for BE/BSc students.

Second year

**MATH2061 Linear Mathematics and Vector Calculus**
- Credit points: 6
- Assumed knowledge: P (MATH1011 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1907) and (MATH1903 or MATH1007)
- Prerequisites: N MATH2001, MATH2901, MATH2002, MATH2902, MATH2961, MATH2067
- Session: Semester 1

Students in combined degrees take MATH2067 as alternative.

**AERO2703 Aerospace Technology 1**
- Credit points: 6
- Assumed knowledge: A ENGG1801
- Prerequisites: P AERO1560
- Session: Semester 1

**AMME2301 Mechanics of Solids**
- Credit points: 6
- Assumed knowledge: P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)
- Session: Semester 1

**AMME2500 Engineering Dynamics**
- Credit points: 6
- Assumed knowledge: P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)
- Session: Semester 1

BE/BSc students can enrol in PHYS2011, PHYS2012 as acceptable alternatives or advanced equivalent.

**MATH2065 Partial Differential Equations (Intro)**
- Credit points: 6
- Assumed knowledge: P MATH1901 or MATH1906 and MATH1014 or MATH1002 or MATH1903 or MATH1907
- Prerequisites: N MATH2005, MATH2905, MATH2965, MATH2067
- Session: Semester 2

MATH2067 as alternative for combined degree students.

**AMME2302 Materials 1**
- Credit points: 6
- Assumed knowledge: N CIVL2110
- Session: Semester 1

**MECH2400 Mechanical Design 1**
- Credit points: 6
- Assumed knowledge: A ENGG1801 and ENGG1802, HSC Maths and Physics
- Session: Semester 2

**AMME2200 Thermodynamics and Fluids**
- Credit points: 6
- Assumed knowledge: A MATH1001, MATH1002, MATH1003
- Session: Semester 2

PHYS2011, PHYS2012 or advanced equivalent, are acceptable alternatives for BE/BSc students.

Third year

**AERO3360 Aerospace Structures 1**
- Credit points: 6
- Assumed knowledge: P AMME2301
- Session: Semester 1

**AMME3500 System Dynamics and Control**
- Credit points: 6
- Assumed knowledge: P AMME2500; (MATH2061 or MATH2961 or MATH2067)
- Session: Semester 1
### Unit of study | Credit points | A: Assumed knowledge | P: Prerequisites | C: Corequisites | N: Prohibition | Session
--- | --- | --- | --- | --- | --- | ---
AERO3460 Aerospace Design 1 | 6 | P AMME2301 and MECH2400 | | | | Semester 1
AERO3660 Aerospace Management | 6 | Students in combined degrees are exempt from this unit. | | | | Semester 2
AERO3260 Aerodynamics 1 | 6 | P AMME2200 and (MATH2061 or MATH2067 or MATH2961) | | | | Semester 2
AERO3261 Propulsion | 6 | A Good knowledge of fluid dynamics including gas dynamics | P AMME2200 | | | Semester 2
AERO3560 Flight Mechanics 1 | 6 | P AMME2500 and (MATH2061 or MATH2067) | C AMME3500 | | | Semester 1
AERO3465 Aerospace Technology 2 | 6 | A AERO1400; AMME2302 | P AMME2301 and MECH2400 | | | Semester 2

**Fourth year**

AERO4260 Aerodynamics 2 | 6 | P AMME2200 | | | | Semester 2
AERO4360 Aerospace Structures 2 | 6 | P AERO3360 | | | | Semester 1
AERO4460 Aerospace Design 2 | 6 | A AERO1400, AERO2703 and AERO3465 | P AERO3260, AERO3261, AERO3360 and AERO3460 | | | Semester 1
AERO4360 Flight Mechanics 2 | 6 | A AMME2500 | P AERO3560 and AMME3500 | | | Semester 1

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

AMME4111 Honours Thesis A | 6 | P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater | C AMME4112 | N AMME4121, AMME4122, AMME4010 | Note: Department permission required for enrolment | Semester 2
Normally taken in Semester 1

AMME4112 Honours Thesis B | 6 | P AMME4111 Honours Thesis A | N AMME4121, AMME4122, AMME4010 | Note: Department permission required for enrolment | | Semester 2
Normally taken in Semester 2

AMME4121 Engineering Project A | 6 | P 36 credit points of senior units of study. | C AMME4132 | N AMME4111, AMME4112, AMME4010 | | Semester 1
Normally taken in Semester 1

AMME4122 Engineering Project B | 6 | P AMME4121 Engineering Project A | N AMME4111, AMME4112, AMME4010 | | | Semester 2
Normally taken in Semester 2

**Acceptable alternative units of study**

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

BE/BSc students can enrol in PHYS2011, PHYS2012 or advanced equivalent, as acceptable alternative to AMME2200 & AMME2500.

Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their department before enrolling.

Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

**Resolutions of the Faculty of Engineering relating to this table:**

**BE(Aeronautical)**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 12 credits points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Aeronautical).

**BE(Aeronautical)/BSc or BCom or BMedSc or BPM**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc or BE/BMedSc, or the Faculty of Economics and Business for the BE/BCom or from the core units table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

**BE(Aeronautical)/BA**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Aeronautical Engineering. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.
### BE(Aeronautical)/LLB

In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.

#### Recommended elective units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Semester 2</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>AERO4206</strong></td>
<td>6</td>
<td>A Prior Learning: concepts from 3rd Year Aerodynamics and Flight Mechanics will be applied to Rotary Wing Vehicles in this unit. P AERO3260 and AERO3560</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>AMME4210</strong></td>
<td>6</td>
<td>A Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. P MECH3261 or AERO3260 Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>AERO4491</strong></td>
<td>6</td>
<td>A AERO1400, AERO2703, AERO3260, AERO3261, AERO3360, AERO3465 and AERO3560</td>
<td>P MECH2400 and AERO3460</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>AMME4500</strong></td>
<td>6</td>
<td>P AMME3500.</td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>AERO4591</strong></td>
<td>6</td>
<td>P AERC3560 and AMME3500 Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

#### Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.
Aeronautical Engineering stream
## Aeronautical (Space) Engineering stream

### Core units of study

#### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>MATH1011, MATH1901, MATH1906, MATH1111</td>
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<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
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<td>MATH1902, MATH1012, MATH1014</td>
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<td>Semester 1 Main</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
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<td>Semester 1 Main</td>
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<tr>
<td>AERO1560 Introduction to Aerospace Engineering</td>
<td>6</td>
<td>N MECH1560, MTRX1701, ENGG1800</td>
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<td>Semester 1 Main</td>
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<tr>
<td>ENGG1803 Professional Engineering 1</td>
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<tr>
<td>ENGG1903 Integral Calculus and Modelling</td>
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<td>MATH1013, MATH1903, MATH1907</td>
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<tr>
<td>MATH1005 Statistics</td>
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<td>MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
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<td>Semester 2 Main</td>
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<tr>
<td>AMME1550 Dynamics 1</td>
<td>6</td>
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<td>Semester 2 Main</td>
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</tbody>
</table>

**Note:** Students in combined degrees are exempt.

#### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td>A MATH1001; MATH1002; MATH1003.</td>
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<tr>
<td>ELEC2004 Electrical Engineering: Foundations</td>
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<td>N ELEC1103</td>
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<tr>
<td>AMME2302 Materials 1</td>
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<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
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<td>Semester 2 Main</td>
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<tr>
<td>AERO2705 Space Engineering 1</td>
<td>6</td>
<td>A ENGG1801</td>
<td>P AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003</td>
<td></td>
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<td>Semester 2 Main</td>
</tr>
</tbody>
</table>

**Note:** Students in combined degrees are exempt from this unit.

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO3260 Aerodynamics 1</td>
<td>6</td>
<td>P AMME2200 and (MATH2061 or MATH2067 or MATH2961)</td>
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<td>Semester 2 Main</td>
</tr>
<tr>
<td>AERO3360 Aerospace Structures 1</td>
<td>6</td>
<td>P AMME2301</td>
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<tr>
<td>AERO3460 Aerospace Design 1</td>
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<td>P AMME2301 and MECH2400</td>
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</table>

**Note:** Students in combined degrees are exempt.
### Aeronautical (Space) Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME3500 System Dynamics and Control</td>
<td>6</td>
<td>AMME2500; (MATH2061 or MATH2961 or MATH2067)</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>AERO3560 Flight Mechanics 1</td>
<td>6</td>
<td>AMME2500 and (MATH2061 or MATH2067)</td>
<td>AMME3500</td>
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<tr>
<td>AERO3760 Space Engineering 2</td>
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<tr>
<td>AERO3660 Aerospace Management</td>
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<tr>
<td>AERO3261 Propulsion</td>
<td>6</td>
<td>Good knowledge of fluid dynamics including gas dynamics</td>
<td>AMME2200</td>
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<td></td>
<td>Semester 2</td>
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<tr>
<td>Fourth year</td>
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<tr>
<td>AERO4360 Aerospace Structures 2</td>
<td>6</td>
<td>AERO3360</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>AERO4701 Space Engineering 3</td>
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<td>AERO3760</td>
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<tr>
<td>AERO4660 Flight Mechanics 2</td>
<td>6</td>
<td>AMME2500 and AMME3500</td>
<td>AERO3560 and AMME3500</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>ENGG4000 Practical Experience</td>
<td>P 36 Credit Points of Senior Units</td>
<td>Students should have completed three years of their BE program before enrolling in this unit.</td>
<td>Semester 1</td>
<td>Semester 2</td>
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<tr>
<td>AERO4260 Aerodynamics 2</td>
<td>6</td>
<td>AMME2200</td>
<td></td>
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<td>Semester 2</td>
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</table>

### Students must select 12cp from the following block of units.

- Students enrol in either Honours A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.
- Students enrol in the appropriate Aerospace International Exchange Program units of study as an alternative to a semester's standard units.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4111 Honours Thesis A</td>
<td>6</td>
<td>AMME4112</td>
<td>AMME4121, AMME4122, AMME4010</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td>Semester 2</td>
</tr>
<tr>
<td>Normally taken in Semester 1</td>
<td></td>
<td></td>
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<tr>
<td>AMME4112 Honours Thesis B</td>
<td>6</td>
<td>AMME4111 Honours Thesis A</td>
<td>AMME4121, AMME4122, AMME4010</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td>Semester 2</td>
</tr>
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<tr>
<td>AMME4121 Engineering Project A</td>
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<td>AMME4121</td>
<td>AMME4111, AMME4122, AMME4010</td>
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<td>Semester 1</td>
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<td>Normally taken in Semester 1.</td>
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<tr>
<td>AMME4122 Engineering Project B</td>
<td>6</td>
<td>AMME4121 Engineering Project A</td>
<td>AMME4111, AMME4122, AMME4010</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2</td>
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<td></td>
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</tr>
</tbody>
</table>

### Acceptable alternative units of study

- Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.
- BE/BSc students can enrol in PHYS2011, PHYS2012, or advanced equivalent, as acceptable alternative to AMME2200 & AMME2500.
- Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met.
- Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate Aerospace International Exchange Program units of study as an alternative to a semester's standard units.

### Resolutions of the Faculty of Engineering relating to this table:

#### BE(Aeronautical Engineering)(Space)

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from either the table of recommended units of study for Aeronautical (Space) Engineering or from free elective units of study. A minimum of 192 credit points is required to be eligible for the award of BE(Aeronautical)(Space).

#### BE(Aeronautical Engineering)(Space)/BSc or BMedSc or BCom or BPM

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc or BE/BMedSc or the Faculty of Economics and Business for the BE/BCom or from the core units table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

#### BE(Aeronautical Engineering)(Space)/BA

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Aeronautical (Space) Engineering. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.
In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.

Recommended elective units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credits</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4210 Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation.</td>
<td>P MECH3261 or AERO3560</td>
<td></td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4500 Guidance, Navigation and Control</td>
<td>6</td>
<td>P AMME3500.</td>
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<td>Semester 2</td>
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<tr>
<td>AERO4591 Advanced Flight Mechanics</td>
<td>6</td>
<td>P AERO3560 and AMME3500</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
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<td>Semester 2</td>
</tr>
</tbody>
</table>

Notes
1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.
### Core units of study

#### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1803 Professional Engineering 1</td>
<td>6</td>
<td>N ENGG1061</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
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</table>

Normally taken in Semester 1, students in combined degrees are exempt from this unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH1560 Introduction to Mechanical Engineering</td>
<td>6</td>
<td>A HSC Mathematics Extension 1</td>
<td>N AERO1560, MTRX1701, ENGG1800</td>
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<td>Semester 1</td>
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Note: Department permission required for enrolment.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
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<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
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<td>Semester 2</td>
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<tr>
<td>ENGG1802 Engineering Mechanics</td>
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<tr>
<td>AMME1550 Dynamics 1</td>
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</table>

Phys1001, Physics 1 Regular is an acceptable alternative for BE/BSc students.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
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<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>MECH1400 Mechanical Construction</td>
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<td>Semester 2</td>
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</table>

Students in combined degrees are exempt from this unit.

#### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2004 Electrical Engineering: Foundations</td>
<td>6</td>
<td>N ELEC1103</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME2302 Materials 1</td>
<td>6</td>
<td>N CIVL2110</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>AMME2500 Engineering Dynamics</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH1001 or MATH1901 or MATH1906 and (MATH1014 or MATH1002 or MATH1902) and (MATH1003 or MATH1903 or MATH1907)</td>
<td>N MATH2001, MATH2002, MATH2003, MATH2004, MATH2005, MATH2006, MATH2007</td>
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</table>

Combined degree students take MATH2067 as alternative.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>MATH2065 Partial Differential Equations (Intro)</td>
<td>6</td>
<td>P MATH1011 or 1001 or 1901 or 1906 and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907)</td>
<td>N MATH2005, MATH2006, MATH2007</td>
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<td>Semester 2</td>
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</table>

Combined degree students take MATH2067 as alternative.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>AMME2301 Mechanics of Solids</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907)</td>
<td>(ENGG1802 or PHYS1001 or PHYS1901)</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td>A MATH1001, MATH1002, MATH1003.</td>
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<td>Semester 2</td>
</tr>
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#### Third year

<table>
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<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>MECH3360 Mechanics of Solids 2</td>
<td>6</td>
<td>P AMME2301 and AMME2302</td>
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<td>Semester 2</td>
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<tr>
<td>AMME3500 System Dynamics and Control</td>
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<tr>
<td>MECH2361 Fluid Mechanics</td>
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<td>Semester 1</td>
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<td>MECH3660 Manufacturing Engineering</td>
<td>6</td>
<td>A AMME2200, AMME2301, AMME2302</td>
<td>P MECH2400</td>
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<td>Semester 1</td>
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### Mechanical Engineering stream

<table>
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<th>Credit points</th>
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<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3661 Engineering Management</td>
<td>6</td>
<td>A It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues and are experienced in academic writing (both essays and reports); including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Students in combined degrees are exempt from this unit.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>MECH3680 Mechanical Design 2</td>
<td>6</td>
<td>A Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the 'solver' and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory.</td>
<td>P MECR2400 and AMME2301</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH3862 Materials 2</td>
<td>6</td>
<td>A This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements.</td>
<td>P AMME2301 and AMME2302</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH3860 Thermal Engineering</td>
<td>6</td>
<td>A Fundamentals of thermodynamics are needed to begin this more advanced course.</td>
<td>P AMME2200</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Fourth year**

| MECH4601 Professional Engineering 2 | 6 | A MECH3661, ENGG1803, AMME4100 | P MECH3660 |                   |                | Semester 1 |
| ENGG4000 Practical Experience      | P 36 Credit Points of Senior Units | Students should have completed three years of their BE program before enrolling in this unit. | Semester 1 | Semester 2 |

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

| AMME4111 Honours Thesis A          | 6 | P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater | C AMME4112, N AMME4121, AMME4122, AMME4010 | Note: Department permission required for enrolment | Semester 1 | Semester 2 |
| normally taken in Semester 1       |   |                                                                                 |                                               |                                                  |           |
| AMME4112 Honours Thesis B          | 6 | P AMME4111 Honours Thesis A | N AMME4121, AMME4122, AMME4010 | Note: Department permission required for enrolment | Semester 1 | Semester 2 |
| normally taken in Semester 2       |   |                                                                                 |                                               |                                                  |           |
| AMME4121 Engineering Project A     | 6 | P 36 credit points of senior units of study. | C AMME4112, N AMME4111, AMME4112, AMME4010 |                              | Semester 1 | Semester 2 |
| normally taken in Semester 1       |   |                                                                                 |                                               |                                                  |           |
| AMME4122 Engineering Project B     | 6 | P AMME4121 Engineering Project A | N AMME4111, AMME4112, AMME4010 |                              | Semester 1 | Semester 2 |
| normally taken in Semester 2       |   |                                                                                 |                                               |                                                  |           |

**Acceptable alternative units of study**

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass program must enrol in AMME4121 & AMME4122.

Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met.

Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate exchange program units of study as an alternative to a semester's standard units.

### Resolutions of the Faculty of Engineering relating to this table:

**BE(Mechanical Engineering)**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 18 credit points from the table of recommended elective units of study for Mechanical Engineering and 12 credit points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Mechanical).

**BE(Mechanical Engineering)/BSc or BCom or BMedSci or BPM**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechanical Engineering and at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom or from the core units table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

**BE(Mechanical Engineering)/BA**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechanical Engineering and 6 credit points of free electives. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

**BE(Mechanical Engineering)/LLB**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechanical Engineering and at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4210 Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation.</td>
<td>P MECH3261 or AERO3260</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4241 Renewable Energy</td>
<td>6</td>
<td></td>
<td>P MECH3260, MECH3261</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4660 Management, Employees and Industrial Rel</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4241 Energy and the Environment</td>
<td>6</td>
<td></td>
<td>P 24 credit points of third year units of study</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4255 Air Conditioning and Refrigeration</td>
<td>6</td>
<td>A Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer.</td>
<td>P MECH3260; MECH3261</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4265 Combustion</td>
<td>6</td>
<td>A This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd &amp; 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years.</td>
<td>P MECH3260; MECH3261</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4310 Advanced Engineering Materials</td>
<td>6</td>
<td>A ENGG1802, AMME2301, AMME2500, MECH3361</td>
<td>P MECH3260</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4460 Mechanical Design 3</td>
<td>6</td>
<td></td>
<td>P MECH2400</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4961 Biomechanics and Biomaterials</td>
<td>6</td>
<td>A MECH3300 or MECH3362</td>
<td>P AMME2302, MECH2900 or MECH2901</td>
<td>N MECH4960</td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Notes
1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.
Mechanical Engineering stream
# Mechanical (Biomedical) Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechanical (Biomedical) Engineering</strong></td>
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</tr>
<tr>
<td>Candidates for the degree of Bachelor of Engineering in Mechanical Engineering (Biomedical) are required to gain credit for the core units of study set out below. Any additional credit necessary shall be gained by completing additional credit points of recommended or elective units of study, as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points.</td>
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</tbody>
</table>

## Core units of study

### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td></td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td></td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td></td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td></td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td></td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>CHEM1101 Chemistry 1A</td>
<td>6</td>
<td></td>
<td>C Recommended concurrent units of study: 6 credit points of Junior Mathematics</td>
<td>N CHEM1001, CHEM109, CHEM1901, CHEM1903</td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>Normally taken in Semester 2,</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>BIOL1003 Human Biology</td>
<td>6</td>
<td></td>
<td>A HSC 2-unit Biology. Semester 1 students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February). N BIOL1903 it is recommended that BIOL1001 or BIOL1911 be taken concurrently with this unit of study.</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>BE/BMedSc students do MBLG1001 instead of BIOL1003.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>AMME1550 Dynamics 1</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PHYS1001 is an acceptable alternate for BE/BSc students.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ENGG1803 Professional Engineering 1</td>
<td>6</td>
<td></td>
<td>N ENGG1061</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Students enrolled in combined degrees or Advanced Engineering are exempt from this unit. This unit is normally taken in Semester 1.</td>
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</tbody>
</table>

### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2067 DEs and Vector Calculus for Engineers</td>
<td>6</td>
<td>P MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907)</td>
<td>N MATH2001, MATH2901, MATH2905, MATH2906, MATH2005, MATH2061, MATH2961, MATH2065, MATH2965</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>ELEC2004 Electrical Engineering: Foundations</td>
<td>6</td>
<td></td>
<td>N ELEC1103</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME2301 Mechanics of Solids</td>
<td>6</td>
<td></td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME2500 Engineering Dynamics</td>
<td>6</td>
<td></td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td></td>
<td>A MATH1001; MATH1002; MATH1003,</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME2202 Materials 1</td>
<td>6</td>
<td></td>
<td>N CIVL2110</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td></td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH2901 Anatomy and Physiology for Engineers</td>
<td>6</td>
<td>A A basic understanding of biology. Recommended: BIOL1003 (or equivalent)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3261 Fluid Mechanics</td>
<td>6</td>
<td></td>
<td>P AMME2200</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH3361 Mechanics of Solids 2</td>
<td>6</td>
<td></td>
<td>P AMME2301 and AMME 2302</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
### Mechanical (Biomedical) Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3362 Materials 2</td>
<td>6</td>
<td>A This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302; Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements.</td>
<td>P AMME2301 and AMME2302</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH9321 Biomedical Design and Technology</td>
<td>6</td>
<td>A BIOL1003, MECH2901, AMME2302, MECH2400</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME3350 System Dynamics and Control</td>
<td>6</td>
<td>P AMME2500; MATH2961 or MATH2961 or MATH2967</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Students in combined degrees are exempt from this unit.</td>
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</tr>
<tr>
<td>MECH3660 Manufacturing Engineering</td>
<td>6</td>
<td>A MECH2200, AMME2301, AMME2302</td>
<td>P MECH2400</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Students enrolled in combined degrees are exempt from this unit.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MECH3661 Engineering Management</td>
<td>6</td>
<td>A It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.</td>
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<td></td>
<td>Semester 2</td>
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<tr>
<td>Students enrolled in combined degrees are exempt from this unit.</td>
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<td></td>
</tr>
<tr>
<td>MECH3460 Mechanical Design 2</td>
<td>6</td>
<td>A Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the ‘solver’ and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory.</td>
<td>P MECH2400 and AMME2301</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Students enrolled in combined degrees are exempt from this unit.</td>
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</tr>
<tr>
<td><strong>Fourth year</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>MECH4601 Professional Engineering 2</td>
<td>6</td>
<td>A MECH3661, ENGG1803, AMME4100</td>
<td>P MECH3660</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4961 Biomechanics and Biomaterials</td>
<td>6</td>
<td>A MECH3300 or MECH3362</td>
<td>P AMME2302, MECH2900 or MECH2901</td>
<td>N MECH4960</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG4000 Practical Experience</td>
<td>6</td>
<td>P 36 Credit Points of Senior Units</td>
<td>Students should have completed three years of their BE program before enrolling in this unit.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3802 Fundamentals of Biomedical Engineering</td>
<td>6</td>
<td>A A knowledge of basic electrical engineering is required: Ohm’s law, Thevenin and Norton’s theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanisms of operation of transformers.</td>
<td>N ELEC3801</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4111 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4112 Honours Thesis B</td>
<td>6</td>
<td>P AMME4111 Honours Thesis A</td>
<td>N AMME4121, AMME4122, AMME4010</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4121 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of senior units of study.</td>
<td>C AMME4122</td>
<td>N AMME4111, AMME4112, AMME4010</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 1.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4122 Engineering Project B</td>
<td>6</td>
<td>P AMME4121 Engineering Project A</td>
<td>N AMME4111, AMME4112, AMME4010</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Acceptable alternative units of study**

Students in the Honours program must enrol in AMME4111 & AMME4112, students in the Pass Program must enrol in AMME4121 & AMME4122.

The elective AMME4790 Intro Biomechatronics is an acceptable alternative to ELEC3802. Students can not do both.

Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their department before enrolling.

Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester’s standard units.

**Resolutions of the Faculty of Engineering relating to this table:**

**BE (Mechanical (Biomedical) Engineering)**

In addition to gaining credit for the units of study set out in this table, candidates are required to complete sufficient Biomedical Engineering electives from the table below so as to bring their total of eligible credit points to at least 192. A minimum of 192 credit points is required to be eligible for the award of the degree of BE(Mechanical)(Biomedical).
In addition to gaining credit for the units of study set out in the above core unit table, students are required to complete sufficient Biomedical Engineering electives from the elective table below so as to bring their total of eligible engineering credit points to at least 144. Further to this they are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci or from the core units table for BPM. In the case of the BE/BA, they are required to complete at least 84 credit points of units of study given by the Faculty of Arts and Social Sciences, and the remaining 12 credit points will be Biomedical Engineering electives from the table below.

A total of 240 credits is required to be eligible for these combined degrees.

### BE(Mechanical (Biomedical) Engineering) / BCom

In the case of BE/BCom students can replace ELEC3802 with 6 credits from the elective table shown below. Students must complete 144 cp of BE units and 96 credit of BCom units to complete this combined degree.

A minimum of 240 credit points is required to be eligible for the combined degree BE/Com.

### BE (Mechanical (Biomedical) Engineering) / LLB

In the case of the BE/LLB, students are required to complete 96 credit points of compulsory Law units of study and a further 48 credit points of elective Law units of study. A minimum of 288 credit points is required to be eligible for the combined degree BE/LLB.

### Recommended Biomedical elective units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4981 Applied Biomedical Engineering</td>
<td>6</td>
<td>A: MECH3921, MECH3362</td>
<td>P: 6cp of junior biology; 6cp of junior chemistry; AMME2302</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4990 Biomedical Product Development</td>
<td>6</td>
<td>A Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td>P: 6 credit points of junior biology 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4210 Computational Fluid Dynamics</td>
<td>6</td>
<td>A: Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation.</td>
<td>P: MECH3921 or AERO3920</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4790 Introduction to Biomechatronics</td>
<td>6</td>
<td>A: Basic concepts in engineering mechanics—statics, dynamics, and solid mechanics; Basic concepts in materials science, specifically with regard to types of materials and the relation between properties and microstructure; and A basic understanding of human biology and anatomy.</td>
<td>P: MTRX3700 or MECH3921</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4902 Orthopaedic and Surgical Engineering</td>
<td>6</td>
<td>A: MECH3921, MECH3362, ENGG1802, BIOL1003, MECH2901, MECH3921.</td>
<td>P: AMME2301, AMME2302, ENGG1802</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4971 Tissue Engineering</td>
<td>6</td>
<td>A: MECH3921</td>
<td>P: 6cp of junior biology; 6cp of junior chemistry; MECH2901</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4992 Regulatory Affairs in Medical Industry</td>
<td>6</td>
<td>A: Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td>P: 6 credit points of junior biology 6 credit points of junior chemistry MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Mechanical (Biomedical) Engineering stream
# Core units of study

## First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MECH1560 Introduction to Mechanical Engineering</td>
<td>6</td>
<td>N AERO1560, MTRX1701, ENGG1800</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>AMME1550 Dynamics 1</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
</tbody>
</table>

PHYS1001 is an acceptable alternative for BE/BSc students.

## Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH267 Differential and Vector Calculus for Engineers</td>
<td>6</td>
<td>P MATH1011 or 1001 or 1001 or 1006 and MATH1014 or 1002 or 1902 and MATH1003 or 1903 or 1907, N MATH2001, MATH2901, MATH2905, MATH2061, MATH2961, MATH2065, MATH2965</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>AMME2302 Materials 1</td>
<td>6</td>
<td>N CIVL2110</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>AMME2500 Engineering Dynamics</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>ELEC2004 Electrical Engineering: Foundations</td>
<td>6</td>
<td>N ELEC1103</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>AMME2301 Mechanics of Solids</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENG1802 or PHYS1001 or PHYS1901)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>AERO2705 Space Engineering 1</td>
<td>6</td>
<td>A ENGG1801</td>
<td>P AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td>A MATH1001, MATH1002, MATH1003.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
</tbody>
</table>

## Third Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3381 Mechanics of Solids 2</td>
<td>6</td>
<td>P AMME2301 and AMME 2302</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>AMME3500 System Dynamics and Control</td>
<td>6</td>
<td>P AMME2500; (MATH2061 or MATH2961 or MATH2067)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MECH3660 Manufacturing Engineering</td>
<td>6</td>
<td>A AMME2200, AMME2301, AMME2302</td>
<td>P MECH2400</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MECH3261 Fluid Mechanics</td>
<td>6</td>
<td>P AMME2200</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
</tbody>
</table>
Mechanical (Space) Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3662 Materials 2</td>
<td>6</td>
<td>A This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2200.-materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements.</td>
<td>P AMME2200</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AERO3760 Space Engineering 2</td>
<td>6</td>
<td>P AERO2705</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH3661 Thermal Engineering</td>
<td>6</td>
<td>A Fundamentals of thermodynamics are needed to begin this more advanced course.</td>
<td>P AMME2200</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH3661 Engineering Management</td>
<td>6</td>
<td>A It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Combined degree students are exempt from this unit.

Fourth Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH4601 Professional Engineering 2</td>
<td>6</td>
<td>A MECH3661, ENGG1803, AMME4100</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AERO4070 Space Engineering 3</td>
<td>6</td>
<td>P AERO3760</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG4000 Practical Experience</td>
<td></td>
<td>P 36 Credit Points of Senior Units</td>
<td>Students should have completed three years of their BE program before enrolling in this unit.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Students must select 12cp from the following block of units:

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4111 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater</td>
<td>C AMME4112, AMME4122, AMME4010</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 1</td>
<td></td>
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</tr>
<tr>
<td>AMME4112 Honours Thesis B</td>
<td>6</td>
<td>P AMME4111 Honours Thesis A</td>
<td>AMME4122, AMME4010</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>AMME4121 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of senior units of study.</td>
<td>C AMME4122</td>
<td>AMME4121, AMME4010</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 1.</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>AMME4122 Engineering Project B</td>
<td>6</td>
<td>P AMME4121 Engineering Project A</td>
<td>AMME4121, AMME4010</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
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</tr>
</tbody>
</table>

Acceptable alternative units of study:

Students in the Honours program must enrol in AMME4111 & AMME4122, students in the Pass program must enrol in AMME4121 & AMME4122.

Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their department before enrolling.

Students enrolled in combined degrees are also exempt from one of the following core units MECH3260, MECH3261, MECH3361 or MECH3362. This choice should be based on the prereq requirements of 4th year recommended units that students plan to enrol in.

Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.

Resolutions of the Faculty of Engineering relating to this table:

BE(Mechanical Engineering)(Space)

In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from the table of recommended elective units of study for Mechanical (Space) Engineering and 12 credit points of free elective units of study. A minimum of 192 credit points is required to be eligible for the award of BE(Mechanical)(Space).

BE(Mechanical Engineering)(Space)/BSc or BCom or BMedSci or BPM

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom or from the core units table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechanical Engineering)(Space)/BA

In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechanical (Space) Engineering. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.

BE(Mechanical Engineering)(Space)/LLB

In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4210 Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation.</td>
<td>P MECH3260 or AERO3260</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4241 Renewable Energy</td>
<td>6</td>
<td>P MECH3260, MECH3261</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4660 Management, Employees and Industrial Rel</td>
<td>6</td>
<td></td>
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<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4241 Energy and the Environment</td>
<td>6</td>
<td>P 24 credit points of third year units of study</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4255 Air Conditioning and Refrigeration</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4265 Combustion</td>
<td>6</td>
<td>A Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer.</td>
<td>P MECH3260; MECH3261</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH4310 Advanced Engineering Materials</td>
<td>6</td>
<td>A This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd &amp; 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years.</td>
<td>P MECH3362</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4460 Mechanical Design 3</td>
<td>6</td>
<td>A ENGG1802, AMME2301, AMME2500, MECH3361</td>
<td>P MECH3240</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4961 Biomechanics and Biomaterials</td>
<td>6</td>
<td>A MECH3300 or MECH3362</td>
<td>P AMME2302; MECH2900 or MECH2901</td>
<td>N MECH4960</td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Notes**

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering
Mechanical (Space) Engineering stream
# Mechatronic Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mechatronic Engineering</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Candidates for the degree of Bachelor of Engineering in Mechatronic Engineering are required to gain credit for the core units of study set out below. Any additional credit necessary shall be gained by completing additional credit points of elective units of study as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Core units of study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>First year</strong></td>
<td></td>
<td></td>
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<td><strong>Semester 1</strong></td>
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<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MTRX1701 Mechatronics Engineering Introductory</td>
<td>6</td>
<td>N AERO1560, MECH1560, ENGG1800</td>
<td>Note: Department permission required for enrolment</td>
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<td>Semester 1 Main</td>
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<td><strong>Semester 1</strong></td>
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<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
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<td>Semester 2 Main</td>
</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
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<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
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<td>Semester 1 Main</td>
</tr>
<tr>
<td>AMME1550 Dynamics 1</td>
<td>6</td>
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<td>Semester 2 Main</td>
</tr>
<tr>
<td>PHYS1001 is an acceptable alternative for BSc physics majors.</td>
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<tr>
<td><strong>Second year</strong></td>
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<tr>
<td>AMME2302 Materials 1</td>
<td>6</td>
<td>N CIVL2110</td>
<td></td>
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<td>Semester 1 Main</td>
</tr>
<tr>
<td>AMME2500 Engineering Dynamics</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)</td>
<td></td>
<td></td>
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<td>Semester 1 Main</td>
</tr>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering</td>
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<td>Semester 2 Main</td>
</tr>
<tr>
<td>AMME2301 Mechanics of Solids</td>
<td>6</td>
<td>P (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENGG1802 or PHYS1001 or PHYS1901)</td>
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<td>Semester 2 Main</td>
</tr>
<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
<td></td>
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<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>MTRX2700 Mechatronics 2</td>
<td>6</td>
<td>P MTRX1701 and MTRX1702</td>
<td>N ELEC2601, ELEC3607</td>
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<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH1001 or MATH1901 or MATH1906) and (MATH1014 or MATH1902 or MATH1002 or MATH1902) and (MATH1003 or MATH1903 or MATH1907)</td>
<td>N MATH2001, MATH2901, MATH2902, MATH2961, MATH2067</td>
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<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>MATH2065 Partial Differential Equations (Intro)</td>
<td>6</td>
<td>P MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1903 or 1900 or 1903 or 1907)</td>
<td>N MATH2005, MATH2905, MATH2965, MATH2067</td>
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<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>Combined degree students take MATH2067 as alternative.</td>
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<td><strong>Third year</strong></td>
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<tr>
<td>AMME3300 System Dynamics and Control</td>
<td>6</td>
<td>P AMME2500; (MATH2061 or MATH2961 or MATH2067)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>ELEC3404 Electronic Circuit Design</td>
<td>6</td>
<td>A A background in basic electronics and circuit theory is assumed.</td>
<td>N ELEC3401</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MECH2660 Manufacturing Engineering</td>
<td>6</td>
<td>A AMME2200, AMME2301, AMME2302</td>
<td>P MECH2400</td>
<td></td>
<td></td>
<td>Semester 1 Main</td>
</tr>
<tr>
<td>MTRX3700 Mechatronics 3</td>
<td>6</td>
<td>P MTRX2700</td>
<td>N MECH4710</td>
<td></td>
<td></td>
<td>Semester 2 Main</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
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</tr>
<tr>
<td>MECH3600 Mechanical Design 2</td>
<td>6</td>
<td>A Properties of engineering materials including fatigue failure theories. Statics and dynamics of machines. Practical use of Word and Excel including the use of the ‘solver’ and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory.</td>
<td>P MECH2400 and AMME2301</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td>A MATH1001; MATH1002; MATH1003.</td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3304 Power Electronics and Applications</td>
<td>6</td>
<td>A Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc.</td>
<td>P ELEC2104</td>
<td>N ELEC3202</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH3661 Engineering Management</td>
<td>6</td>
<td>A It is expected that students will understand the concepts previously presented in ENGG1803 Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.</td>
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<td>Semester 2</td>
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<tr>
<td></td>
<td></td>
<td>Combined degree students are exempt from this unit.</td>
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<tr>
<td></td>
<td></td>
<td>Combined degree students are exempt from this unit.</td>
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<tr>
<td></td>
<td></td>
<td>Combined degree students are exempt from this unit.</td>
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<td></td>
<td></td>
<td>Combined degree students are exempt from this unit.</td>
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<tr>
<td>Fourth year</td>
<td></td>
<td>Combined degree students are exempt from this unit.</td>
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</tr>
<tr>
<td>MECH4601 Professional Engineering 2</td>
<td>6</td>
<td>A MECH3661, ENGG1803, AMME4100</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG4000 Practical Experience</td>
<td></td>
<td>P 36 Credit Points of Senior Units Students should have completed three years of their BE program before enrolling in this unit.</td>
<td></td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>Students must select 12cp from the following block of units.</td>
<td></td>
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</tr>
<tr>
<td>AMME4111 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater</td>
<td>C AMME4112 N AMME4121, AMME4122, AMME4010. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1</td>
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<tr>
<td>Normally taken in Semester 1.</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>AMME4112 Honours Thesis B</td>
<td>6</td>
<td>P AMME4111 Honours Thesis A N AMME4121, AMME4122, AMME4010. Note: Department permission required for enrolment</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>AMME4121 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of senior units of study.</td>
<td>C AMME4122 N AMME4111, AMME4112, AMME4010</td>
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<td>Semester 1</td>
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<tr>
<td>Normally taken in Semester 1.</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>AMME4122 Engineering Project B</td>
<td>6</td>
<td>P AMME4121 Engineering Project A N AMME4111, AMME4112, AMME4010</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2.</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>Acceptable alternative units of study</td>
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</tr>
<tr>
<td>Students in the Honours program must enrol in AMME4111 &amp; AMME4112, students in the Pass program must enrol in AMME4121 &amp; AMME4122.</td>
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<tr>
<td>Most units of study offered by the Faculty of Science shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their department before enrolling.</td>
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<tr>
<td>Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.</td>
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<tr>
<td>Resolutions of the Faculty of Engineering relating to this table:</td>
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<tr>
<td>BE(Mechatronic Engineering)</td>
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</tr>
<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete 18 credit points from the table of recommended elective units of study for Mechatronic Engineering. A minimum of 192 credit points is required to be eligible for the award of the degree.</td>
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<tr>
<td>BE(Mechatronic Engineering)/BSc or BCom or BMedSci or BPM</td>
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<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom or from the core unit table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.</td>
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</tr>
<tr>
<td>BE(Mechatronic Engineering)/BA</td>
<td></td>
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</tr>
<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 18 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.</td>
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<tr>
<td>BE(Mechatronic Engineering)/LLB</td>
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<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete 6 credit points from the table of recommended elective units of study for Mechatronic Engineering and at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.</td>
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</tbody>
</table>
### Mechatronic Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Recommended elective units of study</strong></td>
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</tr>
<tr>
<td>MECH4720 Sensors and Signals</td>
<td>6</td>
<td>A Strong Matlab skills</td>
<td>P MTRX3700</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH4730 Computers in Real-Time Control and Inst</td>
<td>6</td>
<td>P MTRX3700</td>
<td>N ELEC4602</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MTRX4700 Experimental Robotics</td>
<td>6</td>
<td>P AMME3500; MTRX3700</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4500 Guidance, Navigation and Control</td>
<td>6</td>
<td>P AMME3500.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4710 Computer Vision and Image Processing</td>
<td>6</td>
<td>A MECH4720 or MECH4730</td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4790 Introduction to Biomechatronics</td>
<td>6</td>
<td>P MTRX3700 or MECH3921</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.
Mechatronic Engineering stream
# Mechatronic (Space) Engineering stream

Candidates for the degree of Bachelor of Engineering in Mechatronic Engineering (Space Engineering) are required to gain credit for the core units of study set out below. Any additional credit necessary shall be gained by completing additional credit points of elective units of study as recommended by the Faculty, as may be necessary to gain credit for a total of not less than 192 credit points.

## Core units of study

### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td>Semester 1 Main</td>
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<td></td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td>Semester 1 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTRX1701 Mechatronics Engineering Introductory</td>
<td>6</td>
<td>N AERO1560, MECH1560, ENGG1800 Note, Department permission required for enrolment</td>
<td></td>
<td>Semester 1 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH1005 Statics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td>Semester 1 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTRX1702 Mechatronics 1</td>
<td>6</td>
<td>N ELEC1101, ELEC2004, COSC1002, COSC1902</td>
<td></td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
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<td>Semester 2 Main</td>
<td></td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
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<td></td>
<td>Semester 1 Main</td>
<td></td>
</tr>
<tr>
<td>AMME1550 Dynamics 1</td>
<td>6</td>
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<td></td>
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<td>Semester 2 Main</td>
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</tr>
</tbody>
</table>

**Notes:**
- PHYS1001 is an acceptable alternative for BE/BSc physics majors.

### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering.</td>
<td></td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMME2301 Mechanics of Solids</td>
<td>6</td>
<td></td>
<td>(MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903 or MATH1907), (ENG1102 or PHYS1001 or PHYS1901)</td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MATH2067 DEs and Vector Calculus for Engineers</td>
<td>6</td>
<td>(MATH1901 or MATH1906 and MATH1104 or MATH2002 or MATH2002) and MATH1903 or MATH1907</td>
<td>N MATH2001, MATH2901, MATH2905, MATH2905, MATH2905, MATH2905, MATH2905, MATH2905, MATH2905</td>
<td>Semester 1 Main</td>
<td></td>
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<tr>
<td>AMME2500 Engineering Dynamics</td>
<td>6</td>
<td></td>
<td>(MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901)</td>
<td>Semester 1 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO2207 Space Engineering 1</td>
<td>6</td>
<td>A ENGG1801</td>
<td>P AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003</td>
<td>Semester 2 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MTRX2700 Mechatronics 2</td>
<td>6</td>
<td>P MTRX1701 and MTRX1702</td>
<td>N ELEC2601, ELEC3607</td>
<td>Semester 1 Main</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH2400 Mechanical Design 1</td>
<td>6</td>
<td></td>
<td>A ENGG1801 and ENGG1802, HSC Maths and Physics</td>
<td>Semester 2 Main</td>
<td></td>
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<tr>
<td>AMME2302 Materials 1</td>
<td>6</td>
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<td>Semester 1 Main</td>
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</table>

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME3500 System Dynamics and Control</td>
<td>6</td>
<td></td>
<td>(MATH2061 or MATH2906 or MATH2067)</td>
<td></td>
<td>Semester 1 Main</td>
<td></td>
</tr>
<tr>
<td>MTRX3700 Mechatronics 3</td>
<td>6</td>
<td>P MTRX2700, N MECH4710</td>
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<td>Semester 2 Main</td>
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<tr>
<td>MECH2660 Manufacturing Engineering</td>
<td>6</td>
<td>A AMME2200, AMME2301, AMME2302</td>
<td>P MECH2400</td>
<td>Semester 1 Main</td>
<td></td>
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</tr>
<tr>
<td>AERO3760 Space Engineering 2</td>
<td>6</td>
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<td>Semester 2 Main</td>
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</tbody>
</table>
# Mechatronic (Space) Engineering stream

## Unit of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH3661 Engineering Management</td>
<td>6</td>
<td>A It is expected that students will understand the concepts previously presented in ENGG1803  Professional Engineering. It is assumed that the students have an understanding of professional engineering issues, and are experienced in academic writing (both essays and reports), including appropriate referencing techniques, oral presentations and the project management process (particularly in group situations). Such previous knowledge will assist students in the development their awareness of the issues involved with engineering management.</td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3204 Power Electronics and Applications</td>
<td>6</td>
<td>A Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc.</td>
<td></td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME2200 Thermodynamics and Fluids</td>
<td>6</td>
<td>A MATH1001; MATH1002; MATH1003.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AERO4701 Space Engineering 3</td>
<td>6</td>
<td>P AERO3760</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG4200 Practical Experience</td>
<td>P 36 Credit Points of Senior Units</td>
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<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>MECH4601 Professional Engineering 2</td>
<td>6</td>
<td>A MECH3661, ENGG1803, AMME4100.</td>
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<td>Semester 1</td>
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<tr>
<td>Students must select 12cp from the following block of units.</td>
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</tr>
<tr>
<td>AMME4111 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater.</td>
<td></td>
<td></td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 1</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME4112 Honours Thesis B</td>
<td>6</td>
<td>P AMME4111 Honours Thesis A</td>
<td></td>
<td></td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Normally taken in Semester 2</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>AMME4121 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of senior units of study.</td>
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<td>Semester 1</td>
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<tr>
<td>Normally taken in Semester 1</td>
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<td>Semester 2</td>
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<tr>
<td>AMME4122 Engineering Project B</td>
<td>6</td>
<td>P AMME4121 Engineering Project A</td>
<td></td>
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<td>Semester 1</td>
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<tr>
<td>Normally taken in Semester 2</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>Acceptable alternative units of study</td>
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</tr>
<tr>
<td>Students in the Honours program must enrol in AMME4111 &amp; AMME4112, students in the Pass program must enrol in AMME4121 &amp; AMME4122.</td>
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<tr>
<td>Most units of study offered by the Science Faculty shown in the tables can be replaced by an equivalent advanced level unit, subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from their department before enrolling.</td>
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<tr>
<td>Students undertaking Study Abroad in a particular year of their degree must enrol in the appropriate International Exchange Program units of study as an alternative to a semester's standard units.</td>
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<tr>
<td>Resolutions of the Faculty of Engineering relating to this table:</td>
<td></td>
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</tr>
<tr>
<td>BE(Mechatronic Engineering)(Space)</td>
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</tr>
<tr>
<td>In addition to gaining credit for the units of study set out in the above table, candidates are required to complete 12 credit points from the table of recommended elective units of study for Mechatronic (Space) Engineering. A minimum of 192 credit points is required to be eligible for the award of BE(Mechatronic)(Space).</td>
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</tr>
<tr>
<td>BE(Mechatronic Engineering)(Space)/BSc or BCom or BMedSci or BPM</td>
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</tr>
<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 96 credit points of units of study given by the Faculty of Science for the BE/BSc and BMedSci, or the Faculty of Economics and Business for the BE/BCom or from the core unit table for BPM. A minimum of 240 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.</td>
<td></td>
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<tr>
<td>BE(Mechatronic Engineering)(Space)/BA</td>
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</tr>
<tr>
<td>In addition to gaining credit for the units of study set out in this table, candidates are required to complete at least 84 credit points of units of study given by the Faculty of Arts for the BE/BA and 12 credit points from the table of recommended elective units of study for Mechatronic Engineering. A minimum of 240 credit points is required to be eligible for the combined degree. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the faculty in which they are undertaking the combined degree.</td>
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<tr>
<td>BE(Mechatronic Engineering)(Space)/LLB</td>
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<tr>
<td>In addition to gaining credit for the core units of study set out in this table, candidates are required to complete at least 144 credit points of units of study given by the Faculty of Law for the BE/LLB. A minimum of 288 credit points is required to be eligible for the combined degrees. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and IT and the Faculty of Law.</td>
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</tbody>
</table>
### Mechatronic (Space) Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensors and Signals</td>
<td>6</td>
<td>A Strong Matlab skills</td>
<td>P MTRX3700</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Computers in Real-Time Control and Inst</td>
<td>6</td>
<td>P MTRX3700</td>
<td>N ELEC4602</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Experimental Robotics</td>
<td>6</td>
<td>P AMME3500; MTRX3700</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>Guidance, Navigation and Control</td>
<td>6</td>
<td>P AMME3500</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Computer Vision and Image Processing</td>
<td>6</td>
<td>A MECH4720 or MECH4730</td>
<td></td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>Introduction to Biomechatronics</td>
<td>6</td>
<td>P MTRX3700 or MECH3921</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

These units are also available to other Space stream students.

### Notes

1. Choice of electives as shown in the above table will depend on subject availability, timetabling and prerequisite conditions.
2. Units of study not included in this table may also be selected subject to the approval of the Head of School Aerospace, Mechanical and Mechatronic Engineering.
The School of Chemical and Biomolecular Engineering offers the following Bachelor of Engineering degree specialisations:

- Chemical and Biomolecular
- Combined degrees with Science, Commerce, Arts, Medical Science and Law.

### Chemical and Biomolecular Engineering stream requirements

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>MATH1001</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1011, MATH1011</td>
<td>Semester 1</td>
<td></td>
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<tr>
<td>Linear Algebra</td>
<td></td>
<td></td>
<td>N MATH1002, MATH1002</td>
<td>Summer Main</td>
<td></td>
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<tr>
<td>MATH1003</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1013, MATH1013</td>
<td>Semester 1</td>
<td></td>
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<tr>
<td>Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1010, MATH1010</td>
<td>Summer Main</td>
<td></td>
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<tr>
<td>MATH1005</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1015</td>
<td>Semester 2</td>
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<tr>
<td>Statistics</td>
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<td>N STAT1021, STAT1022, ECMT1010</td>
<td>Summer Main</td>
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<tr>
<td>CHEM1101</td>
<td>6</td>
<td>A HSC Chemistry and Mathematics</td>
<td>C Recommended concurrent units of study: 6 credit points of Junior Mathematics</td>
<td>Semester 1</td>
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<tr>
<td>Chemistry 1A</td>
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<td>N CHEM1001, CHEM1001, CHEM1001</td>
<td>Summer Main</td>
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<tr>
<td>CHEM1102</td>
<td>6</td>
<td>P CHEM (1101 or 1901) or a Distinction in CHEM1001 or equivalent</td>
<td>C Recommended concurrent units of study: 6 credit points of Junior Mathematics</td>
<td>Semester 1</td>
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<tr>
<td>Chemistry 1B</td>
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<td>N CHEM1002, CHEM1002, CHEM1002, CHEM1004</td>
<td>Summer Main</td>
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<tr>
<td>CHNG1103</td>
<td>6</td>
<td>A Mathematics Extension 1; 2 unit Physics; 2 unit Chemistry.</td>
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<td>Semester 2</td>
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<tr>
<td>Material &amp; Energy Transformations</td>
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<tr>
<td>ENGG1800</td>
<td>6</td>
<td>A HSC Mathematics Extension 2</td>
<td>N ENGG1001, COSC1001, COSC1002, INFO1003</td>
<td>Semester 1</td>
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<tr>
<td>Engineering Disciplines (Intro)</td>
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<tr>
<td>ENGG1801</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
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<tr>
<td>Engineering Computing</td>
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<tr>
<td>ENGG1803</td>
<td>6</td>
<td>N ENGG1061</td>
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<td>Semester 2</td>
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<tr>
<td>Professional Engineering 1</td>
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<tr>
<td>Chemistry of Biological Molecules</td>
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<tr>
<td>CHEM2004</td>
<td>6</td>
<td>P 12 credit points of Junior Chemistry; 6 credit points of Junior Mathematics</td>
<td>N CHEM3017, CHEM3197</td>
<td>Semester 1</td>
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<tr>
<td>Forensic and Environmental Chemistry</td>
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<tr>
<td>CHNG2801</td>
<td>6</td>
<td>A Calculus Computations (Matlab, Excel) Mass and Energy Balances</td>
<td>P All core 1st year engineering units of study.</td>
<td>Semester 1</td>
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</tr>
<tr>
<td>Conservation and Transport Processes</td>
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<tr>
<td>CHNG2802</td>
<td>6</td>
<td>P All core 1st year engineering units of study.</td>
<td>C CHNG2803 (Analysis Practice 1) CHNG2801 (Conservation and Transport Processes) CHEM2404 (Forensic and Environmental Chemistry)</td>
<td>Semester 1</td>
<td></td>
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</tr>
<tr>
<td>Applied Maths for Chemical Engineers</td>
<td></td>
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</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
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<tr>
<td>CHNG2803 Energy and Fluid Systems Practice</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information.</td>
<td>P All core engineering 1st year units of study.</td>
<td>C CHNG2801 (Conservation and Transport Processes) CHNG2802 (Applied Mathematics for Chemical Engineers) CHEM2404 (Forensic and Environmental Chemistry)</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG2804 Chemical &amp; Biological Systems Behaviour</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL.</td>
<td>P All core 1st year engineering units of study.</td>
<td>C CHNG2805 (Industrial Systems and Sustainability) CHNG2806 (Analysis Practice 2 - Treatment, Purification and Recovery Systems) CHEM2403 (Chemistry of Biological Molecules)</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG2805 Industrial Systems and Sustainability</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information.</td>
<td>P All core 1st year engineering units of study.</td>
<td>C CHNG2804 (Chemical and Biological Systems Behaviour) CHNG2806 (Analysis Practice 2 - Treatment, Purification &amp; Recovery Systems) CHEM2403 (Chemistry of Biological Molecules)</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG2806 Materials Purification and Recovery</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information.</td>
<td>P All core 1st year engineering units of study.</td>
<td>C CHNG2804 (Chemical and Biological Systems Behaviour) CHNG2806 (Analysis Practice 2 - Treatment, Purification &amp; Recovery Systems) CHEM2403 (Chemistry of Biological Molecules)</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG3801 Process Design</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed.</td>
<td>P CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>C CHNG3803, CHNG3802</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG3802 Operating/Improving Industrial Systems</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed.</td>
<td>P CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>C CHNG3801 (Process Design) CHNG3803 (Design Practice 1 - Chemical &amp; Biological Processes)</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG3803 Chemical/Biological Process Design</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature.</td>
<td>P CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>C CHNG3801 (Process Design) CHNG3803 (Design Practice 1 - Chemical &amp; Biological Processes)</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG3806 Management of Industrial Systems</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature.</td>
<td>P CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>C CHNG3805 (Product Formulation and Design) CHNG3807 (Design Practice 2 - Products and Value Chains)</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG3807 Products and Value Chains</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature.</td>
<td>P CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>C CHNG3805 (Product Formulation and Design) CHNG3806 (Management of Industrial Systems)</td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Third year**

**CHNG3801 Process Design**

**CHNG3802 Operating/Improving Industrial Systems**

**CHNG3803 Chemical/Biological Process Design**

**CHNG3805 Product Formulation and Design**

**CHNG3806 Management of Industrial Systems**

**CHNG3807 Products and Value Chains**

**Fourth year**

**CHNG4801 Practical Experience**

**CHNG4802 Chemical Engineering Design A**
Unit of study | Credit points | A: Assumed knowledge | P: Prerequisites | C: Corequisites | N: Prohibition | Session
--- | --- | --- | --- | --- | --- | ---
CHNG4806 Chemical Engineering Design B | 6 | A Enrolment in this unit of study assumes that all core chemical engineering units of study in third-year have been successfully completed, as well as the related first semester unit of study Chemical Engineering Design A. P CHNG4802 or CHNG4203 | | | | Semester 1

Students must select 12cp from the following block of units.
Students enrol in either Honours Thesis A & B or Engineering Project A & B. For enrolment in Honours an ISWAM of 65% or greater is required.

CHNG4811 Honours Thesis A | 6 | A Enrolment in this unit of study assumes that all (six) core chemical engineering units of study in third year have been successfully completed. P CHNG3801, CHNG3802, CHNG3803, CHNG3805, CHNG3806, CHNG3807. This unit is available to only those students who have gained an entry to the Honours degree. C CHNG4812 N CHNG4801, CHNG4813 | | | | Semester 1

CHNG4812 Honours Thesis B | 6 | A Enrolment in this unit of study assumes that Honours Thesis A and all (six) core chemical engineering units of study in third year have been successfully completed. C CHNG4811 N CHNG4805, CHNG4814 | | | | Semester 1

CHNG4813 Engineering Project A | 6 | A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. P CHNG3801, CHNG3802, CHNG3803, CHNG3805, CHNG3806, CHNG3807 C CHNG4814 N CHNG4805, CHNG4811 | | | | Semester 1

CHNG4814 Engineering Project B | 6 | A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. C CHNG4813 N CHNG4805, CHNG4812 | | | | Semester 1

Notes

1. Students in the Honours program must enrol in CHNG4811 & CHNG4812, students in the Pass program must enrol in CHNG4813 & CHNG4814.
2. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge and/or prerequisite requirements will be as prescribed by that Faculty.
3. Students doing any of the combined degree options BE/BA, BE/BCom, BE/BPM, BE/BSc, BE/BMedSc and BE/LLB will be exempt from a First Year core unit of study and from Second Year Chemistry.
4. Students undertaking study overseas as part of an exchange program will enrol in CHNG3041,CHNG3042 in place of 3rd year core or CHNG4041,CHNG4042 in place of 4th year core.

Resolutions of the Faculty of Engineering relating to Chemical and Biomolecular Engineering

Bachelor of Engineering in Chemical and Biomolecular Engineering
Candidates for this degree are required to complete all the core units of study (total 156 credit points). They are also required to gain at least 24 credit points from the Third and Fourth Year electives listed in the table of recommended elective units of study for BE (Chem & Biomolec) as shown below.

Combined degree (Bachelor of Engineering in Chemical & BioMolecular Engineering with either a Bachelor of Arts or Bachelor of Science)
Candidates in these combined degree options are required to complete all the core units of study except where specific exemptions are noted. They are also required to gain at least 12 credit points from the Fourth Year electives listed in the table of recommended elective units of study for BE (Chem & Biomolec) as shown below. This total of 144 credit points is only sufficient to be awarded a Bachelor of Engineering in Chemical & Biomolecular Engineering as part of these combined degree programs.

Combined degree (Bachelor of Engineering (Chemical & Biomolecular) with a Bachelor of Commerce or Bachelor of Project Management)
Candidates in these combined degree options are required to complete all the core units of study except where specific exemptions are noted. They are also required to gain at least 12 credit points from the Fourth Year electives listed in the table of recommended elective units of study for BE (Chem & Biomolec) as shown below. This total of 144 credit points is only sufficient to be awarded a Bachelor of Engineering in Chemical & Biomolecular Engineering as part of this combined degree program.

Acceptable alternative units of study
Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent Advanced level unit of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing Advanced options should seek advice from their Department before enrolling.

Recommended elective units of study

Third year

CHNG3804 Biochemical Engineering | 6 | A Enrolment in this unit of study assumes that all six core chemical engineering units of study in second year have been successfully completed. P CHNG2801; CHNG2802, CHNG2803; CHNG2804; CHNG2805; CHNG2806; | | | | Semester 2
### Session A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>CHNG3808 Polymer Engineering</td>
<td>6</td>
<td></td>
<td>CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806</td>
<td>CHNG3801</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG4203 Major Industrial Project</td>
<td>24</td>
<td>P Passed at least 144 credit points and have a WAM greater than credit average Students wishing to do this unit of study are required to discuss the matter with the Head of School prior to enrolment. Note: Department permission required for enrolment Department permission required</td>
<td>CHNG3801</td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>CHNG5001 Process Systems Engineering</td>
<td>6</td>
<td>A Mathematics, physics and modeling. Assumed knowledge at the bachelor of Science level. This unit of study is for Masters students and can be selected as an elective by 4th year students.</td>
<td>CHNG3801</td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>CHNG5003 Green Engineering</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td>CHNG3801</td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>CHNG5004 Particles and Surfaces</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td>CHNG3801</td>
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<td>Semester 1</td>
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<tr>
<td>CHNG5005 Wastewater Eng - Systems and Practice</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.</td>
<td>CHNG5801</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 2</td>
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<tr>
<td>CHNG5601 Membrane Science</td>
<td>6</td>
<td></td>
<td>CHNG5801</td>
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<td></td>
<td>Semester 1</td>
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<tr>
<td>CHNG5602 Cellular Biophysics</td>
<td>6</td>
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<td>CHNG5801</td>
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<td></td>
<td>Semester 1</td>
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<tr>
<td>CHNG5603 Analysis, Modelling, Control: BioPhy Sys</td>
<td>6</td>
<td>A It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling</td>
<td>CHNG5801</td>
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<td>Semester 1</td>
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<tr>
<td>CHNG5604 Membrane Science Laboratory</td>
<td>6</td>
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<td>CHNG5801</td>
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<td>Semester 2</td>
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<tr>
<td>CHNG5605 Bio-Products: Laboratory to Marketplace</td>
<td>6</td>
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<td>CHNG5801</td>
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<td>Semester 2</td>
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</table>
# Core units of study (all streams except Project Management)

## First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>ENGG1800 Engineering Disciplines (Intro) Stream A</td>
<td>6</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PHYS1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECM1010</td>
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<td></td>
<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
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<td>Semester 2 Summer Main</td>
</tr>
<tr>
<td>ENGG1803 Professional Engineering 1</td>
<td>6</td>
<td>N ENGG1061</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>GEOL1501 Engineering Geology 1</td>
<td>6</td>
<td>A No previous knowledge of Geology assumed</td>
<td>N GEOL1002, GEOL1902, GEOS1003, GEOS1903</td>
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<td>Semester 2</td>
</tr>
</tbody>
</table>

## Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH1001 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1902) and (MATH1001 or MATH1003 or MATH1907)</td>
<td>N MATH2001, MATH2901, MATH2002, MATH2902, MATH2661, MATH2067</td>
<td></td>
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<td>Semester 1 Summer Main</td>
</tr>
<tr>
<td>CIVL2110 Materials</td>
<td>6</td>
<td>A MATH1001, MATH1002, MATH1003, MATH1005</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL2810 Engineering Construction and Surveying</td>
<td>6</td>
<td>A MATH1001, MATH1002, MATH1003, MATH1005</td>
<td></td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL2201 Structural Mechanics</td>
<td>6</td>
<td>P ENGG1802 Engineering Mechanics</td>
<td>N AMME2301</td>
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<td></td>
<td>Semester 1</td>
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<tr>
<td>CIVL2230 Intro to Structural Concepts and Design</td>
<td>6</td>
<td>A ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>CIVL2410 Soil Mechanics</td>
<td>6</td>
<td>A CIVL2201 Structural Mechanics</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL2611 Introductory Fluid Mechanics</td>
<td>6</td>
<td>A MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics</td>
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<td>Semester 2</td>
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## Third year

<table>
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<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
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<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>CIVL3205 Concrete Structures 1</td>
<td>6</td>
<td>A CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL230 Intro to Structural Concepts and Design</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>CIVL3010 Engineering and Society</td>
<td>6</td>
<td>A ENGG1803 Professional Engineering</td>
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<tr>
<td>CIVL3812 Project Appraisal</td>
<td>6</td>
<td>A MATH1005</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>CIVL3206 Steel Structures 1</td>
<td>6</td>
<td>A CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL230 Intro to Structural Concepts and Design</td>
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<td>Semester 2</td>
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## Fourth year

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<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>CIVL4811 Engineering Design and Construction</td>
<td>6</td>
<td>A CIVL2810 Engineering Construction and Survey</td>
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<td>Semester 1</td>
</tr>
</tbody>
</table>
Students must select 12cp from the following block of units.

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

Resolutions of the Faculty of Engineering relating to Civil Engineering (except Project Engineering Management)

Candidates for the degree of Bachelor of Engineering in Civil Engineering are expected to complete all the core units for the study in the above specialisation requirements (144 credit points). They are also required to gain at least 18 credit points from the 3rd year Civil recommended elective units of study listed below, and 18 credit points from fourth year Civil recommended elective units of study listed below. The remaining 12 credit points can be obtained from any of the listed elective units or from units of study in other Faculties subject to approval from the Director of Learning and Teaching Civil Engineering.

Candidates for one of the combined degree programs (that is, Bachelor of Engineering in Civil Engineering with either a Bachelor of Arts, Bachelor of Science, Bachelor of Medical Science, Bachelor of Laws, Bachelor of Project Management or Bachelor of Commerce) are required to complete all of the core units of study listed above (144 credit points). This total of 144 credit points (plus 12 credit points of electives from the list of electives below for combined degrees with Bachelor of Arts) is only sufficient to be awarded a Bachelor of Engineering in Civil Engineering as part of an approved combined degree program. The remaining credit points for the combined degree will be taken in the appropriate Faculty (Arts, Science, Law or Economics) or BPM core unit tables and candidates should refer to the Joint Resolutions of the Faculty of Engineering and the relevant faculty requirements.

Recommended elective units of study

Acceptable alternative units of study

The Faculty has prescribed the following acceptable alternatives to core units of study listed in the above specialisation requirements:

GEOL5001 Engineering Geology 1 (6cps), acceptable alternative: GEOL1001 and GEOL1002

Recommended elective units of study

Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL2511 Instrumentation and Measurement</td>
<td>6</td>
<td>A CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics</td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>MATH2005 Partial Differential Equations (Intro)</td>
<td>6</td>
<td>P MATH(1011 or 1001 or 1901 or 1906) and MATH(1014 or 1002 or 1902) and MATH(1003 or 1903 or 1907)</td>
<td>N MATH2005, MATH2905, MATH2965, MATH2067</td>
<td></td>
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<td>Semester 2 Summer Main</td>
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</table>

Third year

<table>
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<th>Unit of study</th>
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<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>CIVL2355 Structural Analysis</td>
<td>6</td>
<td>A CIVL2110, CIVL2230 and MATH2061</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL3411 Geotechnical Engineering</td>
<td>6</td>
<td>A CIVL2410 Soil Mechanics</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL3613 Ocean and Coastal Engineering</td>
<td>6</td>
<td>A CIVL2611 - Fluid Mechanics: Inviscid Flow Note: Department permission required for enrolment</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL3805 Project Scope, Time and Cost Management</td>
<td>6</td>
<td>A CIVL2810 - Engineering Construction and Surveying</td>
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<td>Semester 2</td>
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### Unit of study

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<tr>
<td><strong>Fourth year</strong></td>
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<tr>
<td>CIVL3813 Contracts Formulation and Management</td>
<td>6</td>
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<td>A CIVL3805 Project Scope, Cost &amp; Time Management</td>
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<td>Semester 2</td>
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<td></td>
<td></td>
<td>P 36 Intermediate (2nd year) credit points</td>
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<tr>
<td>CIVL4810 Mgmt of People, Quality and Risk in PE</td>
<td>6</td>
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<td>A CIVL3805 Project Scope, Time and Cost Management</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL4814 Project Procurement and Tendering</td>
<td>6</td>
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<td>A CIVL3805 Project Scope, Time and Cost Management</td>
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<tr>
<td>CIVL4815 Project Formulation</td>
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<td></td>
<td>P CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal</td>
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<td>CIVL5266 Steel Structures - Stability</td>
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<td>CIVL5269 Concrete Structures - Strength &amp; Service</td>
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<tr>
<td>CIVL5351 Geoenvironmental Engineering</td>
<td>6</td>
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<tr>
<td>CIVL5452 Foundation Engineering</td>
<td>6</td>
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<td>A BE or equivalent.</td>
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<tr>
<td>CIVL5458 Numerical Methods in Civil Engineering</td>
<td>6</td>
<td></td>
<td>A BE or equivalent.</td>
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<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>6</td>
<td></td>
<td>A Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.</td>
<td></td>
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<td>Semester 2</td>
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<tr>
<td>CIVL5668 Wind Engineering for Design-Fundamentals</td>
<td>6</td>
<td></td>
<td>A BE or equivalent.</td>
<td></td>
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<td>Semester 1</td>
</tr>
</tbody>
</table>

### Notes

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.
2. For the BE (Civil) degree students must take at least 18 elective credit points of study from the recommended Civil Third Year level and 18 elective credit points from the recommended Civil Fourth Year electives. The remaining 12 credit points can be obtained from any of the listed elective units or from units of study in other Faculties subject to approval from the Director of the Learning and Teaching, Civil Engineering.

### Exchange units of study

CIVL0011, CIVL0012, CIVL0013, CIVL0014, CIVL0015, CIVL0016, CIVL0017 AND CIVL0018 are available for exchange study programs.
## Project Engineering and Management (Civil) stream

### Core units of study

**First year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td>Semester 1</td>
<td>Semester 1</td>
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<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td>Semester 1</td>
<td>Semester 1</td>
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</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td>Semester 2</td>
<td>Semester 2</td>
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<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td>Semester 2</td>
<td>Semester 2</td>
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<tr>
<td>ACCT1003 Financial Accounting Concepts</td>
<td>6</td>
<td>N ACCT1001, ACCT1002</td>
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<tr>
<td>ACCT1004 Management Accounting Concepts</td>
<td>6</td>
<td>N ACCT1001, ACCT1002</td>
<td>Terminating unit</td>
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<td>ENGG1800 Engineering Disciplines (Intro) Stream A</td>
<td>6</td>
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<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
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<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
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<tr>
<td>ENGG1803 Professional Engineering 1</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
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<tr>
<td>PHYS1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
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**Second year**

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<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>MATH2001 Linear Mathematics and Vector Calculus</td>
<td>6</td>
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<tr>
<td>CIVL2201 Structural Mechanics</td>
<td>6</td>
<td>P ENGG1802 Engineering Mechanics</td>
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<tr>
<td>CIVL2810 Engineering Construction and Surveying</td>
<td>6</td>
<td>A MATH1001, MATH1002, MATH1003, MATH1005</td>
<td>A ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics</td>
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<tr>
<td>CIVL2410 Soil Mechanics</td>
<td>6</td>
<td>A CIVL2201 Structural Mechanics</td>
<td>A CIVL2201 Structural Mechanics</td>
<td>Semester 2</td>
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<tr>
<td>CIVL3805 Project Scope, Time and Cost Management</td>
<td>6</td>
<td>A CIVL2810 - Engineering Construction and Surveying</td>
<td>A CIVL2810 - Engineering Construction and Surveying</td>
<td>Semester 2</td>
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<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td>A ENGG1801 Professional Engineering</td>
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**Third year**

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<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>CIVL3010 Engineering and Society</td>
<td>6</td>
<td>A ENGG1803 Professional Engineering</td>
<td>A ENGG1803 Professional Engineering</td>
<td>Semester 1</td>
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<tr>
<td>CIVL2110 Materials</td>
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<tr>
<td>CIVL3812 Project Appraisal</td>
<td>6</td>
<td>A MATH1005</td>
<td>A MATH1005</td>
<td>Semester 1</td>
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<tr>
<td>CIVL3813 Contracts Formulation and Management</td>
<td>6</td>
<td>A CIVL3805 Project Scope, Cost &amp; Time Management</td>
<td>P 36 Intermediate (2nd year) credit points</td>
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<tr>
<td>Unit of study</td>
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<td>C: Corequisites</td>
<td>N: Prohibition</td>
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<tr>
<td>CIVL4810 Mgmt of People, Quality and Risk in PE</td>
<td>6</td>
<td>A CIVL3805 Project Scope, Time and Cost Management</td>
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<td>Semester 2</td>
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<tr>
<td>CIVL4811 Engineering Design and Construction</td>
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<td>A CIVL2810 Engineering Construction and Survey</td>
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<tr>
<td>CIVL4814 Project Procurement and Tendering</td>
<td>6</td>
<td>A CIVL3805 Project Scope, Time and Cost Management</td>
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<tr>
<td>CIVL4815 Project Formulation</td>
<td>6</td>
<td>P CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal</td>
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<td></td>
<td>Semester 1</td>
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<tr>
<td>ENGG4000 Practical Experience</td>
<td></td>
<td>P 36 Credit Points of Senior Units Students should have completed three years of their BE program before enrolling in this unit.</td>
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<td>Semester 1</td>
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</table>

**Students must select 12cp from the following block of units.**

- Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.
- **CIVL4022** Honours Thesis A 6 P 30 credit points of Senior Units of Study, ISWAM 65 or over Note: Department permission required for enrolment Semester 2 Semester 2
- **CIVL4023** Honours Thesis B 6 P 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A Note: Department permission required for enrolment Semester 1 Semester 2
- **CIVL4024** Engineering Project A 6 P 30 Credit Points of Senior Units of Study Note: Department permission required for enrolment in the following sessions: Semester 2 Semester 2
- **CIVL4025** Engineering Project B 6 P 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A Note: Department permission required for enrolment in the following sessions: Semester 1 Semester 2

**Notes.**

1. Students in the Honours program must enrol in CIVL4022 & CIVL4023, students in the Pass Program must enrol in CIVL4024 & CIVL4025.
2. With special permission from the Director of the Learning and Teaching, Civil Engineering, it is possible to take Honours Thesis A or Engineering Project A in Semester 2 and Honours Thesis B or Engineering Project B in Semester 1.
3. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by the faculty.
4. Candidates for the degree of Bachelor of Engineering in Project Engineering and Management (Civil) are expected to complete all the core units of study (156 credit points). They are also required to gain at least 24 credit points from the third and fourth year table of electives listed below. The remaining 12 credit points required for the degree can be obtained from the list of electives below or from other units of study offered by the University of Sydney subject to approval by the Director of the Learning and Teaching of Civil Engineering.
5. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Commerce are required to complete all of the core units of study in the above specialisation requirements except for ACCT1003, ACCT1004, which are not required, therefore only 144 credit points are needed. This total of 144 credit points is only sufficient to be awarded a Bachelor of Engineering in Project Engineering and Management (Civil) as part of an approved combined degree program. The remaining 96 credit points for the combined degree will be taken in the Faculty of Economics and Business. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty of Economics and Business.
6. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Arts, Bachelor of Science, or Bachelor of Medical Science are required to complete all of the core units of study in the above specialisation requirements. This remaining 84 credit points should be taken from the relevant faculty unit of study subject to the Joint Resolutions of the Faculty of Engineering and the relevant faculty.
7. Candidates commencing a combined degree program that is a Bachelor of Engineering in Project Engineering and Management (Civil) with Bachelor of Laws are required to complete all of the core units of study in the above specialisation requirements except CIVL3010 and CIVL3813. The remaining 144 credit points for the combined degree will be taken in the Faculty of Laws. Candidates should refer to the Joint Resolutions of the Faculty of Engineering and the Faculty of Laws.
8. Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by equivalent advanced level units of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from the relevant department before enrolling.

**Recommended elective units of study**

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL3205 Concrete Structures 1</td>
<td>6</td>
<td>A CIVL2110, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design</td>
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<tr>
<td>CIVL3206 Steel Structures 1</td>
<td>6</td>
<td>A CIVL2110, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design</td>
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<tr>
<td>CIVL3235 Structural Analysis</td>
<td>6</td>
<td>A CIVL2110, CIVL2230 and MATH2061</td>
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<tr>
<td>CIVL3411 Geotechnical Engineering</td>
<td>6</td>
<td>A CIVL2410 Soil Mechanics</td>
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<tr>
<td>CIVL3613 Ocean and Coastal Engineering</td>
<td>6</td>
<td>A CIVL2611 - Fluid Mechanics: Inviscid Flow Note: Department permission required for enrolment</td>
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<tr>
<td>CIVL2511 Instrumentation and Measurement</td>
<td>6</td>
<td>A CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics</td>
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### Fourth year

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<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
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<tbody>
<tr>
<td>CIVL4614 Flow-Induced Vibrations</td>
<td>6</td>
<td>A CIVL2611 Fluid Mechanics: Inviscid Flow, CIVL3612 Environmental Fluids Engineering: Viscous Flow, CIVL2230 Introduction to Structural Concepts and Design, CIVL3235 Structural Analysis Note: Department permission required for enrolment</td>
<td></td>
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<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
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<tr>
<td>CIVL4903 Civil Engineering Design</td>
<td>6</td>
<td>A</td>
<td>CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1.</td>
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<tr>
<td>CIVL5266 Steel Structures - Stability</td>
<td>6</td>
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<tr>
<td>CIVL5269 Concrete Structures - Strength &amp; Service</td>
<td>6</td>
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<tr>
<td>CIVL5351 Geoenvironmental Engineering</td>
<td>6</td>
<td>A</td>
<td>BE or equivalent.</td>
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<tr>
<td>CIVL5458 Numerical Methods in Civil Engineering</td>
<td>6</td>
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</tbody>
</table>

**Notes**

1. Choice of electives as shown in the above table will depend upon subject availability, timetabling and prerequisite conditions.

3. At least one of CIVL3205 and CIVL3612 must be taken.

**Exchange units of study**

CIVL0011, CIVL0012, CIVL0013, CIVL0014, CIVL0015, CIVL0016, CIVL0017 AND CIVL0018 are available for exchange study programs.
Civil Engineering combined with Design in Architecture

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td><strong>Civil Engineering combined with Design in Architecture</strong></td>
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</tr>
<tr>
<td><strong>Candidates for the degree of Bachelor of Engineering in Civil Engineering and Design in Architecture are required to gain credit for the core units of study set out below. To satisfy the degree requirement of the combined degree a candidate must study not less than 144 credit points of the core civil engineering units of study and 96 credit points of units of study of the core design in architecture units of study.</strong></td>
<td></td>
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<tr>
<td><strong>Core units of study</strong></td>
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<td><strong>First year</strong></td>
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<tr>
<td>MATH1001 Differential Calculus</td>
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<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
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<td>Semester 1 Main</td>
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<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
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<td>Semester 1 Main</td>
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<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
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<td>Semester 2 Main</td>
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<tr>
<td>MATH1005 Statistics</td>
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<td>A HSC Mathematics</td>
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<td>BDES1010 Architecture Studio 101</td>
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<td>C BDES1011, BDES1012</td>
<td>N DESA1001</td>
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<tr>
<td>BDES1011 Architectural History/Theory 1</td>
<td>6</td>
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<td>BDES1012 Architectural Communications 1</td>
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<td>N DESA1001</td>
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<tr>
<td>BDES1020 Architecture Studio 102</td>
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<td>A BDES1011, BDES1012</td>
<td>P BDES1010 or DESA1001</td>
<td>C BDES1023, BDES1024</td>
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<td>BDES1023 Architectural Technologies 1</td>
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<td>BDES1024 Art Workshop 1</td>
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<td>MATH2061 Linear Mathematics and Vector Calculus</td>
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<td>PHYS1001 Physics 1 (Regular)</td>
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<td>CIVL2201 Structural Mechanics</td>
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<td>P ENGG1802 Engineering Mechanics</td>
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<td>Semester 1</td>
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<tr>
<td>GEOL1501 Engineering Geology 1</td>
<td>6</td>
<td>A No previous knowledge of Geology assumed</td>
<td>N GEOL1002, GEOL1902, GEOS1003, GEOS1903</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>Third year</strong></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CIVL2201 Structural Mechanics</td>
<td>6</td>
<td></td>
<td>P ENGG1802 Engineering Mechanics</td>
<td>N AMME2301</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL2410 Soil Mechanics</td>
<td>6</td>
<td></td>
<td>A CIVL2201 Structural Mechanics</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL2611 Introductory Fluid Mechanics</td>
<td>6</td>
<td>A MATH1001 Differential Calculus, ENGG1802 Engineering Mechanics, CIVL2201 Structural Mechanics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>BDES2010 Architecture Studio 201</td>
<td>6</td>
<td></td>
<td>P BDES1020 or DESA1002</td>
<td>C BDES2012, BDES2013</td>
<td>N DESA2001</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
### Civil Engineering Combined with Design in Architecture

#### Unit of study | Credit points | A: Assumed knowledge | P: Prerequisites | C: Corequisites | N: Prohibition | Session
---|---|---|---|---|---|---
BDES2012 Architectural Communications 2 | 6 | A BDES1012 C BDES2010, BDES2013 N DESA2001 | Note: Department permission required for enrolment in the following sessions: Semester 2 | | | Semester 1 Semester 2
BDES2013 Architectural Technologies 2 | 6 | A BDES1023 C BDES2010, BDES2012 N DESA2111 | | | Semester 1
BDES2020 Architecture Studio 202 | 6 | P BDES2010 or DESA2001 C BDES2021, BDES2024 N DESA2002 | | | Semester 2
BDES2021 Architectural History/Theory 2 | 6 | P BDES1011 N DESA2111 | | | Semester 2

**Fourth year**

BDES210 Engineering Construction and Surveying | 6 | A MATH1001, MATH1002, MATH1003, MATH1005 | | | Semester 1
BDES212 Project Appraisal | 6 | A MATH1005 | | | Semester 1
BDES306 Structural Analysis | 6 | A CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design | | | Semester 2
BDES310 Architecture Studio 301 | 6 | P BDES1010, BDES1011, BDES1012, BDES1020, BDES1023, BDES1024, BDES2010, BDES2013, BDES2012, BDES2020, BDES2021, BDES2024 or the equivalents from DESA1001, DESA1002, DESA1101, DESA1102, DESA2001, DESA2002, DESA2111 C BDES3011, BDES3012 N DESA3001 | Progression to BDES310 requires successful completion of all preceding BDES10XX and BDES20XX units of study or the successful completion of all preceding Design Practice and Design Studies units of study. | | Semester 1
BDES312 Architectural Communications 3 | 6 | P BDES2012 or DESA2002 C BDES3010 and (BDES3011 or DAAP3001) N DESA3001 | | | Semester 1
BDES320 Architecture Studio 302 | 6 | P BDES3010 or DESA3001 C BDES3023 or DAAP3002 N DESA3002 | | | Semester 2
BDES323 Architectural Technologies 3 | 6 | P BDES2013 or DESA2111 C BDES3020 N DAAP3002 | | | Semester 2

**Fifth year**

CIVL205 Concrete Structures 1 | 6 | A CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design | | | Semester 1
CIVL411 Engineering Design and Construction | 6 | A CIVL2810 Engineering Construction and Survey | | | Semester 1
CIVL493 Civil Engineering Design | 6 | A CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1. | | | Semester 2
ENGG4000 Practical Experience | 36 | Credit Points of Senior Units Students should have completed three years of their BE program before enrolling in this unit. | | | Semester 1 Semester 2
BDES3025 Architectural Professional Practice | 6 | C BDES3020 | | | Semester 2

An additional 6 credit point core unit of study in structural design, CIVL4860, will become available in Fifth year in 2013.

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

| Unit of study | Credit points | A: Assumed knowledge | P: Prerequisites | C: Corequisites | N: Prohibition | Session
---|---|---|---|---|---|---
CIVL4022 Honours Thesis A | 6 | P 30 credit points of Senior Units of Study, ISWAM 65 or over Note: Department permission required for enrolment | | | Semester 1 Semester 2
CIVL4023 Honours Thesis B | 6 | P 30 credit points of Senior units of study and successful completion of CIVL4022 - Honours Thesis A Note: Department permission required for enrolment | | | Semester 1 Semester 2
CIVL4024 Engineering Project A | 6 | P 30 Credit Points of Senior Units of Study Note: Department permission required for enrolment in the following sessions: Semester 2 | N CIVL4022, CIVL4023 | | Semester 1 Semester 2
CIVL4025 Engineering Project B | 6 | P 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A Note: Department permission required for enrolment in the following sessions: Semester 1 | | | Semester 1 Semester 2

**Resolutions of the Faculty of Engineering and IT relating to the combined Civil Engineering/Design in Architecture program.**

1. Candidates for the degrees of Bachelor of Engineering in Civil Engineering and Bachelor of Design in Architecture must complete all the core units of the study as listed in the above table and complete a minimum of 240 credit points.
2. Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by an equivalent advanced level units of study subject to prerequisite conditions (as required by the Faculty of Science) being met.
3. Students considering doing Advanced Engineering options should seek advice from the relevant school adviser before enrolling.

84
Candidates for the degree of Bachelor of Project Management are required to gain credit points for the core units of study set out below. Any additional credit necessary to satisfy the degree requirement of not less than 144 credit points shall be gained by completing additional elective units of study, as recommended by the School (as set out below).

Students in BPM must complete the requirements of one of the three streams; Civil Engineering Science; Built Environment; Software. Requirements for each stream are shown below.

Combined Engineering and Project Management
Students in the combined Engineering/Project management degree are exempt from the Project Management stream requirements. They must however complete an Engineering stream as defined in the relevant Engineering stream tables.

Core units of study

First year; All streams

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td>Semester 1</td>
<td>Summer Main</td>
<td></td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td>Semester 1</td>
<td>Summer Main</td>
<td></td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td>Semester 2</td>
<td>Summer Main</td>
<td></td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td>Semester 2</td>
<td>Summer Main</td>
<td></td>
</tr>
<tr>
<td>ENGG1850 Introduction to Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ECON1001 Introductory Microeconomics</td>
<td>6</td>
<td>A Mathematics</td>
<td></td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PSYC1002 Psychology 1002</td>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

First year : Civil Engineering Science stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1800 Engineering Disciplines (Intro) Stream A</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

First Year : Built Environment stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>DAAE2001 20th Century Australian Architecture</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>DAAE2002 Architecture, Place and Society</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

First Year : Software stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2101</td>
<td>Semester 1</td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td>N INFO1902, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2002, COMP2902</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Second year : All streams

The following units will be offered commencing 2013.

ENGG2850: Introduction to Project Finance
ENGG3852: Project Quality Management
ENGG2851: Data Analytics for Project Management
PMGT2853: Complex Project Coordination

Second Year : Civil Engineering Science stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL2201 Structural Mechanics</td>
<td>6</td>
<td>P ENGG1802 Engineering Mechanics</td>
<td>N AMME2301</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
## Unit of study Table

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL2230 Intro to Structural Concepts and Design</td>
<td>6</td>
<td>A ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Second Year: Built Environment stream

| DESP1001 Introductory Urban Design and Planning         | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 2   |
| DESC9014 Building Construction Technology               | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 1   |

### Second Year: Software stream

| INFO2120 Database Systems 1                             | 6             | A Some exposure to programming and some familiarity with data model concepts such as | INFO1103 or INFO1003 or INFS1000 or INFO1903 | INFO2820, INFO2005, INFO2900 |                                                                                | Semester 1   |
| INFO2110 Systems Analysis and Modelling                 | 6             | A Experience with a data model as in INFO1003 or INFO1103 or INFS1000            | INFO2810, INFO2000, INFO2900 |                                                                                |                                                                                | Semester 2   |

### Third Year: All streams

The following units of study will be offered in 2014
- ENGG3852: Project Quality Management
- ENGG3853: Project Risk Management: Tools & Techniques
- ENGG3854: Negotiating and Contracting
- PMGT3850: Project Management Capstone Project A
- PMGT3851: Project Management Capstone Project B
- PMGT3855: Project Variance Analysis

### Third Year: Civil Engineering Science stream

Select one of the following units
- CIVL2410 Soil Mechanics
- CIVL2611 Introductory Fluid Mechanics

### Third Year: Built Environment stream

| DESC9047 Strategic Facility Management                  | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 1   |
| DESC9151 Introduction to Building Services              | 6             | Students with the relevant building services background may apply for a waiver.  |                                                                                |                                                                                |                                                                                | Semester 1   |

### Third Year: Software stream

| ELEC3609 Internet Software Platforms                     | 6             | P INFO1103, INFO2110, INFO2120, INFO2820, INFO2005, INFO2900                  |                                                                                |                                                                                |                                                                                | Semester 2   |
| ELEC3610 E-Business Analysis and Design                 | 6             | P INFO2120, INFO2810, INFO2000, INFO2900                                     |                                                                                |                                                                                |                                                                                | Semester 1   |

### Honours Year

The following units of study will be available for students wishing to enter the BPM Honours program in 2015
- PMGT4850: Project Management Honours Project A
- PMGT4851: Project Management Honours Project B

Select 24 cp from the following list of electives.

| PMGT5875 Project Innovation Management                   | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 1   |
| PMGT5876 Strategic Delivery of Change                    | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 2   |
| PMGT5879 Strategic Portfolio & Program Management        | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 1   |
| PMGT5886 System Dynamics Modelling for PM                | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 2   |
| PMGT5893 Statistical Methods in PM                       | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 2   |
| PMGT6867 Quantitative Methods: Project Management       | 6             |                                                                                |                                                                                |                                                                                |                                                                                | Semester 1   |

### Notes.

1. The Honours program is completed as an additional year. Students are required to achieve a minimum 65% average mark in the Intermediate and Senior units of the above program to be eligible for entry to Honours.
2. For core units of study offered by other than the Faculty of Engineering, any assumed knowledge, prerequisite and corequisite requirements will be as prescribed by the faculty.
3. Candidates for the degree of Bachelor of Project Management are expected to complete all the core units of study listed above. They are also required to gain additional 12 credit points from a choice of free elective units offered by the University of Sydney.
4. Candidates enrolled in a combined Engineering/Project Management program are exempt from the stream core units listed in the tables above.

5. Most Mathematics, Chemistry, Physics and Computer Science units of study offered by the Faculty of Science can be replaced by equivalent advanced level units of study subject to prerequisite conditions (as required by the Faculty of Science) being met. Students considering doing advanced options should seek advice from the relevant department before enrolling.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
</table>

Project Management Stream Tables
The School of Electrical and Information Engineering offers the following Bachelor of Engineering degree specialisations:

- Electrical
- Electrical (Bioelectronics)
- Electrical (Computer)
- Electrical (Power)
- Electrical (Telecommunications)
- Software, and
- Combined degrees with Science, Commerce, Arts, Medical Science, Project Management and Law.

Candidates for the degree of Bachelor of Engineering in Electrical Engineering, Electrical (Bioelectronics), Electrical (Computer), Electrical (Power), Electrical (Telecommunications) and Software Engineering are required to gain credit for a prescribed number of credit points of core and recommended units of study. The core units of study are set out in the tables below pertaining to each specialisation. The recommended units of study are as defined for each specialisation.

**Note:** Not all recommended units of study shall be available each year.
### Electrical Engineering (Bioelectronics) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Electrical Engineering (Bioelectronics)</strong></td>
<td></td>
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</tr>
<tr>
<td>All candidates for the Bachelor of Engineering in Electrical Engineering (Bioelectronics) degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study.</td>
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</tr>
<tr>
<td>Candidates will also need to choose a number of recommended units of study for Electrical (Bioelectronics) Engineering, which consist of:</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>- all level 3, 4 and 5 ELEC units which do not appear in the table of core units;</td>
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</tr>
<tr>
<td>- the units of study listed in the table of additional recommended units of study; and</td>
<td></td>
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</tr>
<tr>
<td>- such other units of study as may be so designated by the Head of School.</td>
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<td></td>
</tr>
<tr>
<td><strong>Bachelor of Engineering in Electrical (Bioelectronics) Engineering</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Candidates for the 4-year Bachelor of Engineering in Electrical Engineering (Bioelectronics) degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.</td>
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</tr>
<tr>
<td><strong>Electrical Engineering (Bioelectronics) core units of study</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>First year</strong></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG1905 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>MATH1002, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>MATH1013, MATH1903, MATH1907</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PHYS1003 Physics 1 (Technological)</td>
<td>6</td>
<td>A HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent.</td>
<td>C Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905).</td>
<td>N PHYS1004, PHYS1902</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PHYS1003 Physics 1 (Technological)</td>
<td>6</td>
<td>A HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent.</td>
<td>C Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905).</td>
<td>N PHYS1004, PHYS1902</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PHYS1004, PHYS1902</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>INFO1103 Introduction to Programming</strong></td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>SOFT1001, SOFT1961, COMP1001, COMP1901, DECO2011</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>INFO1105 Data Structures</strong></td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td>INFO1905, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2002, COMP2902</td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td><strong>Second year</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>BIOL1003 Human Biology</td>
<td>6</td>
<td>A HSC 2 unit Biology. Semester 1 students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February).</td>
<td>N BIOL1903</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>BIOL1003 Human Biology</td>
<td>6</td>
<td>A HSC 2 unit Biology. Semester 1 students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February).</td>
<td>N BIOL1903</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>BIOL1003 Human Biology</td>
<td>6</td>
<td>A HSC 2 unit Biology. Semester 1 students who have not completed HSC biology (or equivalent) are strongly advised to take the Biology Bridging Course (in February).</td>
<td>N BIOL1903</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>ELEC2103 Simulation &amp; Numerical Solutions in Eng</strong></td>
<td>6</td>
<td>A ELEC1103 Fundamentals of Electrical and Electronic Engineering</td>
<td>COSC1001, COSC1901</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2302 Signals and Systems</td>
<td>6</td>
<td>A MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling.</td>
<td>N ELEC2301, MATH3019, MATH3919</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2602 Digital System Design</td>
<td>6</td>
<td>A ELEC1103</td>
<td>N ELEC3601, ELEC3608</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH101 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1002) and (MATH2001, MATH2001, MATH2002, MATH2002, MATH2902, MATH2902, MATH2907, MATH2907)</td>
<td>N ELEC2001, MATH2001, MATH2002, MATH2002, MATH2902, MATH2902, MATH2907, MATH2907</td>
<td></td>
<td></td>
<td>Semester 1/Summer Main</td>
</tr>
<tr>
<td>PHYS1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
<td>N PHYS1002, PHYS1901, EDUH1017</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH2901 Anatomy and Physiology for Engineers</td>
<td>6</td>
<td>A A basic understanding of biology. Recommended: BIOL1003 (or equivalent)</td>
<td></td>
<td></td>
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<td>Semester 2</td>
</tr>
</tbody>
</table>

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC3304 Control</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: 6 credit points of junior biology</td>
<td>6 credit points of junior chemistry MECH2901 or 6 credit points of junior biology</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3305 Digital Signal Processing</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: 6 credit points of junior biology</td>
<td>6 credit points of junior chemistry MECH2901 or 6 credit points of junior biology</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3404 Electronic Circuit Design</td>
<td>6</td>
<td>A A background in basic electronics and circuit theory is assumed.</td>
<td>N ELEC3401</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3607 Embedded Systems</td>
<td>6</td>
<td>A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2802 Digital System Design.</td>
<td>P ELEC1601 and ELEC2602</td>
<td>N ELEC3302, AMME3500</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3802 Fundamentals of Biomedical Engineering</td>
<td>6</td>
<td>A A knowledge of basic electrical engineering is required: Ohm's law, Thevenin and Norton's theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanism of operation of transformers.</td>
<td>N ELEC3801</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3803 Bioelectronics</td>
<td>6</td>
<td>A A basic understanding of biology. Recommended: BIOL1003 (or equivalent)</td>
<td>P ELEC2104 AND ELEC2802</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Fourth year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC4702 Practical Experience</td>
<td>24</td>
<td>P 24 credit points of level 3 or 4 units of study.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1/2</td>
</tr>
</tbody>
</table>

Students must select 12cp from the following block of units.

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

<table>
<thead>
<tr>
<th>Unit of study</th>
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</tr>
</thead>
<tbody>
<tr>
<td>ELEC4710 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above.</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td></td>
<td>Semester 1/2</td>
</tr>
<tr>
<td>ELEC4711 Engineering Project B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4710 Engineering Project A</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td>Semester 1/2</td>
</tr>
<tr>
<td>ELEC4712 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4713</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td>Semester 1/2</td>
</tr>
<tr>
<td>ELEC4713 Honours Thesis B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4715</td>
<td>N ELEC4707, ELEC4711</td>
<td></td>
<td>Semester 1/2</td>
</tr>
</tbody>
</table>

Notes
1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met.
2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.

Additional Recommended Elective Bioelectronics Units of Study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME4990 Biomedical Product Development</td>
<td>6</td>
<td>A Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td>P 6 credit points of junior biology 6 credit points of junior chemistry</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME4992 Regulatory Affairs in Medical Industry</td>
<td>6</td>
<td>A Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td>P 6 credit points of junior biology 6 credit points of junior chemistry</td>
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<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Electrical Engineering (Computer) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>Electrical Engineering (Computer)</td>
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<tr>
<td>All candidates for the Bachelor of Engineering in Electrical Engineering (Computer) degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Electrical Engineering (Computer), which consist of: – all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and – such other units of study as may be so designated by the Head of School.</td>
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<tr>
<td>Bachelor of Electrical Engineering (Computer)</td>
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<tr>
<td>Candidates for the four-year Bachelor of Engineering in Electrical Engineering (Computer) degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.</td>
<td></td>
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</tr>
<tr>
<td>Bachelor of Engineering in Electrical Engineering (Computer) in a combined degree course</td>
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<tr>
<td>Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering (Computer) with the Bachelor of Commerce, Bachelor of Project Management or Bachelor of Law are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering (Computer) with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study. Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering (Computer) with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology. Candidates in all combined degree courses shall also satisfy such other requirements as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.</td>
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<tr>
<td>Electrical Engineering (Computer) core units of study</td>
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<tr>
<td>First year</td>
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</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td></td>
<td>N MATH1101, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td></td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td></td>
<td>N MATH1013, MATH1903, MATH1907</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td></td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECM1010</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PHYS1003 Physics 1 (Technological)</td>
<td>6</td>
<td>A HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent.</td>
<td></td>
<td>C Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905).</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td></td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td></td>
<td>N INFO1005, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2002, COMP2902</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Second year</td>
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</tr>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2302 Signals and Systems</td>
<td>6</td>
<td>A MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling.</td>
<td></td>
<td>N ELEC2301, MATH1019, MATH3919</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2602 Digital System Design</td>
<td>6</td>
<td>A ELEC1103</td>
<td></td>
<td>N ELEC3901, ELEC3902</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH1001 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1902) and (MATH1003 or MATH1903 or MATH1907).</td>
<td></td>
<td>N MATH2001, MATH2901, MATH2902, MATH2902, MATH2961, MATH2967</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
# Electrical Engineering (Computer) stream

**Unit of study** | **Credit points** | **A: Assumed knowledge** | **P: Prerequisites** | **C: Corequisites** | **N: Prohibition** | **Session**
---|---|---|---|---|---|---
PHYS1001  
Physics 1 (Regular) | 6 | A HSC Physics  
C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) | P PHYS (1001 or 1901), PHYS (1003 or 1903) | N PHYS1002, PHYS1901, EDUH1017 | Semester 1

PHYS2213  
Physics 2EE | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

COMP2129  
Operating Systems and Machine Principles | 6 | A Programming, as from INFO1103, INFO1105  
C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902) | P ELEC1001 and ELEC2902 | N PHYS1002, PHYS1901, EDUH1017 | Semester 1

**Third year**

ELEC3506  
Data Communications and the Internet | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3607  
Embedded Systems | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3608  
Computer Architecture | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

**At least 2 of the following 6 units of study:**

ELEC3104  
Engineering Electromagnetics | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3304  
Control | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3305  
Digital Signal Processing | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3404  
Electronic Circuit Design | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

ELEC3702  
Management for Engineers | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

COMP3520  
Operating Systems Internals | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

**Fourth year**

ELEC4702  
Practical Experience | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 2

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

ELEC4710  
Engineering Project A | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 1

ELEC4711  
Engineering Project B | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 1

ELEC4712  
Honours Thesis A | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 1

ELEC4713  
Honours Thesis B | 6 | A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful  
P PHYS (1001 or 1901) and PHYS (1003 or 1903) | N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902, PHYS2012, PHYS2912 | Semester 1

**Notes**

1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met.

2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.

94
## Electrical Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td>Electrical Engineering</td>
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</tbody>
</table>
| All candidates for the Bachelor of Engineering in Electrical Engineering degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Electrical Engineering, which consist of:
- all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and
- such other units of study as may be so designated by the Head of School. |               |                      |                  |                |               |                 |
| Bachelor of Engineering in Electrical Engineering |               |                      |                  |                |               |                 |
| Candidates for the 4-year Bachelor of Engineering in Electrical Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School. |               |                      |                  |                |               |                 |
| Bachelor of Engineering in Electrical Engineering in a combined degree course |               |                      |                  |                |               |                 |
| Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Commerce, Bachelor of Project Management or Bachelor of Laws are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study. |               |                      |                  |                |               |                 |
| Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study. |               |                      |                  |                |               |                 |
| Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology. Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned. |               |                      |                  |                |               |                 |

### Electrical Engineering core units of study

#### First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
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<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
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</tr>
<tr>
<td>MATH1005 Statistics</td>
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</tr>
<tr>
<td>PHYS1003 Physics 1 (Technological)</td>
<td>6</td>
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</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td></td>
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<td>Semester 2</td>
</tr>
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</table>

#### Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2103 Simulation &amp; Numerical Solutions in Eng</td>
<td>6</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td></td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2302 Signals and Systems</td>
<td>6</td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2602 Digital System Design</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
Electrical Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
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<tbody>
<tr>
<td>PHYS1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
<td>N PHYS1002, PHYS1901, EDU1017</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PHYS2213 Physics 2EE</td>
<td>6</td>
<td>A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful</td>
<td>P PHYS (1001 or 1901) and PHYS (1003 or 1903)</td>
<td>N PHYS2002, PHYS2001, PHYS2901, PHYS2201, PHYS2911, PHYS2902, PHYS2902, PHYS2912</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP2129 Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1105</td>
<td>N SOFT2130, SOFT2830, SOFT2904, SOFT2904, COMP2004, COMP2904</td>
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<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Third year

At least 5 of the following 9 units of study:

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC3104 Engineering Electromagnetics</td>
<td>6</td>
<td>A Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetics and their use in the calculation of static fields.</td>
<td>N ELEC3102</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3203 Electricity Networks</td>
<td>6</td>
<td>A This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics.</td>
<td>N ELEC3201</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3206 Electrical Energy Conversion Systems</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply.</td>
<td>P ELEC2104</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3304 Control</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Laplace transform, Fourier transform, and basic signal processing techniques.</td>
<td>N ELEC3302, AMME3500</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3305 Digital Signal Processing</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals.</td>
<td>P ELEC2302, ELEC3303</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3404 Electronic Circuit Design</td>
<td>6</td>
<td>A A background in basic electronics and circuit theory is assumed.</td>
<td>N ELEC3401</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3505 Communications</td>
<td>6</td>
<td>A Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques.</td>
<td>N ELEC3503</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3607 Embedded Systems</td>
<td>6</td>
<td>A A background in circuit theory, digital electronics and microprocessors is assumed.</td>
<td>N ELEC3607</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3702 Management for Engineers</td>
<td>6</td>
<td>N ELEC3701, ENGG3005, MECH3661</td>
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<td>Semester 2</td>
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</tbody>
</table>

Fourth year

ELEC4702 Practical Experience                      | P             | 24 credit points of level 3 or 4 units of study. |                |                |                | Semester 1 Semester 2 |

Students must select 12cp from the following block of units.

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC4710 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above.</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
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<td></td>
<td>Semester 2 Semester 2</td>
</tr>
<tr>
<td>ELEC4711 Engineering Project B</td>
<td>6</td>
<td>A 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4710 Engineering Project A</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ELEC4712 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4712</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ELEC4713 Honours Thesis B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>C ELEC4713</td>
<td>N ELEC4707, ELEC4711</td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

Notes

1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met.
2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.
Electrical Engineering (Power) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electrical Engineering (Power)</td>
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</tr>
<tr>
<td>All candidates for the Bachelor of Engineering in Electrical Engineering (Power) degree (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study.</td>
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<tr>
<td>Candidates will also need to choose a number of recommended units of study for Electrical Engineering (Power), which consist of:</td>
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<tr>
<td>- all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and</td>
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<tr>
<td>- such other units of study as may be so designated by the Head of School.</td>
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</tbody>
</table>

Bachelor of Engineering in Electrical Engineering (Power)

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Engineering in Electrical Engineering (Power)</td>
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</tr>
<tr>
<td>Candidates for the 4-year Bachelor of Engineering in Electrical Engineering (Power) degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.</td>
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</tr>
<tr>
<td>Bachelor of Engineering in Electrical Engineering (Power) in a combined degree course</td>
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</tr>
<tr>
<td>Candidates in the combined degree course of Bachelor of Electrical Engineering (Power) with the Bachelor of Commerce, Bachelor of Project Management or Bachelor of Law are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study.</td>
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</tr>
<tr>
<td>Candidates in the combined degree course of Bachelor of Electrical Engineering (Power) with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study.</td>
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</tr>
<tr>
<td>Candidates in the combined degree course of Bachelor of Electrical Engineering (Power) with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology.</td>
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</tr>
<tr>
<td>Candidates in all combined degree courses shall also satisfy such other requirements as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.</td>
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</table>

Electrical Engineering (Power) core units of study

First year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENNG1905 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1002, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1111</td>
<td>N MATH1013, MATH1903, MATH1907</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PHYS1003 Physics 1 (Technological)</td>
<td>6</td>
<td>A HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent.</td>
<td>C Recommended concurrent Units of Study: MATH (1003/1903), MATH (1005/1905).</td>
<td>N PHYS1004, PHYS1902</td>
<td>It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit</td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td>N INFO1905, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2002, COMP2902</td>
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<td>Semester 2</td>
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</table>

Second year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2302 Signals and Systems</td>
<td>6</td>
<td>A MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling.</td>
<td>N ELEC2301, MATH1019, MATH1919</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2602 Digital System Design</td>
<td>6</td>
<td>A ELEC1103</td>
<td>N ELEC3601, ELEC3608</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH1001 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1902)</td>
<td>N MATH2001, MATH2002, MATH2902, MATH2961, MATH2067</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

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## Electrical Engineering (Power) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PHYS1001</strong>  Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>N PHYS1100, PHYS1901, EDUH1017</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>PHYS2213</strong>  Physics 2EE</td>
<td>6</td>
<td>A MATH (1001/1901 and 1002/1902 and 1003/1903). MATH (1005/1905) would also be useful</td>
<td></td>
<td></td>
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<td>Semester 2</td>
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<tr>
<td></td>
<td></td>
<td>P PHYS (1001 or 1901) and PHYS (1003 or 1902)</td>
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<td></td>
</tr>
<tr>
<td><strong>COMP2129</strong>  Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1105</td>
<td></td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N SOFT2130, SOFT2830, SOFT2004, SOFT2904, COMP2004, COMP2904</td>
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</tbody>
</table>

### Third year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC3203</strong>  Electricity Networks</td>
<td>6</td>
<td>A This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electronics.</td>
<td></td>
<td></td>
<td>Semester 1</td>
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<td></td>
<td></td>
<td>N ELEC3201</td>
<td></td>
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<td></td>
</tr>
<tr>
<td><strong>ELEC3204</strong>  Power Electronics and Applications</td>
<td>6</td>
<td>A Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc.</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P ELEC2104</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>N ELEC3202</td>
<td></td>
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</tr>
<tr>
<td><strong>ELEC3206</strong>  Electrical Energy Conversion Systems</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P ELEC2104</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>ELEC3209</strong>  Control</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>P MATH2061 and ELEC2302</td>
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<td></td>
<td>N ELEC3202, AMME3500</td>
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### Fourth year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td><strong>ELEC4702</strong>  Practical Experience</td>
<td></td>
<td>P 24 credit points of level 3 or 4 units of study.</td>
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<td>Semester 2</td>
</tr>
<tr>
<td><strong>ELEC5204</strong>  Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment.</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>N ELEC4201</td>
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</tr>
<tr>
<td><strong>ELEC5205</strong>  High Voltage Engineering</td>
<td>6</td>
<td>A The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals equivalent to ELEC3105 Recommended: ELEC5204 Power Systems</td>
<td></td>
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<td>Semester 2</td>
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</tbody>
</table>

### Students must select 12cp from the following block of units.

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ELEC4710</strong>  Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above.</td>
<td></td>
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<td>Semester 1</td>
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<tr>
<td></td>
<td></td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
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<td>Semester 2</td>
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<td>Note: Department permission required for enrolment in the following sessions: Semester 2</td>
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<tr>
<td><strong>ELEC4711</strong>  Engineering Project B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
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<td>Semester 1</td>
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<tr>
<td></td>
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<td>C ELEC4710 Engineering Project A</td>
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<td></td>
<td></td>
<td>Note: Department permission required for enrolment</td>
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<tr>
<td><strong>ELEC4712</strong>  Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
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<td>Semester 1</td>
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<td>C ELEC4713</td>
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<td>Semester 2</td>
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<tr>
<td></td>
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<td>N ELEC4703, ELEC4705, ELEC4707</td>
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<td>Note: Department permission required for enrolment</td>
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<tr>
<td><strong>ELEC4713</strong>  Honours Thesis B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
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<td>Semester 1</td>
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<td>C ELEC4712</td>
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<td>Semester 2</td>
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<tr>
<td></td>
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<td>N ELEC4707, ELEC4711</td>
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<td>Note: Department permission required for enrolment</td>
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</tbody>
</table>

### Notes

1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met.
2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.
# Software Engineering stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Software Engineering</strong></td>
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</tr>
<tr>
<td>All candidates for the Bachelor of Engineering degree in Software Engineering (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Software Engineering, which consist of:</td>
<td></td>
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<tr>
<td>- all level 1, 2, 3, 4 and 5 EIE and SIT units which do not appear in the table of core units;</td>
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<tr>
<td>- the units of study listed in the table of additional recommended units of study; and</td>
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<tr>
<td>- such other units of study as may be so designated by the Head of School.</td>
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</tr>
<tr>
<td><strong>Bachelor of Engineering in Software Engineering</strong></td>
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<tr>
<td>Candidates for the 4-year Bachelor of Engineering in Software Engineering degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2.</td>
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<tr>
<td><strong>Bachelor of Engineering in Software Engineering in a combined degree course</strong></td>
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<tr>
<td>Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Commerce, Bachelor of Project Management or Bachelor of Laws are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2.</td>
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<tr>
<td>Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2.</td>
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<tr>
<td>Candidates in the combined degree course of Bachelor of Engineering in Software Engineering with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study with no more than 18 credit points of recommended elective units from level 1, and 2, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology.</td>
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<tr>
<td>Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.</td>
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<tr>
<td><strong>Software Engineering core units of study</strong></td>
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<tr>
<td><strong>First year</strong></td>
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<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>MATH1001 Differential Calculus</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1011, MATH1901, MATH1906, MATH1111</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1002 Linear Algebra</td>
<td>3</td>
<td>A HSC Mathematics Extension 1</td>
<td>N MATH1902, MATH1012, MATH1014</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MATH1003 Integral Calculus and Modelling</td>
<td>3</td>
<td>A HSC Mathematics Extension 2 or MATH1001 or MATH1011</td>
<td>N MATH1013, MATH1903, MATH1907</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>MATH1005 Statistics</td>
<td>3</td>
<td>A HSC Mathematics</td>
<td>N MATH1015, STAT1021, STAT1022, ECMT1010</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>Programming, as for INFO1103</td>
<td>N INFO1905, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2802, COMP2902</td>
<td>Semester 1</td>
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<tr>
<td><strong>Second year</strong></td>
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<tr>
<td>INFO2110 Systems Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in INFO1003 or INFO1103 or INFS1000</td>
<td>N INFO2860, INFO2900, INFO2905</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2120 Database Systems 1</td>
<td>6</td>
<td>Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1103 or INFS1000 or INFO1903</td>
<td>N INFO2820, INFO2905, INFO2905</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO2315 Introduction to IT Security</td>
<td>6</td>
<td>A Computer literacy</td>
<td>N NETS3305, NETS3605, NETS3916, ELEC5610, ELEC5616</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MATH2069 Discrete Mathematics and Graph Theory</td>
<td>6</td>
<td>P 6 credit points of Junior level Mathematics</td>
<td>N MATH2011, MATH2009, MATH2969</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP2007 Algorithms and Complexity</td>
<td>6</td>
<td>A INFO1105, MATH1004 or MATH1904</td>
<td>N COMP2907, COMP3309, COMP3609, COMP3111, COMP3811</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP2129 Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1105</td>
<td>N SOFT2130, SOFT2830, SOFT2904, SOFT2904, COMP2004, COMP2904</td>
<td></td>
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<td>Semester 1</td>
</tr>
</tbody>
</table>

Select one of the following units.
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2061 Linear Mathematics and Vector Calculus</td>
<td>6</td>
<td>P (MATH1011 or MATH101 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1902) and (MATH1003 or MATH1903 or MATH1907)</td>
<td>N MATH2001, MATH2002, MATH2902, MATH2901, MATH2001, MATH2007</td>
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<td>Semester 1 Summer Main</td>
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<tr>
<td>ELEC2602 Digital System Design</td>
<td>6</td>
<td>A ELEC1103</td>
<td>N ELEC3601, ELEC3608</td>
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<td>Semester 1</td>
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</tbody>
</table>

Select one of the following units.

<table>
<thead>
<tr>
<th>Unit of study</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC2104 Electronic Devices and Circuits</td>
<td>6</td>
<td>A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering.</td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC2302 Signals and Systems</td>
<td>6</td>
<td>A MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling.</td>
<td>N ELEC2301, MATH3019, MATH3919</td>
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<td>Semester 2</td>
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</table>

**Third year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3615 Software Development Project</td>
<td>6</td>
<td>P INFO3402</td>
<td>N INFO3600, SOFT3300, SOFT3600, SOFT3200, SOFT3700</td>
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<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3609 Internet Software Platforms</td>
<td>6</td>
<td>P INFO1103, INFO2110, INFO2120</td>
<td>N EBUS4001</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3220 Object Oriented Design</td>
<td>6</td>
<td>A INFO2110, INFO1105</td>
<td>N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO3315 Human-Computer Interaction</td>
<td>6</td>
<td>A INFO2110, N MULT3307, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802</td>
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<td>Semester 2</td>
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<tr>
<td>INFO3402 Management of IT Projects and Systems</td>
<td>6</td>
<td>A INFO2000, INFO2110, INFO2810, INFO2900</td>
<td>N ISYS3000, ISYS3012, ELEC3606</td>
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<td>Semester 1</td>
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</table>

**Fourth year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
<td>6</td>
<td>A INFO2200 or COMP5028 or equivalent.</td>
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<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC4702 Practical Experience</td>
<td>6</td>
<td>P 24 credit points of level 3 or 4 units of study.</td>
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<td>Semester 1</td>
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<tr>
<td>ELEC5618 Software Quality Engineering</td>
<td>6</td>
<td>N SOFT3302</td>
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<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5619 Object Oriented Application Frameworks</td>
<td>6</td>
<td>A Java programming, and some web development experience are essential. Databases strongly recommended</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Students must select 12cp from the following block of units.**

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

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</thead>
<tbody>
<tr>
<td>ELEC4710 Engineering Project A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above.</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ELEC4713 Honours Thesis A</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ELEC4712 Honours Thesis B</td>
<td>6</td>
<td>P 36 credit points of units of study from level 3 and above</td>
<td>N ELEC4703, ELEC4705, ELEC4707</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
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</table>

**Notes**

1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met.
2. Students in the Honours program must enrol in ELEC4712 & ELEC4713 or the alternate IT Research units INFO4991 & INFO4992, students in the Pass Program must enrol in ELEC4710 & ELEC4711.
## Electrical Engineering (Telecommunications) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
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<tbody>
<tr>
<td>Electrical Engineering (Telecommunications)</td>
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<tr>
<td>All candidates for the Bachelor of Engineering degree in Electrical Engineering (Telecommunications) (including those enrolled in a combined degree) must satisfy the requirements described in the table of core units of study. Candidates will also need to choose a number of recommended units of study for Electrical Engineering (Telecommunications), which consist of: - all level 3, 4 and 5 ELEC units which do not appear in the table of core units; and - such other units of study as may be so designated by the Head of School.</td>
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**Bachelor of Engineering in Electrical Engineering (Telecommunications)**

Candidates for the 4-year Bachelor of Engineering in Electrical Engineering (Telecommunications) degree are required to complete a total of not less than 192 credit points including at least 168 credit points made up of units from the table of core units and recommended units of study. The additional 24 credit points may consist, in whole or in part, of free elective units of study approved by the Head of School.

**Bachelor of Engineering in Electrical Engineering (Telecommunications) in a combined degree course**

Candidates in the combined degree course of Bachelor of Engineering in Electrical Engineering (Telecommunications) with the Bachelor of Commerce, Bachelor of Project Management or Bachelor of Law are required to complete at least 144 credit points made up of units from the table of core units and recommended units of study.

Candidates in the combined degree course of Bachelor of Electrical Engineering (Telecommunications) with the Bachelor of Science or Bachelor of Arts are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study.

Candidates in the combined degree course of Bachelor of Electrical Engineering (Telecommunications) with the Bachelor of Medical Science are required to complete at least 156 credit points made up of units from the table of core units and recommended units of study, but may choose to replace up to 12 credit points of recommended units with CHEM1101 Chemistry 1A and BIOL1001 Concepts in Biology.

Candidates in all combined degree courses shall also satisfy such other requirements for the combined course as are prescribed in the joint resolutions of the Faculty of Engineering and Information Technologies and the second faculty concerned.

### Electrical Engineering (Telecommunications) core units of study

#### First year

- **ELEC1103 Fundamentals of Elec and Electronic Eng** 6 A HSC Physics, HSC Mathematics extension 1 or 2 Semester 1
- **ELEC1601 Foundations of Computer Systems** 6 A HSC Mathematics extension 1 or 2 Semester 2
- **ENGG1905 Professional Engineering and IT** 6 Semester 1
- **MATH1001 Differential Calculus** 3 A HSC Mathematics Extension 1 N MATH1011, MATH1901, MATH1906, MATH1111 Semester 1
- **MATH1002 Linear Algebra** 3 A HSC Mathematics Extension 1 N MATH1902, MATH1012, MATH1014 Semester 1
- **MATH1003 Integral Calculus and Modelling** 3 A HSC Mathematics Extension 2 or MATH1001 or MATH101 N MATH1013, MATH1903, MATH1907 Semester 2
- **MATH1005 Statistics** 3 A HSC Mathematics N MATH1015, MATH1905, STAT1021, STAT1022, ECMT1010 Semester 2
- **PHYS1003 Physics 1 (Technological)** 6 A HSC Physics or PHYS (1001 or 1002 or 1901) or equivalent. C Recommended concurrent Units of Study: MATH (1003/1005), MATH (1005/1905). N PHYS1004, PHYS1902 It is recommended that PHYS (1001 or 1002 or 1901) be completed before this unit Semester 2
- **INFO1103 Introduction to Programming** 6 A HSC Mathematics N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011 Semester 1
- **INFO1105 Data Structures** 6 A Programming, as for INFO1103 N INFO1905, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2160, COMP2860, COMP2111, COMP2811, COMP2002, COMP2902 Semester 2

#### Second year

- **ELEC2103 Simulation & Numerical Solutions in Eng** 6 A ELEC1103 Fundamentals of Electrical and Electronic Engineering N COSC1001, COSC1901 Semester 2
- **ELEC2104 Electronic Devices and Circuits** 6 A ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering Semester 2
- **ELEC2302 Signals and Systems** 6 A MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling. N ELEC2301, MATH3019, MATH3919 Semester 2
- **ELEC2602 Digital System Design** 6 A ELEC1103 N ELEC3601, ELEC3608 Semester 1
- **MATH2901 Linear Mathematics and Vector Calculus** 6 A (MATH1011 or MATH1001 or MATH1901 or MATH1906) and (MATH1014 or MATH1002 or MATH1902) and (MATH1003 or MATH1903 or MATH1907). N MATH2001, MATH2901, MATH2002, MATH2902, MATH2361, MATH2067 Semester 1

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Electrical Engineering (Telecommunications) stream

<table>
<thead>
<tr>
<th>Unit of study</th>
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<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PHYS1001 Physics 1 (Regular)</td>
<td>6</td>
<td>A HSC Physics</td>
<td>C Recommended concurrent Units of Study: MATH (1001/1901, 1002/1902)</td>
<td>N PHYS1002, PHYS1901, EDFH1017</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PHYS2213 Physics 2EE</td>
<td>6</td>
<td>A MATH (1001/1901 and 1002/1902 and 1003/1903), MATH (1005/1905) would also be useful</td>
<td>P PHYS (1001 or 1901) and PHYS (1003 or 1903)</td>
<td>N PHYS2203, PHYS2001, PHYS2901, PHYS2011, PHYS2911, PHYS2002, PHYS2902,</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP2129 Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1105</td>
<td>N SOFT2130, SOFT2830, SOFT2004, SOFT2904, COMP2004, COMP2904</td>
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<td></td>
<td>Semester 1</td>
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</table>

Third year

| ELEC3305 Digital Signal Processing                 | 6             | A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic algebra, differential and integral calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals.  | P ELEC2302                                                                  | N ELEC3303                                                                   |                                                                               | Semester 1    |
| ELEC3405 Communications Electronics and Photonics   | 6             | A ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits. | N ELEC3402                                                                   |                                                                               |                                                                               | Semester 2    |
| ELEC3505 Communications                              | 6             | A Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques.  | N ELEC3503                                                                   |                                                                               |                                                                               | Semester 1    |
| ELEC3506 Data Communications and the Internet       | 6             | N NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501               |                                                                               |                                                                               |                                                                               | Semester 2    |

At least 1 of the following 5 units of study:

| ELEC3104 Engineering Electromagnetics              | 6             | A Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements, fundamental electromagnetic laws and their use in the calculation of static fields.  | N ELEC3102                                                                   |                                                                               |                                                                               | Semester 1    |
| ELEC3304 Control                                    | 6             | A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform.  | P MATH2061 and ELEC2302                                                     | N ELEC3302, AMME3500                                                               |                                                                               | Semester 2    |
| ELEC3404 Electronic Circuit Design                 | 6             | A A background in basic electronics and circuit theory is assumed.                  | N ELEC3401                                                                   |                                                                               |                                                                               | Semester 1    |
| ELEC3607 Embedded Systems                           | 6             | A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design.  | P ELEC1601 and ELEC2602                                                     | N ELEC2601                                                                   |                                                                               | Semester 1    |
| ELEC3702 Management for Engineers                  | 6             | N ELEC3701, ENG33005, MEG3661                                                     |                                                                               |                                                                               |                                                                               | Semester 2    |

Fourth year

| ELEC4505 Digital Communication Systems             | 6             | A ELEC3505 Communications                                                            | N ELEC4502                                                                   |                                                                               |                                                                               | Semester 1    |
| ELEC4702 Practical Experience                      |               | P 24 credit points of level 3 or 4 units of study.                                   |                                                                               |                                                                               |                                                                               | Semester 1    |

Students must select 12cp from the following block of units.

Students enrol in either Honours Thesis A&B or Engineering Project A&B. For enrolment in Honours an ISWAM of 65% or greater is required.

| ELEC4710 Engineering Project A                      | 6             | P 36 credit points of units of study from level 3 and above.                          | N ELEC4703, ELEC4705, ELEC4707                                              |                                                                               |                                                                               | Semester 1    |
| ELEC4711 Engineering Project B                      | 6             | P 36 credit points of units of study from level 3 and above.                          | C ELEC4710 Engineering Project A                                              | N ELEC4703, ELEC4705, ELEC4707                                              |                                                                               | Semester 2    |
| ELEC4712 Honours Thesis A                            | 6             | P 36 credit points of units of study from level 3 and above.                          | C ELEC4713                                                                  | N ELEC4703, ELEC4705, ELEC4707                                              |                                                                               | Semester 1    |
| ELEC4713 Honours Thesis B                            | 6             | P 36 credit points of units of study from level 3 and above.                          | C ELEC4712                                                                  | N ELEC4707, ELEC4711                                                           |                                                                               | Semester 2    |

Notes
1. The Mathematics, Physics and Information Technology units of study may be replaced by equivalent advanced level units of study (if available) subject to prerequisite conditions being met
2. Students in the Honours program must enrol in ELEC4712 & ELEC4713, students in the Pass Program must enrol in ELEC4710 & ELEC4711.
Units of study

Engineering and Information Technology
Undergraduate Units of Study
Complete unit of study descriptions giving details of assessment, learning outcomes, graduate attribute mappings and semester schedule are published on the Faculty of Engineering and Information Technologies course information web site.
http://cusp.sydney.edu.au/engineering
Engineering and Information Technologies undergraduate units of study

Complete unit of study descriptions giving details of assessment, learning outcomes, graduate attribute mappings and semester schedule are published on the Faculty of Engineering and Information Technologies course information website: http://cusp.sydney.edu.au/engineering/

School of Aerospace, Mechanical and Mechatronic Engineering

AERO1400
Intro to Aircraft Construction & Design
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 3 hours of workshop sessions per week. Assumed knowledge: Some basic skills with engineering workshop hand tools is desirable. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

The study towards BE(Aeronautical) involves learning about the Design, Analysis, Flight, and Operation of Aircraft and other Flight Platforms. This unit facilitates the training towards becoming professional aeronautical engineers through a globally-unique experiential-learning opportunity to provide a strong background familiarity with aircraft hardware. This unit is designed to educate and facilitate the learning of aircraft design, basic aircraft construction techniques, the operation of light aircraft and the registration and regulations relating to light aircraft. In addition to hands-on skills on the construction phase, this unit facilitates learning in motivations for unique aircraft design, aircraft aerodynamics, flight mechanics, structural aspects and other design-related issues. Teamwork plays a very important role in this unit; the ability to work with peers and supervising staff is an invaluable skill sought after by employers of engineers. Throughout the semester, students will be actively participating in the construction of a light aircraft. The aircraft is to be constructed under current Australian Civil Aviation Regulations so that students will gain an insight into all aspects of the process. By being a part of the construction team, students will also experience the organisational requirements necessary to successfully complete a complex engineering project. The aircraft construction workshop component is complemented with lectures, homework, research and assignments to further enhance the learning experience on aircraft. The final outcome will be that students gain a good foundation of: aircraft design and analyses methods; innovative methods of construction; techniques for selecting, sizing and stressing components; regulatory requirements for certification; off-design requirements; construction tolerances; and team-work requirements in undertaking complex engineering projects.

AERO1580
Introduction to Aerospace Engineering
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures, 2 hours of tutorials and 3 hours of workshop practice per week. Prohibitions: MECH1560, MTRX1701, ENGG1800. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This Unit introduces students to the role of professional aerospace engineers, along with the development of fundamental engineering knowledge and skills for aerospace vehicle design, analysis performance and operation. Students will learn through experience, to develop professional skills in research, interpretation, communication, and presentation of information relating to aerospace engineering. Expected learning includes: introduction to lateral thinking concepts; glossary of aerospace vehicle components and terminology; an introduction to the multiple disciplines related to aerospace engineering, such as aerodynamics, aircraft and spacecraft performance, mechanics of flight, aerospace structures, materials and propulsion systems; how the various disciplines are integrated into the design and development of flight platform systems; the operating characteristics of modern flight vehicles, their uses and limitations; modern developments and future trends in aerospace; the limitations of the aerospace environment; teamwork; and resource management.

Significantly, professional enhancement is introduced through the development of basic hands-on workshop skills. These practical skills enable students to have a better appreciation of the hardware that they are expected to apply their engineering knowledge to, during their aerospace engineering profession. Experiential learning is facilitated working with machine tools and hand tools in a supervised workshop environment, to develop fundamentals of practical aerospace vehicle component manufacture, construction, servicing and repair.

AERO2703
Aerospace Technology 1
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AERO1560 Assumed knowledge: ENGG1801. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop in students an understanding of the background technologies and processes that are involved in the design, construction and operation of Aerospace Vehicles. It will cover the general areas of aircraft performance, aircraft and laboratory instrumentation and associated programming techniques.

AERO2705
Space Engineering 1
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AERO1560 (or MECH1560 or MTRX1701), MATH1001, MATH1002, MATH1003. Assumed knowledge: ENGG1801. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the terminology, technology and current practice in the field of Space Engineering. Course content will include a variety of topics in the area of orbital mechanics, satellite systems and launch requirements. Case studies of current systems will be the focus of this unit.

AERO2711
Space Engineering Project 1
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of project meeting per week. Prerequisites: Completed the junior year of Aero(Space), Mechanical(Space) or Mechatronics(Space) Engineering. An average mark of > 75% is required as well as departmental permission from the Space Engineering Coordinator. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This unit of study aims to develop deeper practical knowledge in the area of Space systems engineering. Students who take this subject would be interested in developing design skills by working on the sub-system of a real satellite or launch vehicle.

AERO3260
Aerodynamics 1
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. 5 hours of laboratory sessions per semester. Prerequisites: AMME2200 and (MATH2061 or MATH2067 or MATH2961). Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This UoS should prepare students to be able to undertake aerodynamic performance calculations for industry design situations. The unit aims to develop a knowledge and appreciation of the complex behaviour of airflow in the case of two dimensional aerofoil sections and three dimensional wings; To encourage hands-on experimentation with wind-tunnel tests to allow an understanding of these concepts and their range of applicability. To understand the limitations of linearised theory and the effects of unsteady flow.

AERO3261
Propulsion
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AMME2200 Assumed knowledge: Good knowledge of fluid dynamics including gas dynamics. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This UoS teaches the students the techniques used to propel aircraft and rockets. The students will learn to analyse various propulsion systems in use propellers, gas turbines, rocket motors etc. The topics covered include: Propulsion unit requirements for subsonic, and supersonic flight; thrust components, efficiencies, additive drag of intakes. Piston engine components and operation. Propeller theory. Operation, components and cycle analysis of gas turbine engines; turbojets; turboprops; ramjets. Components: compressor; fan; burner; turbine; nozzle. Efficiency of components; off-design considerations. Operation, components and thermodynamics of rocket motors. Dynamics of rocket flight; orbital velocity; staging. Future directions; minimisation of noise and pollution; sub-orbital propulsion systems; scram-jets; hybrid engines.

AERO3360
Aerospace Structures 1
Credit points: 6  Session: Semester 1  Classes: 3 hours of lectures and 2 hours of tutorials per week  Prerequisites: AMME2301  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop a student’s understanding of the theoretical basis of advanced aerospace structural analysis; and introduce students to the solution of real-world aircraft structural problems. This UoS will develop the following attributes: An understanding of the derivation of the fundamental equations of elasticity and their application in certain analytical problems; An understanding of plate theory and the ability to use this to obtain analytical solutions for plate bending and buckling problems; An understanding of energy-method to develop a deeper appreciation for the complexities of designing solution techniques for structural problems; An understanding of the basic principals behind stressed-skin aircraft construction and the practical analysis of typical aircraft components, including the limitations of such techniques. At the end of this unit students will have an understanding of: 2-D and 3-D elasticity; general equations and solution techniques; Energy methods in structural analysis, including the principles of virtual work and total potential and complimentary energies; Fundamental theory of plates, including in-plane and bending loads as well as buckling and shear instabilities; Solution techniques for plate problems including: Navier solutions for rectangular plates; Combined bending and in-plane loading problems; Energy methods for plate-bending; and Plate buckling for compression and shear loadings; Bending of beams with unsymmetrical cross-sections; Basic principals and theory of stressed-skin structural analysis; Determination of direct stresses and shear flows in arbitrary thin-walled beams under arbitrary loading conditions including: Unsymmetrical sections, Open and closed sections, Single and multi-cell closed sections, Tapered sections, Continuous and idealized sections; The analysis of common aircraft components including fuselages, wings, skin-panels, stringers, ribs, frames and cut-outs; The effects of end constraints and shear-lag on the solutions developed as well as an overall appreciation of the limitations of the solution methods presented.

AERO3460
Aerospace Design 1
Credit points: 6  Session: Semester 1  Classes: 2 hours of lectures and 3 hours of in-class project work per week  Prerequisites: AMME2301 and MECH2400  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the theory and practice of aircraft structural component design. In doing so it will emphasize all the considerations, trade-offs and decisions inherent in this process and thus enable students to gain an understanding of why aircraft structures are designed in the way they are with respect to structural, manufacturing and cost considerations. At the end of this unit students will have gained practical skills relevant to working on typical modern aircraft and aerospace vehicle components. They will learn from methods, techniques, and experiences from the modern aerospace industry. Experiential learning is enhanced through verifying analyses with actual testing of fabricated component; and the experience of a full design-build-test cycle of a typical aerospace structural component. Subject areas covered will include design methods, internal loads calculations, stress analysis, design for manufacture, joints and fasteners, test procedures, fatigue and damage tolerance, composites, and the art of design.

AERO3465
Aerospace Technology 2
Credit points: 6  Session: Semester 2  Classes: 4 hours of lecture/project work session per week, 2 hours of tutorials per week  Prerequisites: AMME2301 and MECH2400  Assumed knowledge: AERO1400; AMME2302  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the aerospace industry procedures for design, analysis, and testing of aircraft and aerospace vehicle components. It provides a Design-Build-Test experience by putting into practice, learning outcomes from this and other previously completed UoS, through working on a small structure which is representative of a typical light metal aircraft. Students will be introduced to typical metallic and composite materials and structures for aerospace vehicles. The unit also provides an introduction to fatigue and damaged tolerance analysis of metallic aircraft structures. Experiential learning opportunities are provided to acquire skills and knowledge in structural design, analyses, testing methods, procedures, techniques, and equipment. On satisfactory completion of this unit students will have gained practical skills relevant to working on typical modern aircraft and aerospace vehicle components. They will learn from methods, techniques, and experiences from the modern aerospace industry. Experiential learning is enhanced through verifying analyses with actual testing of fabricated component, and the experience of a full design-build-test cycle of a typical aerospace structural component. Subject areas covered will include design methods, internal loads calculations, stress analysis, design for manufacture, joints and fasteners, test procedures, fatigue and damage tolerance, composites, and the art of design.

AERO3560
Flight Mechanics 1
Credit points: 6  Session: Semester 1  Classes: 3 hours of lectures and 2 hours of tutorials per week, 2 hours of laboratory work per semester  Prerequisites: AMME2500 and (MATH2061 or MATH2067)  Corequisites: AMME3500  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft longitudinal equilibrium, static stability, dynamic stability and response. Students will develop an understanding of the importance and significance of flight stability; will gain skills in dynamic system analysis and will learn mathematical tools used for prediction of aircraft flight behaviour. Students will gain skills in problem solving in the area of flight vehicle motion, and learn the fundamentals of flight simulation. At the end of this unit students will be able to understand: aircraft flight conditions and equilibrium; the effects of aerodynamic and propulsive controls on equilibrium conditions; the significance of flight stability and its impact of aircraft operations and pilot workload; the meaning of aerodynamic stability derivatives and their sources; the effects of aerodynamic derivatives on flight stability; the impact of flight stability and trim on all atmospheric flight vehicles. Students will also be able to model aircraft flight characteristics using computational techniques and analyse the aircraft equations of rigid-body motion and to extract stability characteristics. Course content will include static longitudinal aircraft stability: origin of symmetric forces and moments; static and manoeuvring longitudinal stability, equilibrium and control of rigid aircraft; aerodynamic load effects of wings, stabilisers, fuselages and powerplants; trailing edge aerodynamic controls; trimmed equilibrium condition; static margin; effect on static stability of free and reversible controls.

AERO3660
Aerospace Management
Credit points: 6  Session: Semester 2  Classes: 3 hours of lectures and 2 hours of tutorials per week  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop knowledge and understanding of the current state of aerospace design, manufacturing, and operations in the
Australian aviation industry. Students will gain skills in aerospace engineering management. On satisfactory completion of this unit, students will be able to apply risk management skills to a variety of industry situations and use appropriate methodology to manage these situations. Students will also become proficient in the use of Project Management tools and learn how to apply them to industry standard problems. Subject areas covered within the Unit of Study include principles and practice of aviation and airline management; discussion and analysis of airline operations; flight safety and airworthiness standards; risk and reliability management; and management in aerospace engineering design.

AER03711
Space Engineering Project 2
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of project meeting sessions per week. Prerequisites: AER02711 Space Engineering Project 1, a WAM of >75% is required as well as departmental permission from the Space Engineering Coordinator. Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Project 1, and who wish to extend their design into the prototype phase. Students who take this subject would be interested in manufacturing a sub-system for a real satellite or launch vehicle. This unit allows students to develop a deeper appreciation for the complexities of designing and building space sub-systems, and if completed successfully will allow the student to take further Space Engineering Projects towards the final development of a sub-system ready for launch.

AER03760
Space Engineering 2
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 hours of project work sessions per week. Prerequisites: AER02705 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to provide students with a learning environment that promotes systems thinking and allows students to develop skills in systems analysis and design. In particular the UoS will focus on Space engineering, and students will develop both theoretical and practical skills in the area of systems engineering for this discipline. The primary objective is to develop fundamental systems engineering and systems thinking skills. At the end of this unit students will be able to: define the requirements process and be able to apply it to aerospace systems design.; conduct requirements analysis for an aerospace system and to drill down through requirements breakdown and the use of the V-diagram in this analysis; conduct functional and technical analysis and determine design drivers in a system; manage the use of a log book and its application in engineering design; develop technical skills in the design and development of satellite subsystems; conduct appropriate interaction processes between team members for the successful achievement of goals. Course content will include fundamentals of systems engineering; satellite subsystems; systems design.

AERO4206
Rotary Wing Aircraft
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1 hour of tutorials per semester. Prerequisites: AERO3260 and AERO3560 Assumed knowledge: Prior Learning: concepts from 3rd Year Aerodynamics and Flight Mechanics will be applied to Rotary Wing Vehicles in this unit. Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the theory of flight, design and analysis of helicopters, auto-gyros and other rotary wing aircraft. Students will gain an appreciation of the extra difficulties involved when the vehicle flow is cyclic in nature. At the end of this unit students will be able to: Identify and predict the various flow states of a generic lift producing rotor; Use appropriate methods to determine the forces and torques associated with the rotor; Estimate values for critical stability derivatives for helicopters and be able to construct a simple set of stability analysis equations for the vehicle; become aware of the regulatory and liability requirements relating to all aspects of commercial helicopter operation and maintenance. Course content will include introduction to rotary wing aircraft; vertical flight performance; forward flight performance; blade motion and control; dynamics of rotors; rotor-craft stability; rotor blade design.

AERO4260
Aerodynamics 2
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AMME2200 Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to: elementary and advanced topics in Gasdynamics (High Speed Flows), Course content will include review of Equations of Gasdynamics, One-Dimensional Gas Flow, Inertial Flows, Normal Shock, Flow in a Converging-Diverging Nozzle, Steady Two-dimensional Supersonic flow, Shock waves (Normal and Oblique), Method of Characteristics, Two-dimensional Supersonic Aeroflows, Introduction to Three-dimensional Effects, Unsteady Flows, Moving Shock, Shock Tube Flow and Transonic Flow and Compressible Boundary Layers. At the end of this unit the student will be able to calculate a high speed flow about an aerofoil and compressible flow through a duct of varying cross section and will have a good appreciation of Transonic and Hypersonic Flows.

AERO4360
Aerospace Structures 2
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week. Prerequisites: AERO3360 Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to teach fundamentals of modern numerical and analytical techniques for evaluating stresses, strains, deformations and strengths of representative aerospace structures. In particular the focus is on developing an understanding of: Fundamental concepts and formulations of the finite element methods for basic structural analysis; Elements for typical aerospace structures, such as beams/frames, plates/shells, and their applications and limitations; Finite element techniques for various types of problems pertinent to aerospace structures; d)and, developing hands-on experience of using selected commercial finite element analysis program. At the end of this unit of study the following will have been covered: Introduction to Finite Element Method for modern structural and stress analysis; One-dimensional rod elements; Generalization of FEM for elasticity; Two- and three-dimensional trusses; FEA for beams and frames in 2D and 3D; Two-dimensional problems using constant strain triangular elements; The two-dimensional isoparametric elements; Plates and shells elements and their applications; FEA for axisymmetric shells and pressure vessels, shells of revolution; FEA for axisymmetric solids subjected to axisymmetric loading; FEA for structural dynamics, eigenvalue analysis, modal response, transient response; Finite element analysis for stress stiffening and buckling of beams, plates and shells; Three-dimensional problems in stress analysis; Extensions to the element library, higher order elements, special elements; Constraints; FEA modeling strategy; FEA for heat conduction; FEA for non-linear material and geometric analysis.

AERO4460
Aerospace Design 2
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 3 hours of project work in-class per week. Prerequisites: AERO3260, AERO3261, AERO3360 and AERO3480 Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of the application of design to the modern aerospace industry. Students will gain an overview of how to manage a design team and will also gain skills in carrying out detailed design problems. Course content will include: Design requirements; Sources of information for aircraft design; Configuration design: performance, weight and balance, propulsion; Aerodynamic design: lift, drag and control; Structural design: loads, materials;
AERO4491 Advanced Aircraft Design

This unit aims to develop an understanding of the application of design to the modern aerospace context. Students will gain an overview of how to manage a project and its associated design team and will also gain skills in setting design specifications and carrying out detailed design analysis to meet some challenging requirement. Unit of Study content will include: Aircraft design methods; Methods of processing information for aircraft design; Detailed configuration design: performance, weight and balance, propulsion; Aerodynamic design: lift, drag and control; Advanced structural design, loads, materials; Weight estimation and fulfilling of relevant regulatory requirements; Advanced system design, modern aircraft requirements and specification; systems integration and validation; prototyping, benchmarking and testing.

AERO4580 Flight Mechanics 2

This unit aims to develop an understanding of the application of flight mechanics principles to modern aircraft systems. Students will gain skills in problem solving in the areas of dynamic aircraft behaviour, aircraft sensitivity to wind gusts, control systems development and aircraft handling analysis. At the end of this unit students will be able to: Understand the principles of stability augmentation systems and autopilot control systems in aircraft operation, their functions and purposes; Understand basic feedback control systems and classical frequency domain loop analysis; Understand the characteristics of closed loop system responses; Understand the characteristics of PID, Lead, Lag and Lead-Lag compensators, and to be competent in designing suitable compensators using Bode and Root-locus design techniques; Design multi-loop control and guidance systems and understand the reasons for their structures.

AERO4591 Advanced Flight Mechanics
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AERO3560 and AMME3500. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day.

Note: Department permission required for enrolment.

This unit aims to develop an understanding of the development of modern flight control, guidance, and navigation systems. Students will gain skills in analysis, problem solving and systems design in the areas of aircraft dynamic system identification and control. At the end of this unit students will be able to: understand the principles of stability augmentation systems and autopilot control systems in aircraft operation, their functions and purposes; understand the characteristics of closed loop system responses; understand advanced feedback control systems and state-space design techniques; understand the concepts of parameter and state estimation; design observers in the state space and to implement a Kalman Filter; be comfortable with multi-loop control and guidance systems and the reasons for their structures; appreciate flight test principles and procedures and to be capable of implementing a flight test programme.

AERO4701 Space Engineering 3

This UoS aims to teach students the fundamental principles and methods of designing solutions to estimation problems in aerospace engineering applications. Students will apply learned techniques in estimation theory to solving a wide range of different problems in engineering such as satellite positioning systems, satellite attitude determination, satellite orbit determination and remote sensing. Students will learn to recognize and appreciate the coupling between the different elements within an estimation task, such as satellite remote sensing, from a systems-theoretic perspective. Students will also use this system knowledge and basic design principles to design and test a solution to a given estimation task, with a focus on aerospace applications (such as satellite remote sensing).

AERO4711 Space Engineering Project 3
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of project meeting sessions per week. Prerequisites: AERO3711. Space Engineering Project 2, a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day.

Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Projects 2, and who wish to formalise their design into the launch phase. Students who take this subject would be interested in manufacturing the final sub-system for a real satellite or launch vehicle. This unit allows students to develop a deeper appreciation for the complexities of designing and building space sub-systems, and provide an opportunity for the actual launch of the sub-system. Launch of the sub-system will be dependent on the current opportunities existing with international collaborators.

AERO4712 Space Engineering Project 4
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of project meeting sessions per week. Prerequisites: AERO4711. Space Engineering Project 3; a WAM of > 75% is required as well as departmental permission from the Space Engineering Coordinator. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day.

Note: Department permission required for enrolment.

This unit of study is for those students who have completed Space Engineering Projects 3, and who wish to finalise their design by developing the interfacing and insertion phases into Satellite or Launch Vehicle system. Students who take this subject would have completed the previous three Space Engineering Projects, and have been provided with the opportunity to place their system into an actual system. Launch of the sub-system will be dependent on the current opportunities existing with international collaborators.

AMME0011 International Exchange B

Note: Department permission required for enrolment. Note:

An exchange component unit for students going on an International Exchange Program.

AMME0012 International Exchange C

Note: Department permission required for enrolment. Note:
This unit aims to teach the basic laws of thermodynamics and the fundamentals of fluid statics and dynamics. At the end of this unit students will have: an understanding of the basic laws of thermodynamics and basic equations governing the statics and dynamics of fluids; the ability to analyze the thermodynamics of a simple open or closed engineering system; the ability to analyze and determine the forces governing static fluid; the ability to evaluate the relevant flow parameters for fluid flow in internal engineering systems such as pipes and pumps (velocities, losses, etc.) and external systems such as flow over wings and airfoils (lift and drag). Course content will include concepts of heat and work, properties of substances, first law of thermodynamics, control mass and control volume analysis, thermal efficiency, entropy, second law of thermodynamics, reversible and irreversible processes, isentropic efficiency, power and refrigeration cycles; basic concepts of pressure, force, acceleration, continuity, streamline and stream function, viscosity, non-dimensional parameters; Fluid statics: governing hydrostatic equations, buoyancy; Fluid dynamics: governing conservation equations; Potential flow, vorticity and circulation; Bernouilli and Euler equations; A brief introduction to flow measuring devices, pipe flow, flow over surfaces, lift and drag.

AMME2301
Mechanics of Solids
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week Prerequisites: (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (MATH1003 or MATH1903) or (MATH1907), (ENG1G102 or PHYS1001 or PHYS1901) Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Equilibrium of deformable structures; basic concept of deformation compatibility; stress and strain in bars, beams and their structures subjected to tension, compression, bending, torsion and combined loading; statically determinate and indeterminate structures; energy methods for bar and beam structures; simple buckling; simple vibration; deformation of simple frames and cell box beams; simple two-dimensional stress and Mohr's circle; problem-based applications in aerospace, mechanical and biomedical engineering.

AMME2302
Materials 1
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures, 2 hours of tutorials per week, 3 hours of laboratory work per semester. Prohibitions: CIVL2110 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

AMME2302 is an introductory course in engineering materials. The unit aims to develop students' understanding of the structures, mechanical properties and manufacture of a range of engineering materials as well as how the mechanical properties relate to microstructure and forming and treatment methods. The unit has no prerequisite subject and is therefore intended for those with little or no previous background in engineering materials. However the unit does require students to take a significant degree of independent responsibility for developing their own background knowledge of materials and their properties. The electrical, magnetic, thermal and optical properties of materials are a critical need-to-know area where students are expected to do most of their learning by independent study.

AMME2500
Engineering Dynamics
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester. Prerequisites: (MATH1001 or MATH1901 or MATH1906), (MATH1002 or MATH1902), (AMME1550 or PHYS1001 or PHYS1901) Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study aims to teach: Dynamics of Rigid Bodies: Analysis of Planar mechanisms; Kinematics of rigid bodies; Kinetics of rigid bodies. Students will also develop their skills in: how to model and analyse dynamic systems and the application of theory to real systems through practical/laboratory sessions.
At the end of this unit students will have developed skills in modelling and analysing planar mechanisms and rigid body dynamic systems. Course content will include planar mechanisms, linkages, mobility; instant centres of rotation, Kennedy's theorem; velocity and acceleration polygons; kinematics of rigid bodies, frames of reference, velocity and acceleration, rotating frame of reference, relative velocity and acceleration, gyroscopic acceleration; kinetics of rigid bodies, linear momentum and Euler's first law; angular momentum and Euler's second law; centre of mass; moments of inertia, parallel axis and parallel plane theorems, principal axes and principal moments of inertia, rotation about an axis; impulse and momentum; work and energy, kinetic and potential energies; applications to orbital and gyroscopic motion; introduction to Lagrangian methods.

AMME3110
Project A
Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes Prohibitions: AMME4110 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Supervised project on a relevant engineering discipline.

AMME3500
System Dynamics and Control
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 3 hours of tutorials per week Prerequisites: AMME2500; (MA TH2061 or MA TH2961 or MA TH2967) Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study aims to allow students to develop an understanding of methods for modeling and controlling linear, time-invariant systems. Techniques examined will include the use of differential equations and frequency domain approaches to modeling of systems. This will allow students to examine the response of a system to changing inputs and to examine the influence of external stimuli such as disturbances on system behaviour. Students will also gain an understanding of how the responses of these mechanical systems can be altered to meet desired specifications and why this is important in many engineering problem domains.

The study of control systems engineering is of fundamental importance to most engineering disciplines, including Electrical, Mechanical, Mechatronic and Aerospace Engineering. Control systems are found in a broad range of applications within these disciplines, from aircraft and spacecraft to robots, automobiles, computers and process control systems. The concepts taught in this course introduce students to the mathematical foundations behind the modelling and control of linear, time-invariant dynamic systems.

In particular, topics addressed in this course will include:
1. Techniques for modelling mechanical systems and understanding their response to control inputs and disturbances. This will include the use of differential equations and frequency domain methods as well as tools such as Root Locus and Bode plots.
2. Representation of systems in a feedback control system as well as techniques for determining what desired system performance specifications are achievable, practical and important when the system is under control.
3. Theoretical and practical techniques that help engineers in designing control systems, and an examination of which technique is best in solving a given problem.

AMME4010
Major Industrial Project
Credit points: 24 Session: Semester 1, Semester 2 Classes: no formal classes. Prerequisites: (36 credits of 3rd year units of study) Prohibitions: AMME4111,AMME4112,AMME4121,AMME4122 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment. Note: Passed at least 144 credit points. Departmental permission required for enrolment.

Students spend 6 months at an industrial placement working on a major engineering project relevant to their engineering stream. This is a 24 credit point unit, which may be undertaken as an alternative to ENGG4000 Practical Experience, AMME4111/4112 Honours Thesis A & B, MECH4601 Professional Engineering 2 and a recommended elective. This unit of study gives students experience in carrying out a major project within an industrial environment, and in preparing and presenting detailed technical reports (both oral and written) on their work. The project is carried out under joint University/industry supervision, with the student essentially being engaged fulltime on the project at the industrial site.

AMME4110
Project B
Credit points: 6 Session: Semester 1, Semester 2 Classes: Project Work - own time Prohibitions: AMME3110 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Supervised project on a relevant engineering discipline.

AMME4111
Honours Thesis A
Credit points: 6 Session: Semester 1, Semester 2 Classes: Project Work - own time. Prerequisites: 36 credit points of senior units of study and 2nd/3rd year WAM of 65% or greater Corequisites: AMME4112 Prohibitions: AMME4121, AMME4122, AMME4010 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

The fourth year honours thesis aims to provide students with the opportunity to carry out a defined piece of independent research in a setting and in a manner that fosters the development of engineering research skills. These skills include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Honours thesis is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Honours Thesis A covers first steps of thesis research starting with development of research proposal. Thesis B covers the second of stage writing up and presenting the research results. Students are asked to write a thesis based on a research project, which is very often related to some aspect of a staff member's research interests. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors as part of a seminar program. It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the thesis is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.
The fourth year honours thesis aims to provide students with the opportunity to carry out a defined piece of independent research or design work in a setting and in a manner that fosters the development of engineering skills in research or design. These skills include the capacity to define a research or design question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research or design in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Honours thesis is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Engineering Project A/B is intended to be more practical in orientation while Thesis A/B demands extensive literature review and critical analysis of outcomes. Honours Thesis is a program for individuals whereas Projects can be done by groups or by an individual. Engineering Project A/B is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each.

AMME4122
Engineering Project B
Credit points: 6 Session: Semester 1, Semester 2 Classes: Project Work - own time Prerequisites: AMME4111 Engineering Project A Prohibitions: AMME4111, AMME4121, AMME4122, AMME44010 Campus: Camperdown/Darlington Mode of delivery: Supervision

To complete the research requirement for their engineering degree, students now have a choice of either completing Honours Thesis A/B (AMME 4111/AMME4112) or Project A/B (AMME 4121/AMME4122). Project A/B is intended to be more practical in orientation while Thesis A/B demands extensive literature review and critical analysis of outcomes. Honours Thesis is a program for individuals whereas Projects can be done by groups or by an individual. Engineering Project A/B is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each.

AMME4210
Computational Fluid Dynamics
Credit points: 6 Session: Semester 1 Classes: 1 hour of lectures, 1 hour of tutorial and 3 hours of computer lab work per week Prerequisites: MECH3261 or AERO3260 Assumed knowledge: Partial differential equations, finite difference methods, linear algebra, matrix methods, pressure, force, acceleration, continuity, streamline and streamfunction, viscosity, control parameters, non-dimensionalisation. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

The aim of this unit is to provide students with an understanding of the theoretical basis of computational fluid dynamics, the ability to write a simple Navier-Stokes solver and the skills to use a state of the art commercial computational fluid dynamics package. At the end of this unit students will have the ability to assess fluid mechanics problems commonly encountered in industrial and environmental settings, construct and apply computational models, determine critical control parameters and relate them to desired outcomes and write reports. Course content will include Navier-Stokes equations; finite difference methods; accuracy and stability for the advection and diffusion equations; direct and iterative solution techniques; solution of the full Navier-Stokes equations; turbulent flow; cartesian tensors; turbulence models.

AMME4241
Renewable Energy
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 hour of tutorials per week Prerequisites: MECH3260, MECH3261 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop understanding of the engineering design and analysis of different devices and technologies for generating power from renewable sources including: solar, wind, wave, tidal, ocean thermal, geothermal, hydro-electric, and biofuels; to understand the environmental, operational and economic issues associated with each of these technologies. At the end of this unit students will be able to perform in depth technical analysis of different types of renewable energy generation devices using the principles of fluid mechanics, thermodynamics and heat transfer. Students will be able
to describe the environmental, economic and operational issues associated with these devices.

**AMME4500**  
**Guidance, Navigation and Control**  
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week  
**Prerequisites:** AMME3500  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study will extend the concepts of control theory taught in 3rd year into the broader realm of Guidance and Control (G&C) systems for autonomous vehicles. Students will study the fundamental concepts of G&C with its specific implementation to autonomous space, air, ground and underwater vehicles. Students will also learn about navigation systems and their synergistic role with G&C systems. The unit of study will present a number of real case studies as well as experiential learning through the development of G&C algorithms.

**AMME4660**  
**Management, Employees and Industrial Relations**  
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 5 hours of tutorial/work group sessions per week  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of industrial relations issues in Australia, Government regulations, awards and agreements, and how they relate to companies, management, employers, employees, and unions. Students will develop skills and understanding of Australian regulations and awards, negotiation of workplace agreements, enterprise bargaining agreements, and working with unions. The course will be viewed from the perspective of all players in the system so that a new graduate, who will at some time fit all categories, has an understanding of employer/employee relationships in the workforce. Guest lecturers will be invited from industry (management, unions, etc.) to present their experiences in industrial relations. Role playing will be used to simulate working environments to develop skill in handling grievances, resolving conflicts, and developing negotiating skills. By the end of this unit of study students will be better prepared to enter the workforce as both an employee and as a manager.

**AMME4710**  
**Computer Vision and Image Processing**  
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 3 hours of laboratory work per week  
**Assumed knowledge:** MECH4720 or MECH4730  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces students to vision sensors, computer vision analysis and digital image processing. This course will cover the following areas: fundamental principles of vision sensors such as physics laws, radiometry, CMOS/CDD imager architectures, colour reconstruction; the design of physics-based models for vision such as reflectance models, photometric invariants, radiometric calibration. This course will also present algorithms for video/image analysis, transmission and scene interpretation. Topics such as image enhancement, restoration, stereo correspondence, pattern recognition, object segmentation and motion analysis will be covered.

**AMME4971**  
**Tissue Engineering**  
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week  
**Prerequisites:** 6cp of junior biology; 6cp of junior chemistry; MECH2901  
**Assumed knowledge:** MECH3921  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

With the severe worldwide shortage of donor organs and the ubiquitous problem of donor organ rejection, there is a strong need for developing technologies for engineering replacement organs and other body parts. Recent developments in biochemistry and cell biology have begun to make this possible, and as a consequence, the very new field of tissue engineering has been making dramatic progress in the last few years. This Unit will provide an introduction to the principles of tissue engineering, as well as an up to date overview of recent progress in the field of tissue engineering and where it is going. This Unit assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of tissue engineering.

The objectives are:

1. To gain a basic understanding of the major areas of interest in tissue engineering
2. To learn to apply basic engineering principles to tissue engineering systems
3. To understand the challenges and difficulties of tissue engineering.
4. Understand the ethical issues of stem cell applications.
5. Practical classes in the preparation and evaluation of scaffolds for tissue regeneration.
6. Enable student to access web-based resources in tissue engineering (for example: Harvard-MIT Principles and Practice of Tissue Engineering).
7. Research basic skills in Tissue Engineering.

**AMME4981**  
**Applied Biomedical Engineering**  
**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 3 hour workgroup sessions per week  
**Prerequisites:** 6cp of junior biology; 6cp of junior chemistry; AMME2302  
**Assumed knowledge:** MECH3921, MECH3362  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Computer simulation is a very important aspect of engineering in general, and biomedical engineering specifically. This is because it overcomes the problems of clinical, ethical, and design considerations involved in testing early prototypes on live subjects. This unit of study will take a project-based-learning approach to the topic of computer simulation and design optimization of biomedical devices through lectures and facilitated design work and group seminars. The primary focus will be on finite element modeling, and biomedical implantable devices. After some weeks of lectures on these topics, students will form into teams and use computer simulation techniques to develop and optimize their design. Projects are to be conducted in collaboration with companies in the biomedical industry, and it is anticipated that students will spend a significant amount of time with their host company. It is anticipated that students will gain detailed knowledge not only in the design topic assigned to them, but also in the topics assigned to their peers.

**AMME4990**  
**Biomedical Product Development**  
**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week  
**Prerequisites:** 6 credit points of junior biology; 6 credit points of junior chemistry; MECH2901 or 6 credit points of intermediate physiology or equivalent MECH3921  
**Assumed knowledge:** Junior level chemistry; intermediate level biology; and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Product development in the biomedical area presents unique challenges that need to be addressed to efficiently satisfy strict regulatory requirements and to successfully advance products to approval for marketing. Biomedical engineers need a broad understanding of these challenges as the main components of product development are complex and interdependent. Development of good
manufacturing and quality control processes, preclinical and clinical validation of product safety and efficacy, and regulatory filings, are each progressive and interdependent processes. This UoS will provide a broad understanding of regulatory requirements for biomedical product development, with particular emphasis on the dependence of each component on the development of processes and control systems that conform to Good Manufacturing Practice. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of biomedical product development.

AMME4992
Regulatory Affairs in Medical Industry
Credit points: 6
Session: Semester 2
Classes: 3 hour weekly lecture
Prerequisites: 6 credit points of junior biology 6 credit points of junior chemistry
MECH2901 or 6 credit points of intermediate physiology or equivalent
Assumed knowledge: Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Supply of medical devices, diagnostics and related therapeutic products is regulated in most jurisdictions, with sophisticated and complex regulatory regimes in all large economies. These regulations are applied both to manufacturers and designers and to biomedical engineers undertaking device custom manufacture or maintenance in clinical environments. This UoS will explore the different regulatory frameworks in the "Global Harmonisation Task Force" group of jurisdictions (US, EU, Canada, Japan, Australia) as well as emerging regulatory practices in Asia and South America. Emphasis will be on the commonality of the underlying technical standards and the importance of sophisticated risk management approaches to compliance.

MECH1400
Mechanical Construction
Credit points: 6
Session: Semester 2
Classes: 1 hour of lectures and 3 hours of workshop practice per week
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Learn about selected historical events, research methods, analysis techniques, application of theory and analysis to real machinery, use of machine and hand tools. This is a project based subject where the students will build their own designs. Historical developments in the area of the project selected. Research into the necessary fields to fully understand and analyse the project. Review and improve workshop skills. Student designs their own version of the project. Build the project in the workshop. Test the completed machine. The unit ties in with workshop component of MECH1560. Skills developed become relevant in MECH2400 Mechanical Design 1

MECH1560
Introduction to Mechanical Engineering
Credit points: 6
Session: Semester 1
Classes: (1hr lec, 2hrs tut, 3hrs workshop) per week
Prohibitions: AERO1560, MTRX1701, ENGG1800
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Objectives:

a) To develop an understanding of the role of Mechanical Engineers.

b) To understand the content of the degree structure and how the subjects are applied.

c) To develop an understanding of a range of machining and manufacturing processes required to make mechanical components.

Introductory Mechanical Engineering (50%): Subject introduces the Mechanical Engineering degrees. An overview of the range of roles of a Mechanical Engineer (people, case studies, guests, etc.). The skills/knowledge required of an engineer and the relationship between the subjects in the degree program and how they are applied by practicing engineers. Fundamentals of machinery and equipment common to this degree, with some introductory analysis techniques and problem solving methods.

Manufacturing Technology (50%): Safety requirements: All students are required to comply with the safety regulations. Students who fail to do this will not be permitted to enter the workshops. In particular, approved industrial footwear must be worn, and long hair must be protected by a hair net. Safety glasses must be worn at all times. Workshop Technology practical work in: (a) Fitting. Measurement, marking, hammers, cutting, tapping and screwing, reaming and scraping. (b) Machining. Lathe, mill, grinder, drill, shaper, and finishing operations. (c) Welding. Practical work in gas and electric welding. (d) Blacksmithing and forging. (e) Foundry: moulding and casting.

MECH2400
Mechanical Design 1
Credit points: 6
Session: Semester 2
Classes: 2hr Lectures; 2hrs tuts/lab per week
Assumed knowledge: ENGG1801 and ENGG1802, HSC Maths and Physics
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Aim: For students to experience a realistic design process and to develop good engineering skills.

Course Objectives: To develop an understanding of:

1. the need for and use of standard drawings in the communication and definition of parts and assemblies,
2. Efficient use of a CAD package
3. creativity,
4. the design process from initial idea to finished product
5. Methods used to analyse designs
6. standard components

MECH2901
Anatomy and Physiology for Engineers
Credit points: 6
Session: Semester 2
Classes: 2.5 hours of lectures per week. 12 hours of laboratory work per semester
Assumed knowledge: A basic understanding of biology. Recommended: BIOL1003 (or equivalent)
Campus: Cumberland
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study provides the underpinning knowledge needed in biomedical engineering designs. It is not a pre-requisite for any units of study. However, the anatomic and physiological functional knowledge gained in this subject will enhance prototype development of biomedical designs. Students should gain familiarity with anatomical and physiological terms and their meaning, understanding of the gross anatomy of the major systems in the human body and their importance in the design of biomedical devices and understanding of the major physiological principles which govern the operation of the human body.

MECH3260
Thermal Engineering
Credit points: 6
Session: Semester 2
Classes: 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester
Prerequisites: AMME2200
Assumed knowledge: Fundamentals of thermodynamics are needed to begin this more advanced course.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

To develop an understanding of the principles of thermodynamic cycles, gas mixtures, combustion and thermochromy applied to engineering processes, power and refrigeration systems. To understand heat transfer equipment design. To classify heat transfer situations as conduction, convection, radiation, forced or natural convection. To determine the appropriate approach to problems, the type of solution needed, analytical or numerical. To be able to arrive at a solution and predict heat transfer rates and be able to design and size heat transfer equipment.

MECH3621
Fluid Mechanics
Credit points: 6
Session: Semester 1
Classes: 2 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per semester
Prerequisites: AMME2200
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit aims to provide students with a detailed understanding of the theory and practice of fluid mechanics in the context of mechanical engineering. Students will gain skills in problem solving in areas of pipe, pump and channel flow; lift and drag on immersed bodies; boundary layer theory and gas dynamics. At the end of this unit students will have the ability to critically assess and solve problems commonly found in fluid mechanics practice, such as sizing pumps and piping systems, designing channels, and determining the lift and drag characteristics of submerged bodies. Additionally, they will develop a structured and systematic approach to problem solving.

MECH3361
Mechanics of Solids 2
Credit points: 6  Session: Semester 2  Classes: 3 hours of lectures and 2 hours of tutorials per week. 6 hours of laboratory work per semester.  Prerequisites: AMME2301 and AMME2302  Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study aims to: teach the fundamentals of analyzing stress and deformation in a solid under complex loading associated with the elemental structures/components in aerospace, mechanical and biomedical engineering; develop the following attributes: understand the fundamental principles of solid mechanics and basic methods for stress and deformation analysis of a solid structure/element in the above mentioned engineering areas; gain the ability to analyze problems in terms of strength and deformation in relation to the design, manufacturing and maintenance of machines, structures, devices and elements in the above mentioned engineering areas. At the end of this unit students will have a good understanding of the following: applicability of the theories and why so; and how and why to do stress analysis; why we need equations of motion/equilibrium; how and why to do strain analysis; why we need compatibility equations; why Hooke&apo;s law; why plasticity and how to do elastic and plastic analysis; how and why to do mechanics modeling; how to describe boundary conditions for complex engineering problems; why and how to solve a mechanics model based on a practical problem; why and how to use energy methods for stress and deformation analysis; why and how to introduce plates and shells and how to do analysis for plate and shell structures; why and how to do stress concentration analysis and its relation to fracture and service life of a component/structure; how and why to do fundamental plastic deformation analysis; how and why the finite element method is introduced and used for stress and deformation analysis. The ultimate outcome is that the students have the ability to solve engineering problems by comprehensively using the skills attained above.

MECH3362
Materials 2
Credit points: 6  Session: Semester 1  Classes: 3 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per semester  Prerequisites: AMME2301 and AMME2302  Assumed knowledge: This subject requires you to have two important skills to bring in: (1) A good understanding of basic knowledge and principles of material science and engineering from AMME2302 Materials I and mechanics of solids for simple structural elements (in tension, bending, torsion) from AMME2301 ; (2) Reasonable mathematical skills in calculation of stresses and strains in simple structural elements.  Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims for students to understand the relationship between properties of materials and their microstructures and to improve mechanical design based on knowledge of mechanics and properties of materials. At the end of this unit students should have the capability to select proper materials for simple engineering design. Course content will include: short-term and long-term mechanical properties; introductory fracture and fatigue mechanics, dislocations; polymers and polymer composite materials; ceramics and glasses; structure-property relationships; selection of materials in mechanical design. 

MECH3460
Mechanical Design 2
Credit points: 6  Session: Semester 2  Classes: 2 hours of lectures and 2 hours of tutorials per week  Prerequisites: MECH2400 and AMME2301  Assumed knowledge: Properties of engineering materials including fatigue failure theories. Statics and dynamics properties of machines. Practical use of Word and Excel including the use of the ‘solver’ and graphing capabilities built into the spreadsheet. The use of a spreadsheet is mandatory.  Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to apply some newly acquired skills to begin to understand how stress and strain are distributed in the more common categories of machine parts. Reducing the loads in standard parts to just the most significant, leads to a range of relatively simple analyses. By using different degrees of simplification and a proportional amount of effort, the examination of components can provide results of corresponding accuracy. To lead the student to utilize and be aware of modern computer methods, to be aware of past methods and be prepared of future developments. Not all the analysis of mechanical components are covered in the course but the ones that are deal with exemplify principles that can be applied to novel items that our graduates may encounter in their professional life. At the end of this unit students will be able to: calculate the weld thickness at a welded joint that is required to carry any combination of loads and apply fatigue life prediction in general to any component; design a bolted joint to carry tensile and or shear loads: use a numerical solver to arrive at the optimal dimensions of a component, given its loads and sufficient boundary conditions; design shafts to carry specified steady and alternating bending moments and torques; design and construct a space frame, such as that for a dune buggy, to meet requirements of strength and rigidity; be able to arrive at the principle parameters of a pair of matched spur gears, and to be able to extend this to helical gears. Course content will include: stress and strain in engineering materials; yield and ultimate fail conditions in malleable and brittle materials; spatial, 3D frameworks; deflections due to forces, moments and torques.

MECH3660
Manufacturing Engineering
Credit points: 6  Session: Semester 1  Classes: 2 hours of lectures and 2 hours of tutorials per week.  Prerequisites: MECH2400  Assumed knowledge: AMME2200, AMME2301, AMME2302  Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

The unit aims to teach the fundamentals of manufacturing processes and systems in mechanical, mechatronic and biomedical engineering, including traditional and advanced manufacturing technologies. This unit aims to develop the following attributes: to understand the fundamental principles of manufacturing technologies for the above mentioned engineering areas; to gain the ability to select existing manufacturing processes and systems for direct engineering applications; to develop ability to create innovative new manufacturing technologies for advanced industrial applications; to develop ability to invent new manufacturing systems At the end of this unit students will have a good understanding of the following: merits and advantages of individual manufacturing processes and systems; principles of developing new technologies; comprehensive applications and strategic selection of manufacturing processes and systems. Course content will include: Manufacturing Processes: Common processes and their science (machining, casting, powder metallurgy, metal working, welding, polymer processing and composite manufacture); merits and limitations; NC and CAM; Introduction to advanced processes (sensor and actuator, IC, intelligent robots and biomedical and nano-technological device). Manufacturing Systems: Economics in manufacturing; flexible manufacturing; just-in-time manufacturing; group technology; materials selection and requirements planning; quality control; introduction to new technology; introduction to e-manufacturing; human factors; plant layout.
MECH3661
Engineering Management
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 hours of tutorials per week

This unit aims to: develop an understanding of the principles and practices of industrial and engineering management; provide an understanding of the theoretical and practical issues facing an industrial organisation and the fundamental approaches to their management; understand the ethical, social, economic and environmental contexts of professional engineering within an industrial organisation. The attributes that will be developed in this unit of study are consistent with the development of scholarship, global citizenship and lifelong learning.

At the end of this unit students will be able to: understand the fundamental approaches to industrial management; apply a range of these approaches in class experiences and assessment tasks; practice and appreciate the effective management of workgroups; understand the importance of effective design and management of human systems in managing organisational and professional issues; develop an ethical approach to dealing with professional issues of an economic, social or environmental nature; enhance competence and confidence in oral and written communication.

The concepts covered in this unit are from the following management areas:


This broad range of topics is covered so as to familiarise students with the fundamental areas of managerial practice that they can be expected to become professionally proficient in.

MECH3921
Biomedical Design and Technology
Credit points: 6 Session: Semester 2 Classes: 4 hours of lectures/tutorials per week.

This unit aims to give students an understanding of the Australian and International biomedical industry and in the development, manufacture and uses of biomedical engineering products in therapeutic, rehabilitation and clinical settings. Students will gain an understanding of the process of biomedical regulation in Australia and other major international markets as well as the entire process of creating a new biomedical engineering product, from design through to marketing and monitoring of the product. Students will design a biomedical device including the preparation of a detailed design brief.

This will be done as a team project. Each team will work on a specific biomedical design project following formal design protocols, including design control, regulatory considerations, and commercialisation/IP considerations.

Course content will include:
- Biomedical Design: A team design project on a medical device.
- Intellectual Property in the biomedical industry.
- Biomedical devices and technology.
- Regulatory and clinical considerations in the biomedical industry.
- Commercialisation strategies in the biomedical industry.
- The Australian biomedical industry - an overview. Includes site visits.

MECH4241
Energy and the Environment
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week

This unit is suitable for any engineering discipline student who is interested in developing an understanding of analysis and design in energy, power generation, environment and relevant economic issues. The aim is to acquaint students with the methods engineers use to design and evaluate the thermal processes used for the production of electricity. It also assesses and deals with the environmental consequences of power generation. At the end of this unit students will be able to carry out preliminary design and economic impact analyses for electrical power generation systems. A series of topics will be covered in relation to energy and electricity and relevant issues.

The course contents will include:
1. Economic analysis of energy systems;
2. Environmental impact of power generation;
3. Principles of thermodynamics;
4. First law analysis of power cycles;
5. Design and simulation of power generation cycles;
6. Second law efficiency and availability;
7. Energy efficiency;
8. CO2 capture and sequestration;
9. Design of various components of thermal power plants.

MECH4255
Air Conditioning and Refrigeration
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1 hour of tutorials per week

This UoS aims to teach the basic principles of refrigeration and comfort air conditioning in the built environment including thermal load estimation, system selection, air distribution and energy analysis. Topics covered in this UoS include applied psychrometrics, air conditioning systems, design principles, comfort in the built environment, cooling load calculations, heating load calculations, introduction and use of computer-based load estimation packages software, air distribution, fans, ducts, air conditioning controls, refrigeration cycles, evaporators, condensers, cooling towers, compressors, pumps, throttling devices, piping, refrigerants, control, refrigeration equipment, stimulation of refrigeration systems, food refrigeration and industrial applications; use of CFD packages as tools to simulate flows in building and to optimise air conditioning design, energy estimation methods and software, energy evaluation and management in the built environment.

MECH4265
Combustion
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1 hour of tutorials per week

This UoS aims to teach the basic principles of combustion highlighting the role of chemical kinetics, fluid mechanics, and molecular transport in determining the structure of flames. Students will become familiar with laminar and turbulent combustion of gaseous and liquid fuels including the formation of pollutants. They will also be briefly introduced to various applications such as internal combustion engines, gas turbines, furnaces and fires. This UoS will cover equilibrium compositions, flammability limits, simple chemically reacting systems, detailed chemical kinetics, and the basic theory underlying laminar and turbulent combustion for both premixed and non-premixed cases. There will be an introduction to droplet combustion, the concept of mixture fraction for non-premixed flames, combustion in engines and
Units of study

gas turbines as well as the formation of pollutants. Fire ignition, growth and spread will also be covered with respect to safety in buildings including the hazards related to the formation of smoke and toxic products.

**MECH4310**

**Advanced Engineering Materials**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week. 3 hours of laboratory work per fortnight.  
**Prerequisites:** MECH3265  
**Assumed knowledge:** This subject requires you to have a good understanding of basic knowledge and principles of various aspects for materials engineering UoS (e.g. 2nd & 3rd year Materials I and II, 2nd year Solids 1 and 3rd year Solids 2) especially those relevant to materials engineering and technology over the past 3.5 years.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims for students to understand: how to define the relationship between properties and microstructures of advanced engineering materials; how to improve mechanical design with the knowledge of mechanics and properties of materials; how to conduct failure diagnosis of engineering structures.  

At the end of this unit students should be able to: define structure-property relationships of advanced engineering materials; improve the performance of engineering structures through tailoring materials microstructure and manufacturing processes; conduct failure diagnosis of simplified failure cases of engineering structures.  

Course content will include: advanced ceramics, superalloys, shape memory alloys and polymers, advanced polymer matrix composites, piezoceramic materials, thin film science and technology, advanced materials microstructure and manufacturing processes; conduct failure diagnosis of simplified failure cases of engineering structures.  

**MECH4460**

**Mechanical Design 3**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** MECH2400  
**Assumed knowledge:** ENGG1802, AMME2301, AMME2500, MECH3361  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit teaches the student how to recognise where and how their theoretical skills can be applied to the practical situations that they may encounter in this field of design. The unit utilises assumed theoretical knowledge and skills to elucidate the stresses and strains that exit in the different categories of machine parts. It sets out to make the students familiar with the simplifications that are applied to arrive at the analytic expressions commonly used to analyse the individual categories parts. These simplifications usually begin by assuming that only particular types of loads are carried by each category. The resulting analyses provide approximations to the actual stresses and it is possible to have different degrees of simplifications, requiring more or less work, giving better or worse approximations. Should a particular part be used to carry loads that were not allowed for in the traditional method then some more appropriate method must be found or developed. An important aspect is to make the student practiced in a range of modern concepts, techniques and tools, and to be made aware of their strengths and limitations. Options may be provided in the choice of design assignments. Biomedical engineering and vehicle design problems may be provided as options to more general machine design problems.

**MECH4601**

**Professional Engineering 2**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** MECH3660  
**Assumed knowledge:** MECH3661, ENGG1803, AMME4100  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to create an awareness of issues surrounding the management of projects; impart knowledge resulting in a more global approach to the practice of engineering and engineering management; and provide a vehicle for improving communication skills (both written and oral). The course also aims, when taken together with other courses offered by the School, to substantially meet the requirement of the Institution of Engineers, Australia, for undergraduate training in management theory. On completion of this unit students should be able to: plan small projects and contribute effectively to planning of larger projects; work effectively in small teams; understand their role and expected conduct in the management of engineering projects; perform well in that role from the outset, with performance limited only by experience; prepare an interesting and relevant presentation on aspects of their work for their peers or senior managers; recognise the range of expertise they may need to call on in their role as an engineer working on a project (e.g. in safety and environmental fields); understand what the experts are saying, and be able to contribute effectively to that discussion; understand relationships between humans and the physical and psychological aspects of their occupations and develop basic competence in principles of ergonomics.

**MECH4720**

**Sensors and Signals**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 3 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** MTRX3700  
**Assumed knowledge:** Strong Matlab skills  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The unit aims to provide students with a good practical knowledge of a broad range of sensor technologies, operational principles and relevant signal processing techniques. MECH4720 is the last in a series of practical Mechatronic and Electrical courses taken over three years. It takes these practical engineering concepts, along with the associated mathematical, electronic and mechanical theory and applies this knowledge to a series of practical, albeit specialized applications that will be encountered by most Mechatronic Engineers at sometime during their careers.

This unit will starts by looking at signal characteristics, modulation, filtering and convolution before examining some passive sensors. It goes on to provide an overview of the workings of typical active sensors with a strong emphasis on optical systems and image processing (Radar, Lidar and Sonar). It provides insight into basic sensing methods as well as aspects of interfacing and signal processing. It includes both background material and a number of case studies.

At the end of this unit students will have a good understanding of passive and active sensors, their outputs and applicable signal processing techniques; an appreciation of the basic sensors that are available to engineers and when they should be used.

**MECH4730**

**Computers in Real-Time Control and Inst**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 3 hours of laboratory work per week.  
**Prerequisites:** MTRX3700  
**Prohibitions:** ELEC4602  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to: learn the fundamental principles and requirements of real time software design; understand the basic components of an embedded systems; learn, appreciate and understand the various stages that need to be completed in a large software system implementation; learn the capabilities of a typical high performance real time operating system. At the end of this unit students will have a basic knowledge of the hardware components available in a microcomputer system and a detailed knowledge of facilities and capabilities typically present in a professional real time operating system. The student will have the competence to design, implement and debug interrupt-driven / event driven multitasking systems. The outcomes of this subject are: to be able to design, plan and implement a large real time software system.; to understand the complexity of real time programming; to be able to select appropriate software/hardware platforms for a given control/monitoring task; to understand the problematic of real time software design; to be able to select appropriate software design tool for a real time task; to be able to debug a complete real time system; to be able to organize and distribute tasks in a large software project; to be able to monitor and control the progress towards a due day working in a group; to understand the main facilities offered by
professional real time operating system: Processes, Threads, Timers, interrupts, interprocess communications; to be able to present / demonstrate a real time system in time; to be able to report results in a professional manner.

Textbooks

Library Classification: 629.8102, 629.895133.

MECH4902
Orthopaedic and Surgical Engineering
Credit points: 6 Session: Semester 2 Classes: 3 hours of Lectures per week Prerequisites: AMME2301, AMME2302, ENGG1802, BIOL1003, MECH2901, MECH3921. Assumed knowledge: Basic concepts in engineering mechanics-statistics, dynamics, and solid mechanics; Basic concepts in materials science, specifically with regard to types of materials and the relation between properties and microstructure; And A basic understanding of human biology and anatomy. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The aims and objectives of the UoS are:
1. To introduce the student to the details and practice of orthopaedic engineering.
2. To give students an overview of the diverse knowledge necessary for the design and evaluation of implants used in orthopaedic surgery.
3. To enable students to learn the language and concepts necessary for interaction with orthopaedic surgeons and the orthopaedic implant industry.
4. To introduce the student to the details and practice of other engineering applications in surgery, particularly in the cardiovascular realm.

MECH4961
Biomechanics and Biomaterials
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures per week Prerequisites: AMME3202, MECH2900 or MECH2901 Prohibitions: MECH4960 Assumed knowledge: MECH3300 or MECH3362 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This course is divided into two parts: biomaterials and biomechanics: Biomaterials This course will involve the study of biomaterials from two perspectives: firstly, the response of the body towards the biomaterial - an immune response and foreign body reaction; secondly, the response of the biomaterial to the body - corrosion, biodegradation, and mechanical failure. Our study will begin with the response of the body towards the biomaterial. We will begin by looking at the immune system itself and then move on to look at the normal inflammatory response. We will then study in detail the foreign body reaction caused by biomaterials. The final part of this section is the study of protein adsorption onto biomaterials, with a strong focus on the Vroman effect. Then we will move onto the response of the biomaterial to the body. We will then begin by reviewing of biomaterials, their applications, and compositions, and mechanical properties. We will then look at key problems such as corrosion, stress shielding, static fatigue, and mechanical failure. Finally, we will take a practical look at the materials themselves. Beginning with ceramics (bioinert, biodegradable, and bioactive), we will then study polymers (thermoplastic, thermosetting, and biodegradable), and finally metals. Biomechanics Biomechanics is the study of the body from the point of view of it being an engineering structure. There are many aspects to this since the human body contains soft tissues, hard tissues (skeletal system), and articulating joints. We will begin with a general introduction to biomechanics, modelling the human body from the macroscopic level to the microscopic level. We will then study soft tissue mechanics, with respect to both non-linear and viscoelastic descriptions, with a significant focus on the mathematical methods used in relation to the mechanics of the system. We will then look at specific aspects of biomechanics: muscle mechanics, joint mechanics, kinematics and dynamics of human gait (gait analysis), biomechanics of cells, physiological fluid flow, biomechanics of injury, functional and mechanical response of tissues to mechanical loading.

MTRX1701
Mechatronics Engineering Introductory
Credit points: 6 Session: Semester 1 Classes: 1 hour of lectures, 1 hour of tutorials and 3 hour of workshop practice per week Prohibitions: AERO1150, MECH1560, ENGG1800 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This unit of study aims to introduce students to the fundamental principals that underlie the study of Mechatronic Engineering. It lays the foundation for later studies, including advanced Mechatronic Engineering, computing, control and system design courses. The courses also provides students with the opportunity to develop an understanding of a range of machining and manufacturing processes required to make mechanical components.

Introduction to Mechatronic Engineering (3CP):
a) Introduction - and introduction to the course structure of the Mechatronic Engineering Degree
b) Systems Modelling and Control - Fundamental concepts which underlie the modelling and control of dynamic systems
c) Design Process - The process of Design as an important part of the engineering process
d) Actuators - Components that exert effort to accomplish a given task
e) Sensors - Components which take measurements of the environment
f) Computers - Hardware & Software components that, when combined, allow a system to be controlled
g) Advanced Topics - Case studies relating to the application of Mechatronic Engineering principles.

Manufacturing Technology (3 CP): Safety requirements: All students are required to comply with the safety regulations. Students who fail to do this will not be permitted to enter the workshops. In particular, approved industrial footwear must be worn, and long hair must be protected by a hair net. Safety glasses must be worn at all times. Workshop Technology practical work in: (a) Fitting . Measurement, marking, hammers, cutting, tapping and screwing, reaming and scraping. (b)Machining . lathe, mill, grinder, drill, shaper, and finishing operations. (c)Welding . Practical work in gas and electric welding.
(d)Blacksmithing and forging. (e) Foundry . moulding and casting.

MTRX1702
Mechatronics 1

This unit of study aims to introduce students to the fundamental principals that underlie the study of Mechatronic Engineering. It lays the foundation for later studies, including advanced Mechatronic Engineering, computing, control and system design courses. The courses also provides students with the opportunity to develop an understanding of a range of machining and manufacturing processes required to make mechanical components.

Introduction to Mechatronic Engineering (3CP): a) Introduction - and introduction to the course structure of the Mechatronic Engineering Degree b) Systems Modelling and Control - Fundamental concepts which underlie the modelling and control of dynamic systems c) Design Process - The process of Design as an important part of the engineering process d) Actuators - Components that exert effort to accomplish a given task e) Sensors - Components which take measurements of the environment f) Computers - Hardware & Software components that, when combined, allow a system to be controlled g) Advanced Topics - Case studies relating to the application of Mechatronic Engineering principles.

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Workshop Technology practical work in: (a) Fitting . Measurement, marking, hammers, cutting, tapping and screwing, reaming and scraping. (b) Machining . lathe, mill, grinder, drill, shaper, and finishing operations. (c) Welding . Practical work in gas and electric welding. (d) Blacksmithing and forging. (e) Foundry . moulding and casting.

MTRX2700
Mechatronics 2
Credit points: 6 Session: Semester 1 Classes: 2.5 hours of lectures and 3 hours of laboratory work per week. Prerequisites: MTRX1701 and MTRX1702 Prohibitions: ELEC2601, ELEC3607 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The aim of the unit is to introduce students to microprocessor and microcomputer systems, emphasizing assembly language programming and building on the digital logic foundations from first year. In particular, the following subjects are addressed: Introduction to microprocessors, stored-program computer architecture, instruction codes and addressing modes, instruction execution cycle; Memory devices. Computer architecture and assembly language programming. Microprocessor and microcontroller systems, memory and IO interfacing, interrupts and interrupt handling. Serial and parallel communications. System design, documentation, implementation, debugging and testing. MTRX2700 is the introductory course in the basics of real Mechatronic systems. This course builds on knowledge obtained in the courses ENGG1801, MTRX1701, ELEC1103 and MTRX1702. This course extends this knowledge by introducing students to their first practical applications in Mechatronic Engineering. By passing this subject, the student will have obtained the necessary skills to undertake Mechatronics 3 (MTRX3700).

MTRX3700
Mechatronics 3
Credit points: 6 Session: Semester 2 Classes: 2.5 hours of lectures and 3 hours of lab work per week. Prerequisites: MTRX2700 Prohibitions: MECH4710 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to provide experience, confidence and competence in the design and implementation of microprocessor-based products and instruments; to impart a detailed knowledge of the software and hardware architecture of a typical modern microcontroller, and an understanding of the use of these resources in product design; and to provide experience of working in a project team to prototype a realistic product to meet a specification. At the end of this unit students will understand microprocessor system organization, and the organization of multiple and distributed processor systems, special purpose architectures (DSPs etc) and their application. The student will have a detailed knowledge of the software and hardware architecture of a modern microcontroller. This knowledge will include an in-depth understanding of the relationship between assembly language, high-level language, and the hardware, of the utilisation and interfacing of microcontroller hardware resources, and of the design and development of software comprised of multiple interrupt-driven processes. The student will have the competence to develop prototype microprocessor-based products.

Course content will include single processor systems, multiple and distributed processing systems, special purpose architectures (DSPs etc) and their application; standard interfacing of sensor and actuation systems; ADC/DAC, SSI, parallel, CAN bus etc.; specific requirements for microprocessor-based products; problem definition and system design; tools for design, development and testing of prototype systems; the unit of study will include a project, where groups of students design, develop and commission a microprocessor-based product.

MTRX4700
Experimental Robotics
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 3 hours of lab work per week. Prerequisites: AMME3500; MTRX3700 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to present a broad overview of the technologies associated with industrial and mobile robots. Major topics covered are sensing, mapping, navigation and control of mobile robots and kinematics and control of industrial robots. The subject consists of a series of lectures on robot fundamentals and case studies on practical robot systems. Material covered in lectures is illustrated through experimental laboratory assignments. The objective of the course is to provide students with the essential skills necessary to be able to develop robotic systems for practical applications.

At the end of this unit students will: be familiar with sensor technologies relevant to robotic systems; understand conventions used in robot kinematics and dynamics; understand the dynamics of mobile robotic systems and how they are modeled; have implemented navigation, sensing and control algorithms on a practical robotic system; apply a systematic approach to the design process for robotic systems; understand the practical application of robotic systems in applications such as manufacturing, automobile systems and assembly systems; develop the capacity to think creatively and independently about new design problems; undertake independent research and analysis and to think creatively about engineering problems.

Course content will include: history and philosophy of robotics; hardware components and subsystems; robot kinematics and dynamics; sensors, measurements and perception; robotic architectures, multiple robot systems; localization, navigation and obstacle avoidance, robot planning; robot learning; robot vision and vision processing.

School of Chemical and Biomolecular Engineering

CHNG1103
Material & Energy Transformations Intro
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Assumed knowledge: Mathematics Extension 1; 2 unit Physics; 2 unit Chemistry. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The students should develop an understanding of and competence in the formulation and solution of material and energy balance problems in engineering; develop competence in using basic flowsheet analysis and appropriate computational tools; improve their group work and problem solving skills; gain an ability to extract a simplified version of a problem from a complex situation. Material Transformation related topics include: unit systems and unit conversions; properties of solids, fluids and gases; mass balance calculations on batch and flow systems; balances on multiple units processes, balances on reactive systems, recycle, bypass and purge calculations; equilibrium compositions of reacting systems; vapour pressure and humidity. Energy transformations include the following topics: apply the first law of thermodynamics to flow and batch systems in process industries; understand thermodynamic properties such as internal energy, enthalpy and heat capacity; conduct energy balances for sensible heat changes, phase transformations and reactive processes for practical industrial systems; understand the applications of psychrometry, refrigeration, heat of formation and combustion in industry.

CHNG2801
Conservation and Transport Processes
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week. Assumed knowledge: Material Science 2; Calculus Computations (Matlab, Excel) Mass and Energy Balances. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

By the end of this unit of study, students should be proficient at applying the basic principles of mass, energy and momentum balances to solve engineering problems involving simple fluid flow, heat and mass transfer. Further, students will be able to perform simple dimensional analysis and to see the utility of this general approach in engineering: for example in friction factors, heat and mass-transfer correlations. Students will also develop skills in the basic design of different types of chemical reactors, given the corresponding chemical rate law. The focus of this unit of study is to provide the key concepts and principles as tools through keynote lectures, with supporting
tutorials and laboratory sessions giving valuable hands-on experience. Guidance will be provided to students to seek additional detailed information for specific applications in their projects. This unit of study runs concurrently with another enabling technology unit of study CHNG2802. These two units together will provide students with the tools and know-how to tackle the real-life engineering problems encountered in the concurrent project-based unit of study, CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2802
Applied Maths for Chemical Engineers
Credit points: 6
Session: Semester 1
Corequisites:
Prerequisites: All core 1st year engineering units of study.
CHNG2803 (Analysis Practice 1) CHNG2801 (Conservation and Transport Processes) CHEM2404 (Forensic and Environmental Chemistry)
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study consists of two main strands: statistical analysis of data and numerical (computer based) methods for solution of equation sets. By the end of the statistical analysis strand, students should be proficient at applying the basic principles of statistical analysis, and appreciate how they can be applied to a variety of engineering applications. The following statistical tools are studied: normal distribution, the test statistic z, confidence intervals for the population mean, t-distribution, hypothesis testing, data fitting, uncertainty analysis, propagation of random errors and analysis of variance. The numerical methods strand will see students become proficient at: solution of single and multivariable algebraic equations; solution of nonlinear differential equations; use of Excel and Matlab for data manipulation and equation solving; use of commercial flow-sheeting software (Hysys) for solving engineering problems. This unit of study runs concurrently with another enabling technology unit of study, CHNG2801. These two units together will provide students with the tools and know-how to tackle the real-life engineering problems encountered in the concurrent project-based unit of study, CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2803
Energy and Fluid Systems Practice
Credit points: 6
Session: Semester 1
Corequisites:
Prerequisites: All core engineering 1st year units of study.
CHNG2801 (Conservation and Transport Processes) CHNG2802 (Applied Mathematics for Chemical Engineers) CHEM2404 (Forensic and Environmental Chemistry)
Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of chemical physics, chemistry, and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study is centered around real-life engineering projects which cover traditional and non-traditional domains of chemical engineering, and span the energy, chemical processing, and bio-medical sectors. By the end of this unit, students will be proficient in analysing complex fluid and energy networks and decomposing them into their essential component parts. Students will understand the functionality of each of these key components, and will be able to characterise the performance of the engineering network in terms of both component and system-wide variables. Students will also be able to take this information and explore the optimum operating conditions for the network. This unit of study runs concurrently with two enabling technology units of study, CHNG2801 and CHNG2802. These two units will provide students with the tools and know-how to tackle the real-life engineering problems encountered in CHNG2803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

CHNG2804
Chemical & Biological Systems Behaviour
Credit points: 6
Session: Semester 2
Corequisites:
Prerequisites: All core 1st year engineering units of study.
Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of chemical physics, chemistry, and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This is a core unit within the curriculum. Chemical Engineering requires an understanding of material and energy transformations and how these are driven by molecular interactions. The rate of such transformations is dependent on driving forces and resistances, and these need to be defined in terms of fundamental physical and chemical properties of systems. This course seeks to provide students with a sound basis of the thermodynamics of chemical and biological systems, and how these, in turn, define limits of behaviour for such real systems. The thermodynamic basis for rate processes is explored, and the role of energy transfer processes in these highlighted, along with criteria for equilibrium and stability. Emphasis is placed on the prediction of physical properties of chemical and biological systems in terms of state variables. The course delivery mechanism is problem-based, and examples from thermal, chemical and biological processes will be considered, covering molecular to macro-systems scale. The course builds naturally from the second year first semester course in conservation and transport processes, and prepares students fundamentally for the third year course in design of chemical and biological processes, which deals fundamentally with reaction/transport systems, and considers phase and chemical equilibria.

CHNG2805
Industrial Systems and Sustainability
Credit points: 6
Session: Semester 2
Corequisites:
Prerequisites: All core 1st year engineering units of study.
CHEM2403 (Chemistry of Biological Molecules) CHEM2404 (Chemical and Biological Systems Behaviour) CHNG2806 (Analysis Practice 2 - Treatment, Purification & Recovery Systems) CHEM2403 (Chemistry of Biological Molecules)
Assumed knowledge: Ability to understand basic principles of chemical physics, chemistry, and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This course involves the study of the various concepts which underpin sustainable development, including technical and economic efficiency, stewardship of the bio-physical environment, and social acceptability. The course examines the material economy from the perspective of open and closed thermodynamic systems, and the implications of this for resource consumption and waste generation. A number of governing sustainability frameworks are examined to determine their suitability within the context of chemical engineering. A range of approaches and tools for determining industries environmental performance are introduced as part of a sustainability framework. Process design and operation, product design are all investigated from a sustainability perspective. Green Engineering principles are highlighted as a potential method for transforming industry.

CHNG2806
Materials Purification and Recovery
Credit points: 6
Session: Semester 2
Corequisites:
Prerequisites: All core 1st year engineering units of study.
CHEM2804 (Chemical and Biological Systems Behaviour) CHNG2805 (Industrial Systems and Sustainability) CHEM2403 (Chemistry of Biological Molecules)
Assumed knowledge: Ability to conduct mass and energy balances, and the
integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information.

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

To recognise that chemical engineers are involved in creation of products and processes, in manipulating complex systems, and in managing technical operations. To develop an appreciation of the practical application of concepts and tools to real design problems in the process, products and service sectors in which chemical engineers are engaged. To consider this through three project-driven case studies covering a range of integrated analysis scenarios, from the domain of energy and fluid systems. This course is a concurrent requirement for the concept and enabling technology courses running in parallel in the same semester.

**CHNG3041**  
**Exchange Program 3A**

**Credit points:** 24  
**Session:** Semester 1, Semester 2  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Completion of all Year 1 and 2 core units of study in Chemical Engineering, and at least 96 credit points towards the degree. Approval of the Head of School and approval from the host institution is required.

**Objectives/Outcomes:** The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program. Upon completion of the full year-long exchange (i.e. both CHNG3041 and CHNG3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 core units of study.

**CHNG3042**  
**Exchange Program 3B**

**Credit points:** 24  
**Session:** Semester 1, Semester 2  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment. Note: Completion of all Year 1 and 2 core units of study in Chemical Engineering, and at least 96 credit points towards the degree. Approval of the Head of School and approval from the host institution is required.

**Objectives/Outcomes:** The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program. Upon completion of the full year-long exchange (i.e. both CHNG3041 and CHNG3042), students will have completed work at least equivalent to Year 3 in the Chemical Engineering degree, including in particular all Year 3 core units of study.

**CHNG3801**  
**Process Design**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806  
**Corequisites:** CHNG3803; CHNG3802  
**Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study consists of three strands: reaction engineering; vapour-liquid equilibrium and distillation; heat transfer. The central aim is to show how the unit operations interact in the design and operation of process equipment. The reaction engineering strand covers the following: development of appropriate kinetic rate laws; use of rate laws in designing continuous stirred tank, plug-flow and packed-bed reactors. The second strand focuses on the following: numerical methods for predicting vapour-liquid equilibrium; binary and multi-component distillation; deviations from ideal behaviour. The heat transfer strand covers the following issues: forced and natural convective heat transfer; shell and tube heat exchangers; heat transfer with phase change; radiative heat transfer. The various strands make extensive use of computer software: Excel and Matlab for data manipulation and equation solving; commercial flowsheeting software (Hysys) for solving engineering design problems. This unit of study runs concurrently with another enabling technology unit of study CHNG3802. These two units together provide students with the tools and know-how to tackle real-life engineering problems encountered in the concurrent project-based unit of study, CHNG3803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

**CHNG3802**  
**Operating/Improving Industrial Systems**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806  
**Corequisites:** CHNG3803; CHNG3801  
**Process Design:** CHNG3803  
**Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Aims and Objectives:** All industrial processes require some process monitoring and control for satisfactory operation. The performance of a process may be improved via the implementation of some level of optimisation. This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software. The final component will focus on the optimisation of batch and continuous processes. This UoS demonstrates that: process control and optimisation are integral concepts for any modern plant; a unified approach allows a diversity of application fields to be readily handled via a consistent approach from data analysis, though process control to process optimisation. The UoS will allow each student to achieve and demonstrate competency through a range of individual and group-based activities. By the end of this UoS a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the ‘vertical integration’ that exists from modelling, through control, to optimisation. This UoS is part of an integrated third-year program in chemical engineering. Completion of this body of work is required before a student will be permitted to move into the final-year with its emphasis on detailed design work, thesis based research and advanced engineering options.

**CHNG3803**  
**Chemical/Biological Process Design**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 4 hours of project work in classes concurrently with another enabling technology unit of study.  
**Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806  
**Corequisites:** CHNG3801; CHNG3802  
**Operation (Design) CHNG3802 (Operation, Analysis and Improvement of Industrial Systems)  
**Assumed knowledge:** Ability to conduct mass and energy balances, and the use of the software Aspen Plus for solving real-world engineering problems. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays with phase change; radiative heat transfer. The various strands make extensive use of computer software: Excel and Matlab for data manipulation and equation solving; commercial flowsheeting software (Hysys) for solving engineering design problems. This unit of study runs concurrently with another enabling technology unit of study CHNG3802. These two units together provide students with the tools and know-how to tackle real-life engineering problems encountered in the concurrent project-based unit of study, CHNG3803. This integrated course structure is designed to help students become familiar with the multi-disciplinary nature of chemical engineering today.

**CHNG3802**  
**Operating/Improving Industrial Systems**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806  
**Corequisites:** CHNG3803; CHNG3801  
**Process Design:** CHNG3803  
**Assumed knowledge:** Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in second year have been successfully completed.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Aims and Objectives:** All industrial processes require some process monitoring and control for satisfactory operation. The performance of a process may be improved via the implementation of some level of optimisation. This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software. The final component will focus on the optimisation of batch and continuous processes. This UoS demonstrates that: process control and optimisation are integral concepts for any modern plant; a unified approach allows a diversity of application fields to be readily handled via a consistent approach from data analysis, though process control to process optimisation. The UoS will allow each student to achieve and demonstrate competency through a range of individual and group-based activities. By the end of this UoS a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the ‘vertical integration’ that exists from modelling, through control, to optimisation. This UoS is part of an integrated third-year program in chemical engineering. Completion of this body of work is required before a student will be permitted to move into the final-year with its emphasis on detailed design work, thesis based research and advanced engineering options.

**CHNG3803**  
**Chemical/Biological Process Design**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 4 hours of project work in classes concurrently with another enabling technology unit of study.  
**Prerequisites:** CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806  
**Corequisites:** CHNG3801; CHNG3802  
**Operation (Design) CHNG3802 (Operation, Analysis and Improvement of Industrial Systems)  
**Assumed knowledge:** Ability to conduct mass and energy balances, and the use of the software Aspen Plus for solving real-world engineering problems. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays
Aims and Objectives: All industrial processes require some process monitoring and control for satisfactory operation. The efficient use and recovery of energy is vital for industrial processes. The performance of a process may be improved via the implementation of some level of optimisation. This unit of study commences with a component on process data management before moving on to empirical modelling and data reconciliation techniques. The second component will concentrate on the role of process control covering: the development of linear models, control system analysis, the design and performance of feedback control systems, advanced control systems and the use of control related software. In parallel, this unit of study also focuses on the efficient use of energy in process plants. The final component will focus on process optimisation of batch and continuous processes. This unit of study demonstrates that: process control and optimisation are integral concepts for any modern plant; a unified approach allows a diversity of application fields to be readily handled via a consistent approach from data analysis, though process control to process optimisation. The unit of study will allow each student to achieve and demonstrate competence through a range of individual and group-based activities. By the end of this unit of study a student should achieve competence in the following: process data management skills relevant to engineering (statistical analysis, data-based modelling and data reconciliation techniques); appreciation of the role of process control in modern manufacturing; designing an appropriate feedback control system and analysing its performance for a range of process applications using both traditional and software-based techniques; appreciation of the limitations of feedback control and be able to design a range of common enhancements; appreciation of the role of process optimisation in modern manufacturing; use of both traditional and software-based techniques to design optimisation schemes for a range of process applications and analyse the performance of such schemes; appreciate the limitations that exist whenever mathematical models are used as the basis for process control and/or optimisation; appreciate the “vertical integration” that exists from modelling, through control, to optimisation.

CHNG3805 Product Formulation and Design
Credit points: 6 Session: Semester 2 Classes: Lectures: 2 hours per week; Tutorials: 1 hour per week. Prerequisites: CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 Corequisites: CHNG3806 (Management of Industrial Systems) CHNG3807 (Design Practice 2 - Products and Value Chains) Assumed knowledge: Mass and Energy Balances Conservation and Transport Phenomena Applied Mathematics (for Chemical Engineering) Process Design Concepts Process Control and Optimisation Concepts Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Product design is one of the new frontiers of chemical and biomolecular engineering. Many products emerge from their processing not as a continuous stream, but as discrete entities. There are many examples of discrete systems in chemical and biomolecular engineering; these include particulate systems (e.g. powders or solid particles in fluids), as well as polymeric and biological systems (e.g. emulsions and cells, respectively). This unit of study is an introduction to the basic concepts in discrete systems necessary for a chemical engineer to be able to formulate and design discrete products with desired properties. In essence it is a course on product formulation and design.

The unit of study will provide students with a working knowledge of the types of discrete systems available, the ways in which particular systems can be characterized and their applications in industry. These aspects will form the foundation for an introduction to the common techniques used to model discrete systems. By the end of the unit of study students should be proficient at understanding the types of discrete systems available, and the techniques used to characterize particulate systems, understanding the basic principles of particle-fluid systems, applying these principles and solving simple problems in product design and particulate engineering.

CHNG3806 Management of Industrial Systems
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures/tutorials per week. Prerequisites: CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 Corequisites: CHNG3805 (Product Formulation and Design) CHNG3807 (Design Practice 2 - Products and Value Chains) Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative information Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Aims and Objectives: To develop an appreciation of management practice in process-led and product-driven industries; considering project management, economic evaluation of processes, risk assessment and decision making with multiple objectives and uncertainty; to develop the requisite tools to support above; to consider approaches to innovation and entrepreneurship; to consider all this in the context of different scales of operation - from single process, to business unit, to enterprise, and across supply and value chains; to support this analysis through real-problem case studies and projects. By the end of this unit of study a student should be competent in: developing project work plans in conjunction with project management schedules; performing economic evaluations of projects, plans and processes; performing qualitative risk assessments of projects, plans and processes; exploring optimisation of complex processes under risk and uncertainty, covering unit operations, business units, enterprises and value chains.

CHNG3807 Products and Value Chains
Credit points: 6 Session: Semester 2 Classes: Lectures: 1 hour per week; Project Work in class: 6 hours per week. Prerequisites: CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 Corequisites: CHNG3805 (Product Formulation and Design) CHNG3806 (Management of Industrial Systems) Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical
This unit of study is designed to give students experience at solving complex, interesting, real-world engineering problems, by applying theoretical and experimental principles learnt during their studies. During the unit of study students will be required to work on three project-driven case studies covering a range of design scenarios, from the domain of particulate products, entrepreneurial ventures (business "start-ups"), ethics and product value chains. This unit of study is a concurrent requirement for the concept and enabling technology courses running in parallel in the same semester. By the end of the unit of study students should be proficient at developing a strategy for taking a product development idea from concept to commercial artefact - with a comprehensive appreciation of economic arguments, underlying uncertainties (and how to mitigate these), and consideration of trade-offs inherent in this development. They should also be able to apply design and analysis tools for the synthesis of particulate products leading to the manufacture of a preferred product at pilot scale and be able to develop a strategy for the design and analysis of extended business enterprises. A key aspect of the unit of study is that students demonstrate these outcomes in project mode. The three projects in the unit of study address "issues of scale" of chemical and biomolecular engineers, from molecular to macro-scale systems.

CHNG3808 Polymer Engineering

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week. Prerequisites: CHNG2801; CHNG2802; CHNG2803; CHNG2804; CHNG2805; CHNG2806 Corequisites: CHNG3801 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Polymers are ubiquitous and a significant number of scientists and engineers are employed by the Polymer Industry. This unit of study will facilitate engagement with a broad spectrum of engineering knowledge base that range from polymer synthesis to design of polymer products to developing sustainable technology in polymer synthesis and applications. The industrial applications range from biomechanical to electronics and semiconductors to nanotechnology, in addition to usual consumer products. Technical knowledge relating to polymer chemistry, mathematics, fluid and solid mechanics, heat transfer, mass transfer and reaction engineering will be applied for the planned outcomes of this course.

The specific objectives are: To analyse molecular structures and their relations with material properties; To investigate the variety of thermal and thermo-mechanical properties relevant for probing polymer structure as well as understanding material behaviour in the context of applications; To engage with rheological characterization of polymers to probe polymer structural as well as to understand material behaviour in the context of applications; To understand the principles of polymer synthesis and to design polymerization reactors for producing polymer resins; To understand the principles of polymer processing in order to design polymeric products for consumer and specialty applications; To critically analyze production of polymeric goods from the sustainability point of view; To engage with examples of cutting-edge engineering product and process designs and applications that encompass biomedical, nanotechnology, electronics and other emerging technologies.

At the completion of this Unit of Study students should have developed: An appreciation of the underlying principles of polymer engineering; The ability to apply these skills to new and novel situations; The ability to critically analyse the methods of manufacture of different products and processes and to improve these processes; The development of an integrated suite of problem-solving skills needed to successfully handle new engineering applications; An ability to independently research and be critical of the findings; An ability to analyze experimental data; An ability to carry out process and product design through critical thinking; Interpersonal, group and team work skills including the ability to communicate clearly and concisely; Professionalism in terms of taking responsibility for the results of their calculations and recommendations; Lifetime or self-directed learning skills including the ability to critically assess one's own performance in a constructive manner.

CHNG4001 Practical Experience

This unit of study is not available in 2012

Session: Semester 1, Semester 2 Classes: no formal classes Assumed knowledge: Advisory prerequisite: 28 credit points of 3rd year units Campus: Camperdown/Darlington Mode of delivery: Professional Practice

Students are to obtain first-hand experience of the way chemical engineering skills are employed in an industrial context. Each student is required to work as an employee of an approved organisation and to submit a report on that work. The employment undertaken must be relevant to Chemical Engineering and should be discussed, before acceptance, with a member of the Department of Chemical Engineering. While the responsibility for obtaining satisfactory employment rests with the student, the Department, through the Chemical Engineering Foundation, and the Careers and Appointments Service will assist wherever possible.

CHNG4008 Chemical Engineering Advanced Concepts

This unit of study is not available in 2012

Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Project based unit which allows students to work in conjunction with a research groups or industry specialists in Chemical and Biomolecular Engineering to experience modern developments in the field.

CHNG4041 Exchange Program 4A

Credit points: 24 Session: Semester 1, Semester 2 Prerequisites: Completion of all Year 1, 2 and 3 core units of study in Chemical Engineering, and at least 144 credit points towards the degree. Approval of the Heads of School of Chemical and Biomolecular Engineering at the University of Sydney and at the participating exchange institution. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Year 4 elective unit of study for the degree in Chemical Engineering. Objectives/Outcomes: The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program. Upon completion of the full year-long exchange (i.e. both CHNG4041 and CHNG4042), students will have completed work at least equivalent to Year 4 in the Chemical Engineering degree, including in particular the Year 4 core units of study, and will have fulfilled all the requirements of their degree from the University of Sydney.

CHNG4042 Exchange Program 4B

Credit points: 24 Session: Semester 1, Semester 2 Prerequisites: Completion of all Year 1, 2 and 3 core units of study in Chemical Engineering, and at least 144 credit points towards the degree. Approval of the Heads of School of Chemical and Biomolecular Engineering at the University of Sydney and at the participating exchange institution. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Year 4 elective unit of study for the degree in Chemical Engineering. Objectives/Outcomes: The objective of this (single semester) Exchange Program is to provide students with the opportunity to live and learn in a foreign culture while completing the academic and professional requirements of the University of Sydney degree program. Upon completion of the full year-long exchange (i.e. both CHNG4041 and CHNG4042), students will have completed work at least equivalent to Year 4 in the Chemical Engineering degree, including in particular...
the Year 4 core units of study, and will have fulfilled all the requirements of their degree from the University of Sydney.

**CHNG4203**

**Major Industrial Project**

Credit points: 24 | Session: Semester 1 | Classes: no formal classes | Prerequisites: Passed at least 144 credit points and have a WAM greater than credit average Students wishing to do this unit of study are required to discuss the matter with the Head of School prior to enrolment. | Mode of delivery: Supervision | Note: Department permission required for enrolment. | This unit of study will give students a rich experience in carrying out a major project within an industrial environment, and in preparing and presenting detailed technical reports (both oral and written) on their work. The project is carried out under joint University/industry supervision and extends over several months, with the student essentially being engaged fulltime on the project at the industrial site. Previous students have been placed with industries in areas including the mining industry, oil and gas processing, plastic and paint manufacture, food production, manufacturing and so on. Students will learn from this experience the following essential engineering skills: how to examine published and experimental data, set objectives, organise a program of work, and analyse results and evaluate these in relation to existing knowledge. Presentation skills will also be developed, which are highly relevant to many branches of engineering activity.

**CHNG4802**

**Chemical Engineering Design A**

Credit points: 6 | Session: Semester 1, Semester 2 | Classes: Lectures 2hrs per week, Tutorials 2hrs per week, Site Visits. | Prerequisites: CHNG3801, CHNG3802, CHNG3803, CHNG3805, CHNG3806, CHNG3807 | Mode of delivery: Enrolment in this unit of study assumes that all (six) core chemical engineering unit of study in third year have been successfully completed. | Campus: Camperdown/Darlington | Note: Department permission required for enrolment in the following sessions: Semester 2. | In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This units of study builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity. This design activity is spread over two unit of study (Chemical Engineering Design A and B) in run in first and second semester. The primary aim in the first UoS is to consider the technical issues with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in this UoS is on evaluating non-technical considerations affect the final process design and its operation. By the end of both units of study a student should be able to develop a wide range of alternative conceptual designs for a given product specification and market analysis, have an appreciation of how to evaluate process alternatives at the conceptual level with a view to creating a 'short-list' worthy of more detailed technical investigation, be familiar with the use of process flowsheeting software to compare alternative designs, appreciate the fact that technical considerations are only one component in an overall successful design project and be able to clearly present the results from both individual and group work in oral/written formats.

**CHNG4806**

**Chemical Engineering Design B**

Credit points: 6 | Session: Semester 1, Semester 2 | Classes: Lecture, Project Work - own time, Project Work - in class. | Prerequisites: CHNG4802 or CHNG4203 | Mode of delivery: Enrolment in this unit of study assumes that all core chemical engineering units of study in third-year have been successfully completed, as well as the related first semester unit of study Chemical Engineering Design A. | Campus: Camperdown/Darlington | Note: Department permission required for enrolment in the following sessions: Semester 1. In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This UoS builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity. This design activity is spread over two UoS (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first UoS is to consider the technical issues with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in this UoS is on evaluating how non-technical considerations affect the final process design and its operation. Students joining this course from the Major Industrial Placement Project (MIPPs CHNG4203) or as overseas students (with approval) do the same assignments but on a different schedule.

**CHNG4811**

**Honours Thesis A**

Credit points: 6 | Session: Semester 1, Semester 2 | Classes: no formal classes | Prerequisites: CHNG3801, CHNG3802, CHNG3803, CHNG3805, CHNG3806, CHNG3807. This unit is available to only those students who have gained an entry to the Honours degree. | Mode of delivery: Supervision | Note: Department permission required for enrolment. | The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit, students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The progress at the end of Thesis A will be evaluated based on a seminar presentation and a progress report. The skills acquired will be invaluable to students undertaking engineering work.

**CHNG4812**

**Honours Thesis B**

Credit points: 6 | Session: Semester 1, Semester 2 | Classes: no formal classes | Corequisites: CHNG4811 | Prohibitions: CHNG4805, CHNG4814 | Mode of delivery: Supervision | Note: Department permission required for enrolment. | The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Honours Thesis A and B) run in first and second semester. In this unit of study, the primary emphasis is on the execution of a comprehensive and systemic series of investigations, and the reporting of the study in a major thesis document and an oral presentation. Students will acquire skills in developing a plan for a series of studies to illuminate an area of research, in evaluating
alternatives at the conceptual level with a view to creating a ‘short-list’ worthy of more detailed technical investigation, and in searching the literature for guidance of the studies. Further, communication skills will be developed, such as the ability to clearly present the background and results in a written format and in an oral presentation to a general engineering audience. This UoS is part of an integrated (two semester) fourth year program involving a chemical engineering research project and thesis. It has the overarching aim of completing the ‘vertical integration’ of knowledge - one of the pillars on which this degree program is based. Students who have successfully completed CHNG4203 Major Industrial Project may apply for exemption from this unit of study and replace it with an advanced level chemical engineering elective unit of study.

CHNG4813

Engineering Project A

Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes Prerequisites: CHNG3801, CHNG3802, CHNG3803, CHNG3805, CHNG3806, CHNG3807 Corequisites: CHNG4814 prohibitions: CHNG4809, CHNG4811 Assumed knowledge: Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment in the following sessions: Semester 2. Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member’s research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit, students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The progress at the end of Thesis A will be evaluated based on a seminar presentation and a progress report. The skills acquired will be invaluable to students undertaking engineering work.

CHNG4814

Engineering Project B

Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes Corequisites: CHNG4813 prohibitions: CHNG4805, CHNG4812 Assumed knowledge: Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year have been successfully completed. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment in the following sessions: Semester 1. Note: Students are expected to take the initiative when pursuing their research projects. The supervisor will be available for discussion - typically 1 hour per week.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies introduced in previous years, as well as making use of the report writing and communications skills the students have developed. The research activity is spread over two units (Chemical Engineering Thesis A and B) run in first and second semester. In this unit of study, the primary emphasis is on the execution of a comprehensive and systemic series of investigations, and the reporting of the study in a major thesis document and an oral presentation. Students will acquire skills in developing a plan for a series of studies to illuminate an area of research, in evaluating alternatives at the conceptual level with a view to creating a ‘short-list’ worthy of more detailed technical investigation, and in searching the literature for guidance of the studies. Further, communication skills will be developed, such as the ability to clearly present the background and results in a written format and in an oral presentation to a general engineering audience.

School of Civil Engineering

CIVL0011

Civil Exchange A

Credit points: 6 Session: Semester 1, Semester 2 Classes: A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. Prerequisites: Department permission required. Students must have a WAM >65 and to have completed one full year of study, that is 48 credit points. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies unterkaen at exchange university. To be approved by exchange program coordinator.

CIVL0012

Civil Exchange B

Credit points: 6 Session: Semester 1, Semester 2 Classes: A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies unterkaen at exchange university. To be approved by exchange program coordinator.

CIVL0013

Civil Exchange C

Credit points: 6 Session: Semester 1, Semester 2 Classes: A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies unterkaen at exchange university. To be approved by exchange program coordinator.

CIVL0014

Civil Exchange D

Credit points: 6 Session: Semester 1, Semester 2 Classes: A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies unterkaen at exchange university. To be approved by exchange program coordinator.

CIVL0015

Civil Exchange E

Credit points: 6 Session: Semester 1, Semester 2 Classes: A workload one quarter of that a full time student at the exchange university. Meet requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies unterkaen at exchange university. To be approved by exchange program coordinator.
At the end of this unit, students should be able to understand the basic actions; the distribution of internal actions within structures; and the significance and methods of calculation of the geometric properties of structural sections (I, Z, S, J etc); understand the effect of internal forces and deformations of bodies through the concept and calculation of strains and stresses; appreciate the behaviour of structures by analysing structures without numerical calculations; display a knowledge of basic material properties, combined stresses and failure criteria; and demonstrate their hands-on experience of the behaviour of structural members via experiments and the ability to prepare written reports on those experiments.

Equivalent syllabus of Civil Engineering unit of study/studies undertaken at exchange university. To be approved by exchange program coordinator.

CIVL0017 Civil Exchange G
Credit points: 6 Session: Semester 1, Semester 2 Classes: A work load one quarter of that of a full time student at the exchange university. Meets requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies undertaken at exchange university. To be approved by exchange program coordinator.

CIVL0018 Civil Exchange H
Credit points: 6 Session: Semester 1, Semester 2 Classes: A work load one quarter of that of a full time student at the exchange university. Meets requirements of the exchange course. Prerequisites: Department permission required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note: Student must have WAM > 65 and to have completed one full year of study, that is 48 credit points.

Equivalent syllabus of Civil Engineering unit of study/studies undertaken at exchange university. To be approved by exchange program coordinator.

CIVL2110 Materials
Credit points: 6 Session: Semester 1 Classes: 3 hrs of lectures and a 2 hr tutorial per week & 4 hrs of lab work per semester Prerequisites: AMME2302
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Materials are an important part of the civil engineers' work. Indeed, civil engineers who are concerned with the design, construction, and maintenance of facilities need to understand the behaviour and performance of the materials used. And as it happens, mechanical properties - which are essential and basic for civil engineers - are highly dependent on the structure of materials at various scales. Therefore, it is important that a student in Civil Engineering possesses a fundamental knowledge in materials science. This unit of study aims to provide students with the tools necessary to select the adequate material for a particular application and to assess its mechanical behaviour while in use. This course will focus mainly on materials for civil engineering and construction applications, i.e. metals, concrete and soils.

CIVL2201 Structural Mechanics
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 2 hours of tutorials per week, 2 hours of laboratory per semester. Prerequisites: ENGG1802 Engineering Mechanics Prohibitions: AMME2301
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The primary objective of this unit is to understand internal actions (forces and moments) in structures (deformable objects) under loads in three key areas: how structures resist external loads by internal actions; the distribution of internal actions within structures; and the deformations, stresses and strains associated with the internal actions. At the end of this unit, students should be able to understand the basic methods of load transfer in structures - tension, compression, bending, shear and torsion (internal actions); apply the equations of equilibrium to determine the distribution of internal actions in a simple structure by drawing BMDs, SFDs, AFDs, and TMDs; understand the significance and methods of calculation of the geometric properties of structural sections (I, Z, S, J etc); understand the effect of internal forces and deformations of bodies through the concept and calculation of strains and stresses; appreciate the behaviour of structures by analysing structures without numerical calculations; display a knowledge of basic material properties, combined stresses and failure criteria; and demonstrate their hands-on experience of the behaviour of structural members via experiments and the ability to prepare written reports on those experiments.

Emphasis in the assessment scheme will be placed on understanding structural behaviour and solving problems, rather than remembering formulae or performing complex calculations. The course seeks to utilise and improve the generic skills of students, in areas such as problem solving, neat and logical setting out of solutions, report writing, and team work.

The syllabus comprises introduction; equilibrium; internal actions: BMDs, SFDs, AFDs, and TMDs; elasticity, strain and stress, and basic material properties; axial forces: tension and compression; elastic bending of beams; shear force and shear stresses in beams; torsion; deflection of beams; pipes and pressure vessels; trusses; material properties, combined stresses and yield criteria; advanced bending; introduction to buckling and instability.

CIVL2230 Intro to Structural Concepts and Design
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1.5 hours of tutorials per week Assumed knowledge: ENGG1802 Engineering Mechanics, CIVL2110 Materials CIVL2201 Structural Mechanics
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The primary objective is to develop an understanding of design concepts and an introduction to the design of steel, concrete and composite structures. This involves calculation of loads on structures caused by gravity, wind and earthquake; and analysis and design of basic structural elements

CIVL2410 Soil Mechanics
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 1 hour of tutorial per week, 10 hrs of laboratory work per semester Assumed knowledge: CIVL2201 Structural Mechanics
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; methods of predicting soil settlements, the stress-strain-strength response of soils, and earth pressures.

CIVL2511 Instrumentation and Measurement
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 to 4 hours of tutorial/project work/laboratory per week. Site visit Assumed knowledge: CIVL2201 Structural Mechanics, ENGG1802 Engineering Mechanics
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The objectives of this unit are to introduce students to the philosophy and principles of measurement, and its uses in Civil Engineering practice and research. The instrumentation used in practice, the underlying physical principles and the basic electrical/electronic and signal processing issues. It will introduce students to issues in the planning and construction of experiments. Give experience working in groups and in producing reports.
At the end of this unit, students should gain an understanding of the importance of measurement, of the methods and application of measurement; ability to conduct experiments and interpret
measurements. The course will reinforce key concepts in Structural Mechanics, Fluid Mechanics, Soil Mechanics and Surveying.

The syllabus comprises principles of measurement, presentation of data, error analysis, stress and strain, sensor types and technologies, wave based techniques and wave analysis, photographic techniques, signal processing, electric circuit theory. CIVL2611 Introductory Fluid Mechanics


The objective of this unit of study is to develop an understanding of basic fluid concepts for inviscid and incompressible fluids. Topics to be covered will include: basic fluid properties, hydrostatics, buoyancy, stability, pressure distribution in a fluid with rigid body motion, fluid dynamics, conservation of mass and momentum, dimensional analysis, open channel flow, and pipe flow. This core unit of study together with CIVL3612 forms the basis for further studies in the applied areas of ocean, coastal and wind engineering and other elective fluid mechanics units which may be offered.

CIVL2810 Engineering Construction and Surveying

Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and a 2 hour tutorial per week. 18 hrs of practical exercises per semester. Assumed knowledge: MATH1001, MATH1002, MATH1003, MATH1005 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to gain an understanding of the fundamentals of engineering construction including systems and methods in construction of excavation, embankments and other earthworks, hauling and associated operations. To provide basic analogue methods of distance, angle and height measurement. To provide an understanding of three dimensional mapping using basic total station electronic field equipment with associated data capture ability. To give an insight into future trends in the use of GPS and GIS systems.

At the end of this unit, students should develop basic competency in earthwork engineering and economic optimisation of related construction, including proposing and analysing systems and methods, estimation of probable output, unit cost and productivity evaluation. Proficiency in the design and implementation of mapping systems in Civil Engineering, using analogue and electronic field equipment and associated software packages. The syllabus comprises introduction to the framework under which construction projects are formulated and analysed; construction engineering fundamentals; construction systems related to excavation, hauling and embankment construction, including selection and evaluation of plant and methods as well as the expected output and cost; introduction to construction operations management. Introduction to engineering surveying, distance measurement, angle measurement, levelling, traversing, topographic surveys, electronic surveying equipment, future surveying technologies.

CIVL3010 Engineering and Society

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2-3 hours workshop sessions per week. Assumed knowledge: ENGG1803 Professional Engineering. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Engineering graduates apply their technical skills in a wide variety of legal, institutional, and environmental settings, acting as agents and managers of technology-driven social change. Engineering decision-making and problem-solving are made more complex by technical, economic, environmental, social and ethical constraints. In particular, environmental sustainability has given rise to a new framework of engineering analysis that is now an essential part of the work of engineers. The goals of this unit are to introduce students to major problems of environmental deterioration, especially air quality, climate change and energy, and to concepts of sustainability and ethics, and show the role of civil engineers in addressing these issues; to develop the students skills at quantifying the impact of engineering decisions within the broader economic, environmental and socio-cultural contexts; to develop communication skills through participation in group discussions, oral presentations, and written report writing. Lectures, group discussions, case problems and projects are all used in teaching and learning in this unit of study. At the end of the unit, students will be able to: a. identify and analyse important ecological, social and ethical issues deriving from technology-driven change, including new paradigms of environmental sustainability, especially in relation to short and long-range air pollution and energy. b. write environmental impact statements for engineering projects and identify and analyse the impacts of infrastructure projects on the social and natural environments. c. use design and analysis tools such as the Life-Cycle Analysis and the BASIX system to develop better engineering design solutions. d. understand the influence of organizational, ethical and legal factors on engineering practice. The secondary objectives of the UoS are: a. to improve students team-work ability. b. to improve students communication skills, through verbal and written media. c. to improve students skills in research and use of library resources. The syllabus comprises roles of civil engineers, historical development of profession, air pollution, climate change, energy; definitions and practice of sustainability; BASIX design system; environmental impact statements; life-cycle analyses; theories of ethical behavior and public interest disclosures.

CIVL3205 Concrete Structures 1

Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 3 hours of project work in class per week. Assumed knowledge: CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide a basic understanding of the behaviour of reinforced concrete members and structures; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capabilities and limitations); and to provide basic design training in a simulated professional engineering environment. At the end of this unit students will gain proficiency in basic methods of reinforced concrete analysis and design. The syllabus comprises the behaviour of reinforced concrete members and structures, including: material properties, ‘elastic’ analysis (stresses/deformations/time-dependence), ultimate strengths of beams (flexure), ultimate strength of columns (short and slender), behaviour of reinforced concrete slabs. The reinforced concrete truss analogy (shear/torsion/del tailing implications). Design of typical elements of a reinforced concrete building, structural modelling, analysis of load-effects (incl.earthquakes), design criteria (for durability, fire-resistance, serviceability and strength), design calculation procedures, reinforcement detailing, structural drawings.

CIVL3206 Steel Structures 1

Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures, 3 hours of tutorials per week, 4 hours of laboratory work per semester. Assumed knowledge: CIVL2110 Materials, CIVL2201 Structural Mechanics, CIVL2230 Intro to Structural Concepts and Design. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study is concerned with the behaviour and design of steel structures. Statics provided the fundamentals of equilibrium upon which most structural engineering is based. Structural Concepts and Structural Analysis provided information on the loads (actions) on a structure and how structures resist these actions with a resulting distribution of internal actions (bending moments, shear forces, axial forces; BMDs, SFDs and AFDs). Structural Mechanics considered how these internal actions resulted in stresses and strains in members. Materials considered the microscopic and molecular structure of metals to determine its inherent mechanical properties such as yield stress.
This unit of study will then combine the knowledge of stresses, material properties of steel, structural analysis, and loading, and consider new concepts and modes of failure, such as local and flexural torsional buckling, combined actions and second-order effects to understand the behaviour of steel members and frames, and how this behaviour is accounted for in the design standard AS 4100. Both the units of study 

Structural Analysis

Credit points: 6
Session: Semester 2
Classes: 4 hours of lectures and 2 hours of tutorials per week
Assumed knowledge: CIVL2110, CIVL2230 and MATH2061
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the principles of structural analysis by introducing the strain-displacement, stress-strain and equilibrium relationships for beam members; applying the relationships to the matrix displacement analysis of frame structures; and using computer software to conduct the linear-elastic and buckling analyses of frame structures.

At the end of this unit, students will be able to deduce appropriate structural models for frame structures; and use computer methods and simple hand methods to obtain internal forces and displacements as well as buckling loads for frame structures.

The syllabus comprises theoretical background (strain-displacement, stress-strain and equilibrium relationships), structural analysis software, matrix displacement method, beam theory, introduction to nonlinear analysis, buckling analysis.

Geotechnical Engineering

Credit points: 6
Session: Semester 2
Classes: 2 hours of lectures and 2 hours of tutorials per week
Assumed knowledge: CIVL2410 Soil Mechanics
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the factors influencing soil strength, and to give practice in the application of this understanding by exploring the stability of slopes, retaining walls and foundations. At the end of this unit students will be able to:

determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches; evaluate strength parameters from laboratory data; critically analyse foundation stability and slope stability problems; use spreadsheets to perform parametric studies and produce design charts for simple geotechnical design problems; and communicate the results of experiments and analyses using written methods appropriate for professional geotechnical engineers. The syllabus comprises; methods of analysis for gravity and sheet pile retaining walls; reinforced soil; slope stability, including modes of failure, analysis and computer methods; bearing capacity of shallow foundations under general loading, and axial and lateral capacities of deep pile foundations; the mechanical behaviour of sands and clays; the Cam Clay model and the breakage model.

Fluid Mechanics

Credit points: 6
Session: Semester 1
Classes: 2 hours of lecture and 2 hours of tutorials per week, 8 hours of laboratory work per semester
Assumed knowledge: ENGG1802 Engineering Mechanics, MATH2061 - Linear Mathematics and Vector Calculus, CIVL2201 - Structural Mechanics, CIVL2611

This unit of study aims to provide an understanding of the conservation of mass and momentum in differential forms for viscous fluid flows. It provides the foundation for advanced study of turbulence, flow around immersed bodies, open channel flow, and turbo-machinery.

Ocean and Coastal Engineering

This unit of study is not available in 2012
Credit points: 6
Session: Semester 2
Classes: 4 hours of lectures and 2 hours of tutorials per week
Assumed knowledge: CIVL2611 - Fluid Mechanics
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

The objectives of this unit of study are to develop an understanding of the physics of ocean waves at any water depth and its application to the analysis and design of marine structures. This unit of study introduces the governing equations for free surface flows, including linear and nonlinear wave theories, wave transformation physics and nearshore hydrodynamics modelling. Furthermore, this unit of study includes the calculation of wave forces based on deterministic and probabilistic wave theories, wave-induced coastal currents and sediments, wind-wave-structure interactions, tides, ocean engineering operational sea state, storm surges (due to cyclones and tsunamis) and various other environmental effects. Many marine structure design applications are introduced, including jetties, harbours, breakwaters, bridge piers, dams, offshore platforms, turbines and other wind/wave energy devices. The major outcomes of this unit of study are (i) an understanding of wave physics at any water depth and the criteria for choosing the appropriate wave theory, and (ii) the ability to apply this understanding to the analysis and design of engineering marine structures. Although the unit has an analytical focus, the use of model scale, computational techniques and code of practice based design are also discussed.

Project Scope, Time and Cost Management

Credit points: 6
Session: Semester 2
Classes: 2 hours of lectures and 2 hours of tutorials per week
Assumed knowledge: CIVL2810 - Engineering Construction and Surveying
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study is a third year core course for the Bachelor of Project Engineering & Management (Civil), fourth year elective for Civil Engineering degree, elective for all other branches of engineering and faculties. The general aim of this unit of study is to offer student the opportunity to develop an understanding of the scope, time and cost management in project environments. Student will engage with some of the key concepts and various activities which underpin project scope, time and cost management. At the end of this unit, students will be able to: develop Work Breakdown Structure (WBS), network diagrams, and undertake Critical Path Analysis (CPA) and Earned Value Analysis (EVA) using the given project information; explain in depth why scope, time and cost management are important to project management; analyze a project situation that involves scope, time and cost management issues; and explain how the components of scope, time and cost management interrelate in project environments. The syllabus comprises the project planning cycle, working with the project sponsor, scope initiation and definition, project scope definition tools, WBS, network scheduling techniques, CPA, Just-In-Time philosophy, estimating and budgeting, cash flow management, EVA and application of project management software.

Project Appraisal

Credit points: 6
Session: Semester 1
Classes: 2 hours of lectures and 2 hours of tutorials per week
Assumed knowledge: MATH1005
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This UoS is a third-year core unit for students enrolled in any of the undergraduate streams in the School of Civil Engineering and elective
for all other branches of engineering and other faculties. The objectives of this unit of study are to develop students’ ability to critically analyse issues involved in project appraisal and to equip students with the concepts, tools and analytical processes to effectively carry out project appraisal tasks for businesses, non-profit organisations, and governments. At the end of this unit, students should be able to comprehend and relate to real-life examples the fundamental concepts in project appraisal (e.g. the meaning of time value for money, equivalence); calculate common financial indicators for a given project and explain the relevance of each to the appraisal of the project; rank projects by combining both financial and non-financial indicators (e.g. environmental and social); understand how risks and uncertainties affect evaluation outcomes and be able to deal with uncertainties and risks in analysis; apply techniques to account for the effects of inflation/deflation and exchange rates in analysis; understand the concept and mechanisms for depreciation and carry out pre-tax as well as post-tax analysis; understand the assumptions, pros and cons of each evaluation method and be able to explain why a particular method is appropriate/not appropriate for a given project. The syllabus comprises time value of money, cost of capital, simple/compound interest, nominal/effective interest, cost/benefit analysis of projects; equivalence, net present value (value), future worth (value), annual worth (value), internal rate of return, external rate of return, payback period, cost-benefit analysis, cost-utility analysis, identifying and quantifying non-financial benefits/externalities, price changes and exchange rates, techniques for multi-criteria group decision-making, economic analysis of business investment projects, depreciation, capitalisation and valuation studies, replacement of assets, real option, project risk analysis, decision-tree analysis, binomial method, WACC, MARR, equity capital, debt.

CIVL3813 Contracts Formulation and Management

Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 hours of tutorials per week Prerequisites: 36 Intermediate (2nd year) credit points Assumed knowledge: CIVL3805 Project Scope, Cost & Time Management Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to give students a fundamental knowledge of the legal system and contract terms under which projects are generally conducted. Emphasis will be on the principles of contract formulation, administration and finalisation, including prevention and/or settlement of disputes. At the end of this unit, students will have both legal and practical knowledge in the field of project management and contract administration, within a legal framework. The syllabus comprises brief overview of the legal system in Australia and comparison with other legal systems introduction to project delivery systems and the running of a typical project, introduction to contract law and the formation of contracts, the principles of standard form contracts as well as bespoke drafting, an understanding of the risks undertaken by the different contracting parties, a detailed review of a standard contract promoting an understanding of major project issues such as time, variations and payment; implementation and administration; potential liabilities associated with project participation; contract conditions and specifications; management of claims for variations and extensions of time; notification requirements including time bar, understanding the commercial significance of issues such as latent conditions, subcontracting, bank guarantees and security of payment legislation.

CIVL4022 Honours Thesis A

Credit points: 6 Session: Semester 1, Semester 2 Classes: Weekly contact with supervisor - typically 1 hour per week Prerequisites: 30 credit points of Senior Units of Study, ISWAM 65 or over Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Honours Thesis provides an opportunity for students to conduct original research. Students will generally work in groups, although planning and writing of the thesis will be done individually; i.e., a separate thesis must be submitted by each student. Only in exceptional circumstances and by approval of Thesis course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Honours Thesis is a major task and is to be conducted with work spread over most of the year, in two successive Units of Study of 6 credits points each. Honours Thesis A (CIVL4022) and Honours Thesis B (CIVL4023). This particular unit of study, which must precede CIVL4023 Honours Thesis B, should cover the first half the work required for a complete ‘final year’ thesis project. In particular, it should include almost all planning of a research or investigation project, a major proportion of the necessary literature review (unless the entire project is based on a literature review and critical analysis), and a significant proportion of the investigative work required of the project.

CIVL4023 Honours Thesis B

Credit points: 6 Session: Semester 1, Semester 2 Classes: Weekly contact with supervisor - typically 1 hour per week Prerequisites: 30 credit points of Senior Units of Study and successful completion of CIVL4022 - Honours Thesis A Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Honours Thesis provides an opportunity for students to conduct original research. Students will generally work in groups, although planning and writing of the thesis will be done individually; i.e., a separate thesis must be submitted by each student. Only in exceptional circumstances and by approval of Thesis course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Honours Thesis is a major task and is to be conducted with work spread over most of the year, in two successive Units of Study of 6 credits points each. Honours Thesis A (CIVL4022) and Honours Thesis B (CIVL4023). This particular unit of study, which must precede CIVL4023 Honours Thesis B, should cover the first half the work required for a complete ‘final year’ thesis project. In particular, it should include almost all planning of a research or investigation project, a major proportion of the necessary literature review (unless the entire project is based on a literature review and critical analysis), and a significant proportion of the investigative work required of the project.

CIVL4024 Engineering Project A

Credit points: 6 Session: Semester 1, Semester 2 Classes: Weekly contact with Supervisor - typically 1 hour per week Prerequisites: 30 Credit Points of Senior Units of Study Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment in the following sessions: Semester 2.

Engineering Project A & B provide an opportunity for students to undertake a major project in a specialised area relevant to civil engineering. Students will generally work in groups, although planning and writing of reports will be done individually; i.e., a separate report must be submitted by each student. Only in exceptional circumstances and by approval of Engineering Project course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Engineering Project is spread over a whole year, in two successive Units of Study of 6 credits points each, Engineering Project A (CIVL4024) and Engineering Project B (CIVL4025). This particular unit of study, which must precede CIVL4025 Engineering Project B, should cover the first half of the work required for a complete ‘final year’ thesis project. In particular, it should include almost all project planning, a major proportion of the necessary background research, and a significant proportion of the investigative or design work required of the project.

CIVL4025 Engineering Project B

Credit points: 6 Session: Semester 1, Semester 2 Classes: Meeting, Project Work - own time. Prerequisites: 30 Credit Points of Senior Units of Study and successful completion of CIVL4024 Engineering Project A Prohibitions: CIVL4022, CIVL4023 Campus: Camperdown/Darlington Mode of delivery: Supervision
Engineering Project A & B provide an opportunity for students to undertake a major project in a specialised area relevant to civil engineering. Students will generally work in groups, although planning and writing of reports will be done individually; i.e., a separate report must be submitted by each student. Only in exceptional circumstances and by approval of Engineering Project course coordinator and the relevant academic supervisor concerned will a student be permitted to undertake a project individually. Engineering Project is spread over a whole year, in two successive Units of Study of 6 credits points each, Engineering Project A (CIVL4024) and Engineering Project B (CIVL4025). This particular unit of study, which must be preceded by or be conducted concurrently with CIVL4024 Engineering Project A, should cover the second half of the work required project work. In particular, it should include completion of all components planned but not undertaken or completed in CIVL4024 Engineering Project A.

The construction topics covered in this course have not been previously addressed in CIVL2810 (Engineering Construction and Survey). The topics may vary dependent on current and planned projects in Sydney, NSW and Australia. At this stage the topics are hand rock tunnelling and general hard rock underground excavation; soft ground tunnelling; underground construction; micro tunnelling; cut and cover (cover and cut) tunnelling; earth retaining systems; piling; formwork and falsework (incl Tilt up, Ultrafloor, Sacrificial form); dewatering; pavement design and construction - rigid and flexible (incl and pavement construction materials); stormwater drainage design and construction; marine construction; civil construction in environmentally sensitive areas; contract administration for construction engineers; general engineering in remote localities (project based); construction methods in bridge engineering; OA documentation on a typical project; insurance in the construction industry occupational health and safety issues in the construction industry.

This unit of study is a fourth year core unit of study for the Bachelor of Project Engineering & Management (Civil), elective for all other branches of engineering and other faculties. The objectives of this unit are to provide underpinning knowledge and application skills in the project environment for risk, quality and human resource management including managing teams. At the end of this unit, students will be able to understand and apply the dynamics of team building and management, project leadership; and, be able to design and implement integrated plans for risk, quality and procurement management on a range of simple generic projects as well as provide input to these plans for more complex projects. The syllabus comprises team management, project leadership; modern quality management principles and techniques, quality assurance, preparation of quality plans; risk analysis, planning and risk management, as well as linking risk and quality management to procurement strategies.

Textbooks

Engineering Design and Construction
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures/project work in class per week. Assumed knowledge: CIVL2810 Engineering Construction and Survey Module of delivery: Normal (lecture/lab/tutorial) Day

The objectives of this unit are to develop an understanding of construction methods, strategies, equipment and machinery in a range of construction activities and an understanding of the principles involved in the design for those construction activities.

At the end of this unit, students will have developed a familiarity with a variety of construction methods, strategies, equipment and machinery in a range of construction activities such that they will be able, if and when the opportunity arises to participate as site engineers (or similar role) in the planning and execution of those construction activities, albeit with supervision and guidance from experienced professionals. Students will also have developed an understanding of the design principles and techniques involved in the planning for those construction activities such that they are able, if and when the opportunity arises, to participate as design engineers, in the planning and design for those construction activities, with supervision and guidance from experienced professionals. The range of topics covered in this course is such that the learning outcomes form a basis for later development of more detailed knowledge, dependent on the future career experiences of the student. The course does not prepare a student for immediate, unsupervised participation in construction and design work associated with the topics covered.

The construction topics covered in this course have not been previously addressed in CIVL2810 (Engineering Construction and Survey). The topics may vary dependent on current and planned projects in Sydney, NSW and Australia. At this stage the topics are hand rock tunnelling and general hard rock underground excavation; soft ground tunnelling; underground construction; micro tunnelling; cut and cover (cover and cut) tunnelling; earth retaining systems; piling; formwork and falsework (incl Tilt up, Ultrafloor, Sacrificial form); dewatering; pavement design and construction - rigid and flexible (incl and pavement construction materials); stormwater drainage design and construction; marine construction; civil construction in environmentally sensitive areas; contract administration for construction engineers; general engineering in remote localities (project based); construction methods in bridge engineering; OA documentation on a typical project; insurance in the construction industry occupational health and safety issues in the construction industry.

This unit of study is a fourth year core unit of study for the Bachelor of Project Engineering and Management (Civil), elective for all other branches of engineering and other faculties. The general aim of this unit is to offer student the opportunity to develop an understanding of the procurement of built facilities and the methods of job allocation in project environments. Student will engage with some of the key concepts which underpin job allocations in the construction industry. At the end of this unit of study, students should be able to: evaluate a client's procurement situation and apply an appropriate procurement route; explain how and why a particular procurement route is chosen; undertake procurement assessment exercises; analyze a contractor's strategic responses in tendering (bidding) decision-making; discuss why a particular bidding strategy is chosen in different contexts; and evaluate a contractor's bidding performance using competitor analysis techniques. The syllabus comprises fundamentals of building procurement, assessment of procurement risks, international contracting, competitive bidding, cost estimating, the competitive environment in the construction industry, contractors' competitive positioning, contractors' decision-making in bidding competition, bidding strategies and competitor analysis.

Project Formulation
Credit points: 6 Session: Semester 1 Classes: 4 hours of lectures/tutorials per week. Prerequisites: CIVL3805 Project Scope, Time and Cost Management, CIVL3812 Project Appraisal Module of delivery: Normal (lecture/lab/tutorial) Day

This unit of study is a fourth-year core unit for PEM students and an elective for all other branches of engineering and other faculties. The assumed knowledge for this Unit includes Project Appraisal (CIVL3812) and Project Scope, Time and Cost Management (CIVL3805). The objective of this unit is, through the integration of areas of project management knowledge learned in various PEM subjects, to develop students' ability to develop project proposals through carrying out a feasibility study and developing a project plan for a real-life engineering project. This unit is relevant for students who intend to pursue a career related to project management. At the end of this unit, students should have developed understanding of the fundamentals of project conceptualisation, appraisal and planning plus the abilities to: model and analyse basic financing and cash flow requirements; develop risk management plan, marketing and sales plan, stakeholder management and communication plan, operations plan; and design professional documentation and presentation to a board of review. In addition, this unit also develops students' abilities in problem solving, working with other students, conducting independent research, communication in team environment, information need identification and collection, and understanding social and environmental issues. The syllabus comprises feasibility study, project appraisal, risk assessment and
management, sensitivity analysis, project planning, project integration management, carbon-trading scheme, global warming, environmental impact assessment, investment capital, venture capital, due diligence, project planning, operational planning, revenue projection, community consultation, communication management, stakeholder management, political environment.

**CIVL4903 Civil Engineering Design**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 1 hour of lectures and 3 hours of tutorial per week.  
**Assumed knowledge:** CIVL3205 Concrete Structures 1 and CIVL3206 Steel Structures 1.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This is a fourth year core unit of study for the degree in Civil Engineering and fourth year elective for the degree in Project Engineering and Management (Civil).

The objective of this unit is to give students an appreciation of the role of the designer in the development of Civil Engineering projects.

At the end of this unit, students will have developed an understanding of the design philosophy. They will gain this through their involvement in a number of exercises which cover the design sequence from concept to documentation.

The syllabus comprises: design sequence including definition, value and criteria selection; generation of proposals; analysis of proposals; selection of design; development of details of a particular design selected; feasibility studies and examination of existing works; study of design projects by stages, including details of some aspects.

This unit is under the direction of an engineer in professional practice in cooperation with members of the academic staff. Lectures and exercises on architectural design and practice and their relationship to civil engineering are included in the unit.

**Textbooks**

Reference books:

- The unit is of a wide-ranging nature, and all text and reference books previous and current courses have relevance. In addition, reference will be made to many codes and guides to practice, of which the following list covers only the structural field.

  - Current SAA Codes, Manuals and Specifications, particularly
  - AS4100 - Steel Structures Code
  - AS3600 - Concrete Structures Code
  - AS1554 - Manual Welding, Part I
  - AS1170 - Loading Code, Parts I and II
  - AS1511 - High Strength Structural Bolting Code
  - MAI Steel Structures: Austroads Bridge Design Specification
  - AS1720 - Timber Engineering Code

(Purchase of separate codes is recommended)

**School of Electrical and Information Engineering**

**ELEC1103 Fundamentals of Elec and Electronic Eng**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures, 3 hours of laboratory, 2 hours tutorial.  
**Assumed knowledge:** HSC Physics, HSC Mathematics extension 1 or 2.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to develop knowledge of the fundamental concepts and building blocks of electrical and electronics circuits. This is a foundation unit in circuit theory. Circuit theory is the electrical engineer's fundamental tool.

The concepts learnt in this unit will be made use of heavily in many units of study (in later years) in the areas of electronics, instrumentation, electrical machines, power systems, communication systems, and signal processing.

Topics: a) Basic electrical and electronic circuit concepts: Circuits, circuit elements, circuit laws, node and mesh analysis, circuit theorems, energy storage, capacitors and inductors, circuits with switches, transient response, sine waves and complex analysis, phasors, impedance, ac power.; b) Project management, teamwork, ethics; c) Safety issues

**ELEC1601 Foundations of Computer Systems**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures, 1 hour of tutorial, 1 hour project work and 2 hours of laboratory per week.  
**Assumed knowledge:** HSC Mathematics extension 1 or 2.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study introduces the fundamental digital concepts upon which the design and operation of modern digital computers are based. A prime aim of the unit is to develop a professional view of, and a capacity for inquiry into, the field of computing.

The unit covers the fundamental digital concepts upon which the design and operation of modern digital computers are based. Topics covered include: data representation, basic computer organisation, the CPU, elementary gates and logic, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks.

**ELEC2004 Electrical Engineering: Foundations**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures, 1 hour of tutorial, 1 hour of laboratory and 1 hour of E-Learning per week.  
**Prohibitions:** ELEC1103, ELEC1104  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

1. Introduction to Electric Circuits: current and voltage, power, Kirchhoff's Laws, sources and resistors, Ohm's Law, series and parallel connections, voltage and current dividers, equivalent circuits. Inductors and capacitors, RC circuits, RL circuits, introduction to RLC circuits.
2. Electric Power Systems: sinusoidal signals, effective (rms) value of sinusoids, power in ac circuits, transformer principles and ideal transformers, balanced 3-phase circuits. Electromechanical machine types, DC machines, introduction to ac and induction machines.

**ELEC2103 Simulation & Numerical Solutions in Eng**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 1 hour lecture, 3 hours of laboratory per week.  
**Prohibitions:** COSC1001, COSC1901  
**Assumed knowledge:** ELEC1103 Fundamentals of Electrical and Electronic Engineering  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Objectives:**

* How to apply the software package Matlab to achieve engineering solutions
* Critical assessment of various computer numerical techniques
* Professional project management, teamwork, ethics

This unit assumes an understanding of various topics in electrical and electronic circuits. This unit is an introduction to the fundamental concepts and building blocks of electrical and electronics circuits. As well as covering the specific topics described in the following paragraphs, this unit aims to develop skills in professional project management and teamwork and promote an understanding of ethics.


Matlab based numerical solutions applicable to numerical optimization, ordinary differential equations, and data fitting. Introduction to symbolic mathematics in Matlab. Applications, including the derivation of network functions for simple problems in circuit analysis. Introduction to the use of Simulink for system modelling and simulation.
### ELEC2104
#### Electronic Devices and Circuits
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures per week, 2 hours of tutorial and 2 hours lab per fortnight.  
**Assumed knowledge:** ELEC1102 Foundations of Electronic Circuits or ELEC1103 Professional Electronic Engineering.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Modern electronics has come to be known as microelectronics which refers to the Integrated Circuits (ICs) containing millions of discrete devices. This course introduces some of the basic electronic devices like diodes and different types of transistors. It also aims to introduce students the analysis and design techniques of circuits involving these discrete devices as well as the integrated circuits.  

Completion of this course is essential to specialize in Electrical, Telecommunication or Computer Engineering stream. The knowledge of ELEC1103 is assumed.

### ELEC2302
#### Signals and Systems
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 2 hours lab/tutorial per week.  
**Prohibitions:** ELEC2301, MATH3019, MATH3191  
**Assumed knowledge:** MATH1001 Differential Calculus and MATH1002 Linear Algebra and MATH1003 Integral Calculus and Modelling.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to teach some of the basic properties of many engineering signals and systems and the necessary mathematical tools that aid in this process. The particular emphasis is on the time and frequency domain modeling of linear time invariant systems. The concepts learnt in this unit will be heavily used in many units of study (in later years) in the areas of communication, control, power systems and signal processing. A basic knowledge of differentiation and integration, differential equations, and linear algebra is assumed.

### ELEC2602
#### Digital System Design
**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures per week and 3 hours labs/tutorials per week.  
**Prohibitions:** ELEC3601, ELEC3608  
**Assumed knowledge:** ELEC1103  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The purpose of this unit is to equip the students with the skills to design simple digital logic circuits which comprise modules of larger digital systems. The following topics are covered: logic operations, theorems and Boolean algebra, number operations (binary, hex, integer and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, and the design of a simple computer.

### ELEC3104
#### Engineering Electromagnetics
**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prohibitions:** ELEC3102  
**Assumed knowledge:** ELEC3102  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit introduces students to the broad spectrum of engineering electromagnetics and helps students to develop theoretical and analytical skills in the area of electrical and telecommunications engineering and develop understanding of the basic electromagnetic theory underpinning optical communications, wireless communications and electrical engineering.

### ELEC3203
#### Electricity Networks
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures, 3 hours of lab and 1 hour tutorial per week.  
**Prohibitions:** ELEC3201  
**Assumed knowledge:** This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an introduction to electrical power engineering and lays the groundwork for more specialised units. It assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in elements of introductory physics. A revision will be carried out of the use of phasors in steady state ac circuit analysis and of power factor and complex power. The unit comprises an overview of modern electric power system with particular emphasis on generation and transmission. The following specific topics are covered. The use of three phase systems and their analysis under balanced and unbalanced conditions. Transmission lines: calculation of parameters, modelling, analysis, Transformers; construction, equivalent circuits. Generators: construction, modelling for steady state operation. Cables: types and modelling for steady state operation. Types of electricity grids, radial, mesh, networks. The use of per unit system. The analysis of systems with a number of voltage levels. The control of active and reactive power. The load flow problem: bus and impedance matrices, solution methods.

### ELEC3204
#### Power Electronics and Applications
**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures, 2 hours tutorial and 3 hours lab per week.  
**Prerequisites:** ELEC2104  
**Prohibitions:** ELEC3202  
**Assumed knowledge:** Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, junction generator, power supply, etc.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to teach the fundamentals of advanced energy conversion systems based on power electronics. It provides description of the operation principles and control of these blocks. Through analysis and design methodologies, it delivers an in depth understanding of modern enabling technologies associated with energy conversion. Through laboratory hands-on experience on various industrial systems, such as electric motor drives, robotic arms, and power supplies, it enhances the link between the theory and the "real" engineering world. The unit clarifies unambiguously the role these imperative technologies play in every human activity; from mobile telephone chargers to energy electricity grids; from electric vehicles and industrial automation to wind energy conversion to name just few. The following topics are covered: Introduction to power electronic converters and systems; applications of power electronic converters; power semiconductor devices; uncontrolled rectifiers: single- and three-phase; non-isolated dc-dc converters: buck, boost and buck-boost; isolated dc-dc converters; inverters: single- and three-phase; uninterruptible power supplies; battery chargers and renewable energy systems; electric and hybrid electric vehicles technologies, design of converters and systems.

### ELEC3206
#### Electrical Energy Conversion Systems
**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures per week, 2 hours tutorial per fortnight and 3 hours lab per fortnight.  
**Prohibitions:** ELEC2104  
**Assumed knowledge:** Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study aims to give students a good understanding of electrical energy conversion techniques and equipment. Students who successfully complete this unit will 1) have a broad view of electrical energy conversion systems including transformers, DC machines, induction machines and synchronous machines; 2) be able to analyze and solve problems in transformers and electric machines; 3) have gained confidence in their ability to undertake more advanced study in the power area. The following specific topics are covered: magnetic circuits, inductance, sinusoidal excitation, hysteresis and eddy current loss, permanent magnets, electromechanical energy conversion, singly-excited and doubly-excited systems, transformers, single-phase, equivalent circuit parameters, three-phase transformers,
This unit of study aims to teach students analysis and design techniques for electronic systems such as signal amplifiers, differential amplifiers and power amplifiers. Completion of this unit will allow progression to advanced studies or to work in electronics and telecommunication engineering. Topics covered are as follows. The BJT as an amplifier. Biasing in BJT amplifier circuits. Small signal operation and models. Single stage BJT amplifiers. BJT internal capacitances and high frequency models. The frequency response of the common-emitter amplifier. BJT current sources and current mirrors. Differential amplifiers. Output stages and power amplifiers: class A, class B and class AB.

**ELEC3405 Communications Electronics and Photonics**

Credit points: 6  Session: Semester 2  Classes: 2 hours of lectures and a 3 hours lab/tutorial per week.  Prohibitions: ELEC3402  Assumed knowledge: ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits.

This unit of study provides an introduction to the fundamental operation and design of transmitter and receiver subsystems for two broad classes of communications systems: those based on electronic transmission and those based on optical transmission.

In the area of electronic communication subsystems, the course presents transmitter and receiver design. Topics relating to the transmitter comprise electronic oscillator sources, tuned electronic amplifiers, and modulators. Topics relating to receiver design comprise RF and IF frequency selective amplifiers, mixers, demodulators, phase-lock loops, feedback amplifiers, and high frequency, RF and microwave communication amplifiers. In the area of optical communication subsystems, the course presents photonic transmitters and receivers. On the transmitter side this focuses on the principles of light generation in optical sources such as semiconductor lasers and light emitting diodes, electro-optic modulation of light, and optical amplifiers. On the receiver side, photodetectors, optical receivers, and front-end circuits are discussed. The principles and design of these subsystems are considered with reference to a basic optoelectronic communication link.

**Units of study**

This unit of study aims to teach students analysis and design techniques for electronic systems such as signal amplifiers, differential amplifiers and power amplifiers. Completion of this unit will allow progression to advanced studies or to work in electronics and telecommunication engineering. Topics covered are as follows. The BJT as an amplifier. Biasing in BJT amplifier circuits. Small signal operation and models. Single stage BJT amplifiers. BJT internal capacitances and high frequency models. The frequency response of the common-emitter amplifier. BJT current sources and current mirrors. Differential amplifiers. Output stages and power amplifiers: class A, class B and class AB.
theory: fundamental limits in communications, channel capacity and channel coding, signal compression.

**ELEC3506**
Data Communications and the Internet

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 2 hours tutorials per week.  
**Prohibitions:** ELEC2150, ELEC2208

This unit explores the design of a computer system at the digital logic level. Topics covered include instruction set computer arithmetic, performance evaluation, data path design, pipelining, memory hierarchies including caches and virtual memory, I/O devices, and bus-based I/O systems. Students will design a pipelined reduced instruction set processor.

**Prerequisites:** ELEC1601 and ELEC2902

**Assumed knowledge:** Basic knowledge of digital logic is required.

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**ELEC3607**
Embedded Systems

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 1 hour of lectures and 3 hours of laboratory per week.  
**Prohibitions:** ELEC2607

This unit examines the essential pre-production stages of designing successful internet websites and services. It focuses on the aspects of analysis, project specification, design, and prototype that lead up to the actual build of a website or application. Topics include, B2C, B2B and B2E systems, business models, methodologies, modeling with use cases / UML and WebML, the Project Proposal and Project Specification Document, Information Architecture and User-Centred Design, legal issues, and standards-based web development. Students build a simple use-case based e-business website prototype with web standards. A final presentation of the analysis, design and prototype are presented in a role play environment where students try to win funding from a venture capitalist.

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**ELEC3609**
Internet Software Platforms

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours lecture and 2 hours tutorials per week.  
**Prohibitions:** INF01103, INF02110, INF02120

This unit will focus on the design, the architecture and the development of web applications using technologies currently popular in the marketplace including Java and .NET environments. There are three key themes examined in the unit: Presentation layer, Persistence layer, and Interoperability. The unit will examine practical technologies such as JSP and Servlets, the model-view-controller (MVC) architecture, database programming with ADO.NET and JDBC, advanced persistence using ORM, XML for interoperability, and XML-based SOAP services and Ajax, in support of the theoretical themes identified.

On completion the students should be able to:
- Compare Java/J2EE web application development with Microsoft .NET web application development.
- Exposure to relevant developer tools (e.g. Eclipse and VS.NET)
- Be able to develop a real application on one of those environments.
- Use XML to implement simple web services and AJAX applications.

**ELEC3610**
E-Business Analysis and Design

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours project work in class and 1hr tutorials per week.  
**Prohibitions:** ELEC3801

This unit examines the essential pre-production stages of designing successful internet websites and services. It focuses on the aspects of analysis, project specification, design, and prototype that lead up to the actual build of a website or application. Topics include, B2C, B2B and B2E systems, business models, methodologies, modeling with use cases / UML and WebML, the Project Proposal and Project Specification Document, Information Architecture and User-Centred Design, legal issues, and standards-based web development. Students build a simple use-case based e-business website prototype with web standards. A final presentation of the analysis, design and prototype are presented in a role play environment where students try to win funding from a venture capitalist.

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**ELEC3702**
Management for Engineers

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 1 hour of lectures, 2 hours of tutorials per week.  
**Prohibitions:** ELEC3701, ENGG3005, MECH3661

This unit aims to develop an understanding of the principles and practices of industry, to provide an overview of the various issues facing an industrial organisation, and of the basic approaches to their management, to understand the changing nature and effects of globalisation on Australia's economic performance, the competitiveness of Australian firms, and the generation of employment and wealth, to gain an insight into the importance of innovation at all levels and functions of all organisations, and of the ways of developing people-skills and organisational styles to promote innovation, to develop the broader skills required by employers of engineers, and to understand the objectives and roles appropriate to governments.

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**ELEC3802**
Fundamentals of Biomedical Engineering

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of lab/tutorial per week.  
**Prohibitions:** INF02120

This unit assumes a knowledge of basic principles in physics, mathematics, circuit theory and electronics. In particular, some understanding of the following is required: Thevenin and Norton's theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanism of operation of transistors.  

**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit assumes a knowledge of basic principles in physics, mathematics, circuit theory and electronics. In particular, some understanding of the following is required: Thevenin and Norton's theorems, basic circuit theory involving linear resistors, capacitors and inductors, a basic knowledge of bipolar and field effect transistor theory, simplified theoretical mechanism of operation of transistors.
This unit is descriptive and does not require detailed knowledge of electronics or mathematics, but does require an understanding of some key aspects of mathematical and electronic theory. The unit concentrates on some of the practical applications of biomedical engineering to patient diagnosis and treatment.

ELEC3803
Bioelectronics
Credit points: 6 Session: Semester 2 Classes: 2hr lectures per week, 2hrs tutorials/labs per week. Prerequisites: ELEC2104 AND ELEC2602 Assumed knowledge: Familiarity with transistor operations, basic electrical circuits, embedded programming is required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit will cover recent advances in bioelectronics circuits and systems including electronic medical devices, implanted devices, lab on a chip devices, biomedical signal processing and neuromorphic engineering. Regulatory aspects of bioelectronic system design will be addressed including the IEC standards and TGA approval processes. The unit will have a strong practical design focus with laboratories focused on dealing with real life bioelectronic signals and subject-device interfaces. Industry, clinical and research guest lecturers will introduce current topics and design needs.

ELEC3901
Electrical Exchange Unit 1A
Credit points: 6 Session: Semester 1 Classes: A workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit.

ELEC3902
Electrical Exchange Unit 1B
Credit points: 12 Session: Semester 1 Classes: A workload that is equivalent to one half of that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit.

ELEC3903
Electrical Exchange Unit 1C
Credit points: 24 Session: Semester 1 Classes: A workload that is equivalent to that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit.

Thus the marks obtained at the exchange university will not be included in any WAM calculations.

ELEC3904
Electrical Exchange Unit 2A
Credit points: 6 Session: Semester 2 Classes: A workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit. Thus the marks obtained at the exchange university will not be included in any WAM calculations.

ELEC3905
Electrical Exchange Unit 2B
Credit points: 12 Session: Semester 2 Classes: A workload that is equivalent to one half of that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit. Thus the marks obtained at the exchange university will not be included in any WAM calculations.

ELEC3906
Electrical Exchange Unit 2C
Credit points: 24 Session: Semester 2 Classes: A workload that is equivalent to that of a (normal) full time student at the exchange university. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This is a unit of study for the University of Sydney students who have gone on exchange and are doing unit(s) with a syllabus that is equivalent to unit(s) of study in the School of Electrical & Information Engineering. The enrollment in this unit needs to be approved by the school. The enrollment in this unit will be granted for a workload that is equivalent to one quarter of that of a (normal) full time student at the exchange university. Assessment is set by the exchange university. A Pass/Fail grade is awarded by the University of Sydney in this unit. Thus the marks obtained at the exchange university will not be included in any WAM calculations.

ELEC4505
Digital Communication Systems
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 2 hours lab/tutorial per week. Prohibitions: ELEC4502 Assumed knowledge: ELEC3505 Communications Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

ELEC4702
Practical Experience

Session: Semester 1, Semester 2 Classes: Not applicable. Prerequisites: 24 credit points of Year 3 units of study. Campus: Camperdown/Darlington Mode of delivery: Professional Practice

The Bachelor of Engineering degree requires students to obtain industrial work experience of twelve weeks (50 working days) duration towards satisfying the requirements for award of the degree. Students may undertake their work experience after completion of a minimum of 24 credit points of Year 3 units of study when they have built up a sufficient background of engineering. In general, the type of job that is acceptable for work experience should be in an engineering environment but not necessarily in the same discipline of the degree the student is pursuing. The student is required to inform the School of any work arrangements made by email.

Assessment in this unit is by the submission of a written report of about 4-6 pages on the industrial experience undertaken. The report is to describe the overall structure of the company, the areas that the student became familiar with and their relationship to the firm and, finally, what the student did. A certificate from the company stating the period of employment and the type of work you have undertaken should be attached to your report. The student should inform the company that a short report on the work experience is to be submitted to the School.

The report is to be submitted to the School electronically (see details on the course website). There is no deadline for submission of the report but it is a good practice to submit it in the first two weeks after the new semester started.

ELEC4706
Project Management

Credit points: 6 Session: Semester 1 Classes: 1 hour of lectures per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit of study aims to develop an understanding of the principles and practices of project management and engineering design industry, to provide an overview of the various issues facing an industrial organisation, and of the basic approaches to their project management.


ELEC4710
Engineering Project A

Credit points: 6 Session: Semester 1, Semester 2 Classes: There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. Prerequisites: 36 credit points of units of study from level 3 and above. Prohibitions: ELEC4703, ELEC4705, ELEC4707 Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment in the following sessions: Semester 2.

Students will work individually or in groups on an assigned project for the Semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

ELEC4711
Engineering Project B

Credit points: 6 Session: Semester 1, Semester 2 Classes: There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. Prerequisites: 36 credit points of units of study from level 3 and above Corequisites: ELEC4710 Engineering Project A Prohibitions: ELEC4703, ELEC4705, ELEC4707 Assumed knowledge: 36 credit points of units of study from level 3 and above Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

In Engineering Project B, the students are required to complete the remaining aspects of the project, present their results to their peers and academic staff in a seminar format, and prepare and submit a detailed Treatise.

The final grade is based on the work done in both Engineering Project A and B, and will be awarded upon successful completion of Engineering Project B.

ELEC4712
Honours Thesis A

Credit points: 6 Session: Semester 1, Semester 2 Classes: There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. Prerequisites: 36 credit points of units of study from level 3 and above Corequisites: ELEC4713 Prohibitions: ELEC4703, ELEC4705, ELEC4707 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Students will work individually or in groups on an assigned project for the semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

ELEC4713
Honours Thesis B

Credit points: 6 Session: Semester 1, Semester 2 Classes: There are no lectures for this unit. However, the students are expected to spend at least one full day per week undertaking background research work, organizing their plan of work and preparing their experimental or developmental program. Prerequisites: 36 credit points of units of study from level 3 and above Corequisites: ELEC4712 Prohibitions: ELEC4707, ELEC4711 Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Students will work individually or in groups on an assigned project for the Semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

School of Information Technologies

COMP2007
Algorithms and Complexity

Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 2hrs) per week Prohibitions: COMP2007, COMP3309, COMP9609, COMP3111, COMP3811 Assumed knowledge: INFO1105, MATH1004 or MATH1904 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit provides an introduction to the design and analysis of algorithms. The main aims are (i) to learn how to develop
solutions to computational problem and (ii) to develop understanding of algorithm efficiency and the notion of computational hardness.

COMP2121
Distributed Systems & Network Principles
Credit points: 6 Session: Semester 2 Classes: Lecture 2 hrs per week, Tutorial 2 hrs per week. Prerequisites: (INFO1103 or INFO1903) AND (INFO1105 or INFO1905) Corequisites: COMP2007 OR COMP2907
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The unit will provide a broad introduction to the principles of distributed systems and their design; provide students the fundamental knowledge required to analyse and construct various types of distributed systems; explain the common architectural principles and approaches used in the design of networks at different scales (e.g., shared medium access and routing); introduce the programming skills required for developing distributed applications, and will cover the use of Java class libraries and APIs; cover common approaches and techniques in distributed resource management (e.g., task scheduling).

COMP2129
Operating Systems and Machine Principles
Credit points: 6 Session: Semester 1 Classes: Lecture 2 hours per week, Laboratory 2 hours per week. Prerequisites: SOFT2130, SOFT2930, SOFT2004, SOFT2904, COMP2004, COMP2904 Assumed knowledge: Programming from INFO1103, INFO1105 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
In this unit of study elementary methods for developing robust, efficient and re-useable software will be covered. The unit is taught in C, in a Unix environment. Specific coding topics include memory management, the pragmatic aspects of implementing data structures such as lists and hash tables and managing concurrent threads. Debugging tools and techniques are discussed and common programming errors are considered along with defensive programming techniques to avoid such errors. Emphasis is placed on using common Unix tools to manage aspects of the software construction process, such as version control and regression testing. The subject is taught from a practical viewpoint and it includes a considerable amount of programming practice, using existing tools as building blocks to complete a large-scale task.

COMP2555
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment
This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

COMP2556
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment
This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

COMP2557
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment
This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

COMP2558
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment
This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

COMP2907
Algorithms and Complexity (Advanced)
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Pract 2hrs) per week Prerequisites: Distinction level result in INFO1105 or INFO1905 or SOFT1102 or SOFT1902 Assumed knowledge: INFO1905, MATH1904 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
An advanced alternative to COMP2007; covers material at an advanced and challenging level. This unit provides an introduction to the design and analysis of algorithms. The main aims are (i) to learn how to develop algorithmic solutions to computational problem and (ii) to develop understanding of algorithm efficiency and the notion of computational hardness.

COMP3109
Programming Languages and Paradigms
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Tutorial 1hrs) per week Assumed knowledge: COMP2007 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit provides an introduction to the foundations of programming languages and their implementation. The main aims are to teach what are: grammars, parsers, semantics, programming paradigms and implementation of programming languages.

COMP3308
Introduction to Artificial Intelligence
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Tut 1hr) per week Prerequisites: COMP3608, COMP3002, COMP3902 Assumed knowledge: COMP2007 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Artificial Intelligence (AI) is all about programming computers to perform tasks normally associated with intelligent behaviour. Classical AI programs have played games, proved theorems, discovered patterns in data, planned complex assembly sequences and so on. This unit of study will introduce representations, techniques and architectures used to build intelligent systems. It will explore selected topics such as heuristic search, game playing, machine learning, and knowledge representation. Students who complete it will have an understanding of some of the fundamental methods and algorithms of AI, and an appreciation of how they can be applied to interesting problems. The unit will involve a practical component in which some simple problems are solved using AI techniques.

COMP3419
Graphics and Multimedia
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Pract 2hrs) per week Prerequisites: MULT3306, MULT3606, MULT3019, MULT3919, MULT3004, MULT3904, COMP3004, COMP3904 Assumed knowledge: COMP2007, MATH1902 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit provides a broad introduction to the field of graphics and multimedia to meet the diverse requirements of application areas such as entertainment, industrial design, virtual reality, intelligent media management, medical imaging and remote sensing. It covers both the underpinning theories and the practices of computing and manipulating digital media including graphics / image, audio, animation, and video. Emphasis is placed on principles and cutting-edge techniques for multimedia data processing, content analysis, media retouching, media coding and compression.

COMP3456
Computational Methods for Life Sciences
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Pract 2hrs) per week Prerequisites: INFO1105 and (COMP2007 or INFO2125) and 6 credit points from BIOL or MBLG Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit introduces the algorithmic principles driving advances in the life sciences. It discusses biological and algorithmic ideas together,
linking issues in computer science and biology and thus is suitable for students in both disciplines. Students will learn algorithm design and analysis techniques to solve practical problems in biology.

COMP3520  
Operating Systems Internals  
Credit points: 6  
Session: Semester 1  
Classes: (Lec 2hrs & Prac 2hrs) per week  
Prohibitions: NETS3304, NETS3604, NETS3909, COMP3009, COMP3909  
Assumed knowledge: COMP2129, INFO1105  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

This unit will provide a comprehensive discussion of relevant OS issues and principles and describe how those principles are put into practice in real operating systems. The contents include internal structure of OS; several ways each major aspect (process scheduling, inter-process communication, memory management, device management, file systems) can be implemented; the performance impact of design choices; case studies of common OS (Linux, MS Windows NT, etc.).

COMP3556  
Computer Science Exchange  
Credit points: 6  
Session: Semester 1  
Classes: (Lec & Prac 1hrs) per week  
Prohibitions: NETS3304, NETS3604, NETS3909, COMP3009, COMP3909  
Assumed knowledge: COMP2129, INFO1105  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP3557  
Computer Science Exchange  
Credit points: 6  
Session: Semester 1  
Classes: (Lec & Prac 2hrs) per week  
Prohibitions: NETS3304, NETS3604, NETS3909, COMP3009, COMP3909  
Assumed knowledge: COMP2129, INFO1105  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP3558  
Computer Science Exchange  
Credit points: 6  
Session: Semester 1  
Classes: (Lec & Prac 2hrs) per week  
Prohibitions: NETS3304, NETS3604, NETS3909, COMP3009, COMP3909  
Assumed knowledge: COMP2129, INFO1105  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP3559  
Computer Science Exchange  
Credit points: 6  
Session: Semester 1  
Classes: (Lec & Prac 2hrs) per week  
Prohibitions: NETS3304, NETS3604, NETS3909, COMP3009, COMP3909  
Assumed knowledge: COMP2129, INFO1105  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP3608  
Intro. to Artificial Intelligence (Adv)  
Credit points: 6  
Session: Semester 1  
Classes: (Lec 2hrs & Prac 1hrs) per week  
Prohibitions: Distinction-level results in some 2nd year COMP or MATH or SOFT units. COMP3308, COMP3002, COMP3902  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

An advanced alternative to COMP3308; covers material at an advanced and challenging level.

COMP3615  
Software Development Project  
Credit points: 6  
Session: Semester 2  
Classes: Meeting with academic supervisor 1hr & Class meeting 1hr per week  
Prohibitions: COMP3002, COMP3902  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

The unit will teach some powerful ideas that are central to quality software: data abstraction and recursion. It will also show how one can analyse the scalability of algorithms using mathematical tools of asymptotic notation. Contents include: both external "interface" view, and internal "implementation" details, for commonly used data

INFO1003  
Foundations of Information Technology  
Credit points: 6  
Session: Semester 1, Semester 2  
Classes: (Lec 2hrs & Prac 2hrs) per week  
Prohibitions: INFO1000 or INFS1000  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

Information technologies (IT) and systems have emerged as the primary platform to support communication, collaboration, research, decision making, and problem solving in contemporary organisations. The essential necessity for all university students to acquire the fundamental knowledge and skills for applying IT effectively for a wide range of tasks is widely recognised. Foundations of Information Technology (INFO1003) is an introductory unit of study which prepares students from any academic discipline to develop the necessary knowledge, skills and abilities to be competent in the use of information technology for solving a variety of problems. The main focus of this unit is on modelling and problem solving through the effective use of using IT. Students will learn how to navigate independently to solve their problems on their own, and to be capable of fully applying the power of IT tools in the service of their goals in their own domains while not losing sight of the fundamental concepts of computing. Students are taught core skills related to general purpose computing involving a range of software tools such as spreadsheets, database management systems, internet search engine, HTML, and JavaScript. Students will undertake practical tasks including authoring an interactive website using HTML, JavaScript and AJAX and building a small scale application for managing information. In addition, the course will address the many social, ethical, and intellectual property issues arising from the wide-spread use of information technology in our society.

INFO1105  
Data Structures  
Credit points: 6  
Session: Semester 1, Semester 2  
Classes: (Lec 1hr & Lab 2hrs) per week  
Prohibitions: SOFT1101, SOFT1901, COM1901, COMP1902, DECO2011  
Assumed knowledge: COMP2111, COMP2001, COMP2002, COMP2902  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  

Programming in a legible, maintainable, reusable way is essential to solve complex problems in the pervasive computing environments. This unit will equip students with foundation of programming concepts that are common to widely used programming languages. The "fundamentals-first & objects-later" strategy is used to progressively guide this introductory unit from necessary and important building blocks of programming to the object-oriented approach. Java, one of the most popular programming languages, is used in this unit. It provides interdisciplinary approaches, applications and examples to support students from broad backgrounds such as science, engineering, and mathematics.
This unit of study is specially designed for students in their first year of study who is an academic high achiever, as well as talented in IT areas of study. In this unit, students will be involved in advanced projects, which may be research-oriented, in which students apply problem solving and IT skills.

INFO2110
Systems Analysis and Modelling
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 2hrs) per week
Prohibitions: INFO2810, INFO2900, INFO2990
Assumed knowledge: Experience with a data model as in INFO1003 or INFO1103 or INFO1100
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit provides a comprehensive introduction to the analysis of complex systems. Key topics are the determination and expression of system requirements (both functional and non-functional), and the representation of structural and behavioural models of the system in UML notations. Students will be expected to evaluate requirements documents and models as well as producing them. This unit covers essential topics from the ACM/IEEE SE2004 curriculum, especially from MAA Software Modelling and Analysis.

INFO2120
Database Systems 1
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Prac 2hrs) per week
Prohibitions: INFO2820, INFO2905, INFO2995
Assumed knowledge: Some exposure to programming and some familiarity with data model concepts such as taught in INFO1103 or INFO1003 or INFO1500 or INFO1903
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The proper management of data is essential for all data-centric applications and for effective decision making within organizations. This unit of study will introduce the basic concepts of database designs at the conceptual, logical and physical levels. Particular emphasis will be placed on introducing integrity constraints and the concept of data normalization which prevents data from being corrupted or duplicated in different parts of the database. This in turn helps in the data remaining consistent during its lifetime. Once a database design is in place, the emphasis shifts towards querying the data in order to extract useful information. The unit will introduce different query languages with a particular emphasis on SQL, which is industry standard. Other topics covered will include the important concept of transaction management, application development with a backend database, an overview of data warehousing and online analytic processing, and the use of XML as a data integration language.

INFO2315
Introduction to IT Security
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 1hr) per week
Prohibitions: NETS3305, NETS3405, NETS3505, NETS3916, ELEC3610, ELEC3616
Assumed knowledge: Computer literacy
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit provides a broad introduction to the field of IT security. We examine secure and insecure programs, secure and insecure information, secure and insecure computers, and secure and insecure network infrastructure. Key content includes the main threats to security; how to analyse risks; the role in reducing risk that can be played by technical tools (such as encryption, signatures, access control, firewalls, etc); the limitations of technical defences; and the simple process and behavioural changes that can reduce risk.

INFO2551
Information Technology Exchange
Credit points: 6 Session: Semester 1, Semester 2 Classes: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.
INFO2552
Information Technology Exchange
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

INFO2820
Database Systems 1 (Advanced)
Credit points: 6 Session: Semester 1 Classes: (Lec 3hrs & Prac 2hrs) per week Prerequisites: Distinction-level result in INFO1003 or INFO1103 or INFO1903 or INFO1105 or INFO1905 Prohibitions: INFO2120, INFO2005, INFO2905 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The proper management of data is essential for all data-centric applications and for effective decision making within organizations. This unit of study is an advanced alternative to INFO2120 that will introduce the basic concepts of database designs at the conceptual, logical and physical levels. Particular emphasis will be placed on introducing integrity constraints and the concept of data normalization which prevents data from being corrupted or duplicated in different parts of the database. This in turn helps in the data remaining consistent during its lifetime. Once a database design is in place, the emphasis shifts towards querying the data in order to extract useful information. The unit will introduce different query languages with a particular emphasis on SQL and, in INFO2820, deductive databases and DATALOG, which are all industry standard. Other topics covered will include the important concept of transaction management, application development with a backend database, an overview of data warehousing and OLAP, and the use of XML as a data integration language.

INFO2911
IT Special Project 2A
Credit points: 6 Session: Semester 1 Classes: Meeting 1 hour per week, project work 8 hours per week. Prerequisites: Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Departmental permission required.
This unit of study enables talented students to apply their IT knowledge from their first year study to more advanced and exciting projects. In this unit, students will be provided with the opportunity to be involved in projects that will greatly research focus.

INFO2912
IT Special Project 2B
Credit points: 6 Session: Semester 2 Classes: Meeting 1 hour per week, project work 8 hours per week. Prerequisites: Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Departmental permission required.
This unit of study enables talented students to apply their IT knowledge from their first year study to more advanced and exciting projects. In this unit, students will be provided with the opportunity to be involved in projects that will greatly research focus.

INFO3220
Object Oriented Design
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Prac 2 hrs) per week Prerequisites: SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908 Assumed knowledge: INFO2110, INFO1105 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit covers essential design methods and language mechanisms for successful object-oriented design and programming. C++ is used as the implementation language and a special emphasis is placed on those features of C++ that are important for solving real-world problems. Advanced software engineering features, including exceptions and name spaces are thoroughly covered.

INFO3315
Human-Computer Interaction
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 1hr) per week Prohibitions: MULT3307, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802 Assumed knowledge: INFO2110 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit will introduce techniques to evaluate software user interfaces using heuristic evaluation and user observation techniques. Students will (i) learn how to design formal experiments to evaluate usability hypothesis and (ii) apply user centered design and usability engineering principles to design software user interfaces. A brief introduction to the psychological aspects of human-computer interaction will be provided.

INFO3402
Management of IT Projects and Systems
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Prac 1hr) per week Prohibitions: ISYS3300, ISYS3102, ELEC3606 Assumed knowledge: INFO2900, INFO2110, INFO2810, INFO2905 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This course introduces the basic processes and techniques of managing IT projects, systems and services, throughout the IT lifecycle. It addresses both the technical and behavioural aspects of IT management at the enterprise level. Major topics include: organisational strategy and IT alignment, IT planning, project planning, tracking, resource estimation, team management, software testing, delivery and support of IT services, service level agreements, change and problem management, cost effectiveness and quality assurance.

INFO3404
Database Systems 2
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 2hrs) per week Prohibitions: INFO3504, INFO3005, INFO3905, COMP3005, COMP3905 Assumed knowledge: Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit of study builds upon INFO2120 Database Systems 1 and provides a comprehensive overview of the internal mechanisms of Database Management Systems (DBMS) and other systems that manage large data collections. These skills are needed for successful performance tuning and to understand the scalability challenges faced by the information age. The first part of this subject focuses on mechanisms for large-scale data management. It provides a deep understanding of the internal components of a database engine. Topics include: physical data organization and disk-based index structures, query processing and optimisation, locking and logging, and database tuning. The second part focuses on the large-scale management of textual data such as by an information retrieval system or with web search engines. Topics include: distributed and replicated databases, information retrieval, document management, text index structures, web retrieval and page rank algorithms. The unit will be of interest to students seeking an introduction to database tuning, disk-based data structures and algorithms, and information retrieval. It will be valuable to those pursuing such careers as Software Engineers, Database Experts, Database Administrators, and e-Business Consultants.

INFO3504
Database Systems 2 (Adv)
Credit points: 6 Session: Semester 2 Classes: (Lec 2hrs & Prac 2hrs) per week Prerequisites: Distinction-level result in INFO2120 or INFO2820 or COMP2007 or COMP2009 Prohibitions: INFO3404, INFO3005, INFO3905, COMP3005, COMP3905 Assumed knowledge: INFO2110 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit of study builds upon INFO2820 Database Systems 1 (Adv) and provides a comprehensive overview of the internal mechanisms
of Database Management Systems (DBMS) and other systems that manage large data collections. These skills are needed for successful performance tuning and to understand the scalability challenges faced by the information age. The first part of this subject focuses on mechanisms for large-scale data management. It provides a deep understanding of the internal components of a database engine. Topics include: physical data organization and disk-based index structures, query processing and optimisation, locking and logging, and database tuning. The second part focuses on the large-scale management of textual data such as by an information retrieval system or with web search engines. Topics include: distributed and replicated databases, information retrieval, document management, text index structures, web retrieval and page rank algorithms. This is an advanced alternative to INFO3404; it covers material on the advanced and challenging level. In particular, students in this advanced stream will study an actual DBMS implementation on the source code level, and also gain practical experience in extending the DBMS code base.

INFO3551 Information Technology Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

INFO3552 Information Technology Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

INFO3553 Information Technology Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

INFO3600 Major Development Project (Advanced)
Credit points: 12 Session: Semester 2 Classes: Project Work - in class 2 hours per week, Site Visit 1 hour per week, Meeting 1 hour per week. Prerequisites: INFO3402 Prohibitions: COMP3615, ISYS3400, SOFT3300, SOFT3600, SOFT3200, SOFT3700 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Only available to students in BIT, BCST(Adv) or BSc(Adv)

This unit will provide students an opportunity to carry out substantial aspects of a significant software development project. The project will be directed towards assisting a client group (from industry or with strong industry links). The student's contribution could cover one or more aspects such as requirements capture, system design, implementation, change management, upgrades, operation, and/or tuning. Assessment will be based on the quality of the delivered outputs, the effectiveness of the process followed, and the understanding of the way the work fits into the client's goals, as shown in a written report.

INFO3911 IT Special Project 3A
Credit points: 6 Session: Semester 1 Classes: Meeting 1 hour per week, project work 8 hours per week. Prerequisites: Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students with maturing IT knowledge to integrate various IT skills and techniques to carry out projects which are predominantly research-intensive.

INFO3912 IT Special Project 3B
Credit points: 6 Session: Semester 2 Classes: Meeting 1 hour per week, project work 8 hours per week. Prerequisites: Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: Departmental permission required.

This unit of study enables talented students with maturing IT knowledge to integrate various IT skills and techniques to carry out projects which are predominantly research-intensive.

ISYS1551 Information Systems Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS1552 Information Systems Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS2140 Information Systems
Credit points: 6 Session: Semester 1 Classes: (Lec 2hrs & Prac 3hrs) per week Prohibitions: ISYS2506, ISYS2507 Assumed knowledge: INFO1003 or INFO1000 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study will provide a comprehensive conceptual and practical introduction to information systems (IS) in contemporary organisations. Content: General Systems Theory; Basic concepts of organisations, systems and information; The role of information systems in operating and managing organisations; How IS and the Internet enables organisations to adopt more competitive business models, including e-Commerce; The technologies that underpin IS; Distributed systems, including security, networking principles, the client server model and how distributed components locate and communicate with each other; The integration of disparate systems both within the organisation and between organisations, including the role of XML; Behavioural, managerial and ethical issues in implementing and managing IS.

ISYS2554 Information Systems Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS2555 Information Systems Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.
ISYS2556
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS2557
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS3400
Information Systems Project
Credit points: 6  Session: Semester 2  Classes: (Meeting with academic supervisor 1hr & Class meeting 1hr) per week  Prerequisites: (INFO3402 or ISYS3012) and (ISYS3401 or ISYS3015)  Prohibitions: INFO3600, ISYS3207  Assumed knowledge: INFO2120  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit will provide students an opportunity to apply the knowledge and practices in the prerequisite and qualifying units, in the context of a substantial information systems research or development project and to experience in a realistic way many aspects of analysing and solving information systems problems. Since information systems projects are often undertaken by small teams, the experience of working in a team is seen as an important feature of the unit. Students often find it difficult to work effectively with others and will benefit from the opportunity provided by this unit to further develop this skill.

ISYS3540
Analytical Methods & Information Systems
Credit points: 6  Session: Semester 1  Classes: (Lec 2hrs & Prac 1hr) per week  Prerequisites: ISYS3015  Assumed knowledge: INFO2110, ISYS2140  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
This course will provide an introduction to the scientific approach and basic research methods that are relevant for conceptualizing and solving complex problems encountered in Information Systems practice. A collection of different methods for collecting and analyzing information will be studied in the context of a few typical information system projects. These methods include surveys, controlled experiments, questionnaire design and sampling.

ISYS3554
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS3555
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS3556
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

ISYS3557
Information Systems Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This Unit of Study is for University of Sydney students in the Exchange program studying at an overseas university.

School of Information Technologies (Honours units)

COMP4011
Computer Science Honours A
Credit points: 12  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
Students enrolled in the Honours programs study various advanced aspects of Computer Science. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

COMP4012
Computer Science Honours B
Credit points: 12  Session: Semester 1, Semester 2  Corequisites: COMP4011  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
Students enrolled in the Honours programs study various advanced aspects of Computer Science. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

COMP4013
Computer Science Honours C
Credit points: 12  Session: Semester 1, Semester 2  Corequisites: COMP4012  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
Students enrolled in the Honours programs study various advanced aspects of Computer Science. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

COMP4014
Computer Science Honours D
Credit points: 12  Session: Semester 1, Semester 2  Corequisites: COMP4013  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
Students enrolled in the Honours programs study various advanced aspects of Computer Science. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

COMP4551
Computer Science Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

COMP4552
Computer Science Exchange
Credit points: 6  Session: Semester 1, Semester 2  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit of study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP4553
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit of study is for University of Sydney students in the Exchange program studying at an overseas university.

COMP4554
Computer Science Exchange
Credit points: 6 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit of study is for University of Sydney students in the Exchange program studying at an overseas University.

INFO4991
IT Research Thesis A
Credit points: 6 Session: Semester 1, Semester 2 Classes: 12 hours per week research work (including interaction with supervisor and research group).
Prerequisites: Enrolment in Honours (BCST or BIT) Corequisites: INFO4992 and INFO5993 Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

Students enrolled in the Honours programs study various advanced aspects of Information Technology. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

INFO4992
IT Research Thesis B
Credit points: 12 Session: Semester 1, Semester 2 Classes: 24 hours per week research work (including interaction with supervisor and research group).
Prerequisites: Enrolment in Honours (BCST or BIT) Corequisites: INFO4991 and INFO5993 Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

Students enrolled in theHonours programs study various advanced aspects of Information Technology. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.

INFO4999
Computer Science Honours Result
Session: Semester 1, Semester 2 Prerequisites: Permission of the Head of Department Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

All SIT Honours students must enrol in this non assessable unit of study in their final semester.

ISYS4301
Information Systems Honours A
Credit points: 12 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

Students enrolled in the Honours programs study various advanced aspects of Information Systems. The program may include lectures, tutorials, seminars and practicals. They will undertake a research project. Assessment will include the project and may include examinations and coursework.
the Civil Engineering Courtyard. Preliminary lectures related to the tower will include safety issues, loading, statical analysis, foundation calculations, construction management, engineering drawings and detailing, geometric calculations, and survey measurements. Exercises related to these issues will be performed before assembly and disassembly of the tower.

School of Chemical and Biomolecular Engineering

-4 weeks-

This course will enable students to gain an appreciation of: the methods and materials of construction of items of process equipment; the role of this equipment in building an entire chemical processing plant: its operation and maintenance and safety requirements and procedures. Students will dismantle, disassemble and operate items of process equipment. They will present written answers to questions, supplemented by drawings of process flowsheets, diagrams of dismantled equipment, and discussions of heat and mass balances and of process parameters.

ENGG1801
Engineering Computing

Credit points: 6 Session: Semester 1 Classes: 2 hour of lectures and 2 hours of computer laboratory sessions per week. Prohibitions: INFO1000, COSC1001, COSC1002, INFO1003 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The unit will introduce students to fundamental principles of programming. The language used will be Matlab but the principles taught are readily portable to other languages like C and Java. The unit material will be presented in a manner which will help students to draw a connection between programming constructs and real engineering applications. The unit will use engineering inspired case-studies : especially from Civil, Chemical, Aerospace and Mechanical streams, to motivate new material. Besides introductory concepts like variables, arrays and loops, the unit will also introduce more sophisticated Matlab data structures like structs and cells. The extensive Matlab library for visualization will also be introduced. Matlab will cover two-thirds of the unit. The remaining one-third will be devoted to the use of Excel in engineering scenarios. Furthermore, cross integration between Matlab and Excel will also be highlighted.

ENGG1802
Engineering Mechanics

Credit points: 6 Session: Semester 2, Summer Main Classes: 2hrs of lectures per week, 3hrs of tutorials per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The unit aims to provide students with an understanding of and competence in solving statics problems in engineering. Tutorial sessions will help students to improve their group work and problem solving skills, and gain competency in extracting a simplified version of a problem from a complex situation. Emphasis is placed on the ability to work in 3D as well as 2D, including the 2D and 3D visualization of structures and structural components, and the vectorial 2D and 3D representations of spatial points, forces and moments.

ENGG1803
Professional Engineering 1

Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours lectures, 2 hours tutorial/project work per week. Prohibitions: ENGG1061 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Professional Engineering 1 is an introductory Unit of Study within the Faculty of Engineering. The semester 1 course is aimed at students from the School of Aerospace, Mechanical and Mechatronic Engineering. It seeks to introduce newly admitted undergraduates to general principles of professional engineering practice, a range of contemporary professional engineering issues, plus outline skills related to academic study within an engineering environment. The subject is structured around a team based design and build project, in which students apply the professional engineering concepts they are learning to an engineering project. Professional engineering topics to be covered include: accessing information, teamwork, creativity, leadership, written and oral communication, project management, problem solving, ethics, liability, occupational health and safety and environmental issues.

ENGG1805
Professional Engineering and IT

Credit points: 6 Session: Semester 1 Classes: 2hrs lectures and 2 hrs of lab per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

It is the intention of the Faculty of Engineering and Information Technologies to integrate the acquisition of certain generic attributes seamlessly into all units taught by the School. In ENGG1805 - Professional Engineering and Information Technology, this intention is reflected in the objectives of the Unit of Study, the specific topics included in lectures and tutorials, the skills and commitment of the teaching team and in the way in which students’ contributions and work is assessed.

ENGG2004
Engineering Studies B

Credit points: 4 Session: Semester 1, Semester 2 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2005
Engineering Studies C

Credit points: 6 Session: Semester 1, Semester 2, Summer Main, Winter Main Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2008
Engineering Studies A

This unit of study is not available in 2012

Credit points: 2 Session: Semester 1, Semester 2, Winter Main Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Special project specified for individual requirement.

ENGG2062
Engineering Project: Business Plan 2 Adv

Credit points: 6 Session: Semester 1 Classes: 1hr Lecture, 2hr Project work in class per week. Prerequisites: WAM of 75% or greater for 1st year studies. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This course aims to extend student experience beyond the design and build phase of engineering to the business planning necessary to transform a good idea into a commercial reality. It will provide the opportunity for students to develop a range of skills used by professional engineers in a business environment, including planning, strategy development and assessment, business environment and market analysis together with financial management and resource allocation.

ENGG3005
Engineering & Industrial Management Fund

This unit of study is not available in 2012

Credit points: 6 Session: Semester 2 Classes: 2hrs lectures, 2 hrs tutorials per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

Engineers and management; communication; micro-and macro-economics; strategic management; business planning; legal responsibilities; industrial hazard management; human resource management; industrial relations; project management; quality assurance; operations management; accounting and financial management.
This unit is to introduce students to a range of management concepts and techniques, and to develop an understanding of the role and challenges of management.

**ENGG3062**

**Technology Education (Advanced)**

*Credit points: 6*  
*Session: Semester 2*  
*Classes: 1 hr Lecture; 2hrs Project work in class per week.*  
*Prerequisites: WAM of 75% or greater in 2nd year of studies.*  
*Campus: Camperdown/Darlington*  
*Mode of delivery: Normal (lecture/lab/tutorial) Day*  

Note: Department permission required for enrolment.

This UoS aims to give the student experience in critically engaging an audience in the theoretical and practical understanding of engineering and technology. Students will learn professional skills in client relationship management, teaching and presenting, project management, leadership and teamwork. This work will be carried out with partner schools to enhance the engineering knowledge and understanding of Stage 5 high school students. This UoS places students in an environment with which they are familiar, albeit in a very different and challenging role. It allows them the opportunity to deliver a project for a professional external client and in doing so showcase engineering, the faculty and the University to the wider community.

**ENGG4061**

**Innovation/Technology Commercialisation**

*Credit points: 6*  
*Session: Semester 1*  
*Classes: 1 hr lecture; 1 hour project work in class per week.*  
*Campus: Camperdown/Darlington*  
*Mode of delivery: Normal (lecture/lab/tutorial) Day*  

This UoS is designed as a Master Class for final year Engineering students to grapple with the challenges of engaging in, facilitating and managing innovation and developing competence in entrepreneurship and technology commercialisation. Issues covered will include the major elements in the management of technological innovation, including forecasting, R&D, technology acquisition, business strategy, financial control and marketing. Through case studies and field research on innovative companies, students will develop an understanding of the complexities of entrepreneurship, issues involved in commercialisation of research and technology, and in the start-up of a new technology-based venture.

**ENGG4064**

**Advanced Engineering Design A**

*Credit points: 6*  
*Session: Semester 2*  
*Classes: project work - own time*  
*Prerequisites: WAM of 75% or greater in Senior Year of Studies.*  
*Campus: Camperdown/Darlington*  
*Mode of delivery: Normal (lecture/lab/tutorial) Day*  

Note: Department permission required for enrolment.

The aim to this unit is to develop an understanding of the practice of engineering, utilising a diverse range of skills to solve complex problems. Students will gain skills in design, analysis and management by undertaking a significant project in a multi-disciplinary team comprising students from across the faculty. Each student will be required to work in a team to produce an integrated design in greater detail than is possible in ordinary classes and to write a significant design report presenting the results of the process. The ability to work in a team of engineers from different disciplines will be assessed as part of this design project. We try to centre projects around a client, which can be an industrial facility, the Campus and Property Services Office of the University, Research departments within the university, or outside clients (e.g. Nature Conservation Council NSW). Elements drawn from: Introduction to the design process, Clarification of the Brief, Inquiry, brainstorming, Design philosophy, Design optimization, Equipment design and costing, Hazard assessment, Environmental Impact Assessment, Project financial Analysis, Business planning.

**ENGG4065**

**Advanced Engineering Design B**

*Credit points: 6*  
*Session: Semester 2*  
*Classes: project work - own time*  
*Prerequisites: This unit is an extension module for students in ENGG4064. WAM of 75% or greater in Senior Year of Studies.*  
*Campus: Camperdown/Darlington*  
*Mode of delivery: Normal (lecture/lab/tutorial) Day*  

Note: Department permission required for enrolment.

The aim to this unit is to develop an understanding of the practice of engineering, utilising a diverse range of skills to solve complex problems. Students will gain skills in design, analysis and management by undertaking a significant project in a multi-disciplinary team comprising students from across the faculty. Each student will be required to work in a team to produce an integrated design in greater detail than is possible in ordinary classes and to write a significant design report presenting the results of the process. The ability to work in a team of engineers from different disciplines will be assessed as part of this design project. We try to centre projects around a client, which can be an industrial facility, the Campus and Property Services Office of the University, Research departments within the university, or outside clients (e.g. Nature Conservation Council NSW). Elements drawn from: Introduction to the design process, Clarification of the Brief, Inquiry, brainstorming, Design philosophy, Design optimization, Equipment design and costing, Hazard assessment, Environmental Impact Assessment, Project financial Analysis, Business planning.
Advanced Engineering and Faculty Elective options

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<tbody>
<tr>
<td>Advanced Engineering, Talented IT student program and Faculty-wide elective subjects</td>
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<tr>
<td>Engineering students are eligible for the award of Advanced Engineering by completing a minimum of 18 cp of advanced units as listed in the following table. Only one Advanced unit can be selected from a particular year. Entry to the Advanced Engineering program is by invitation of the Dean and is based on a ATAR of 98+ in the NSW HSC or equivalent, or by obtaining a Distinction average in Years 1, 2 or 3 of their engineering course. Information technology degree students are eligible to join the talented IT student program by invitation of the Dean. Entry is based on a ATAR of 98+ in the NSW HSC or equivalent, or by obtaining a Distinction average in Years 1, 2 or 3 of their information technologies course.</td>
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<tr>
<td>Advanced Engineering units</td>
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<td>ENGG1061 Advanced Engineering 1A</td>
<td>6</td>
<td>P ATAR score of at least 98 and good performance in HSC Maths, Physics and Chemistry.</td>
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<td>Semester 1</td>
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<tr>
<td>ENGG2062 Engineering Project: Business Plan 2 Adv</td>
<td>6</td>
<td>P WAM of 75% or greater for 1st year studies.</td>
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<td>Semester 2</td>
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<tr>
<td>AERO2711 Space Engineering Project 1</td>
<td>6</td>
<td>P Completed the junior year of Aero(Space), Mechanical(Space) or Mechatronics(Space) Engineering. An average mark of &gt; 75% is required as well as departmental permission from the Space Engineering Coordinator.</td>
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<td>Semester 2</td>
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<tr>
<td>ENGG3062 Technology Education (Advanced)</td>
<td>6</td>
<td>P WAM of 75% or greater in 2nd year of studies.</td>
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<td>Semester 2</td>
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<tr>
<td>AERO3711 Space Engineering Project 2</td>
<td>6</td>
<td>P AERO2711 Space Engineering Project 1; a WAM of &gt; 75% is required as well as departmental permission from the Space Engineering Coordinator.</td>
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<td>Semester 2</td>
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<tr>
<td>AERO4711 Space Engineering Project 3</td>
<td>6</td>
<td>P AERO3711 Space Engineering Project 2; a WAM of &gt; 75% is required as well as departmental permission from the Space Engineering Coordinator.</td>
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<td>Semester 2</td>
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<tr>
<td>AERO4712 Space Engineering Project 4</td>
<td>6</td>
<td>P AERO4711 Space Engineering Project 3; a WAM of &gt; 75% is required as well as departmental permission from the Space Engineering Coordinator.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG4064 Advanced Engineering Design A</td>
<td>6</td>
<td>P WAM of 75% or greater in Senior Year of Studies.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG4065 Advanced Engineering Design B</td>
<td>6</td>
<td>P This unit is an extension module for students in ENGG4064. WAM of 75% or greater in Senior Year of Studies.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Talented IT Students program units of study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO1911 IT Special Project 1A</td>
<td>6</td>
<td>Note: Department permission required for enrolment. Enrolment in this unit of study is by invitation only.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1912 IT Special Project 1B</td>
<td>6</td>
<td>A ATAR of at least 98 and High Distinction average in first year IT units of study and Distinction average in first year non-IT units of study.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2911 IT Special Project 2A</td>
<td>6</td>
<td>P Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO2912 IT Special Project 2B</td>
<td>6</td>
<td>P Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3911 IT Special Project 3A</td>
<td>6</td>
<td>P Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO3912 IT Special Project 3B</td>
<td>6</td>
<td>P Distinction average in non-IT units completed in previous year of study, high distinction average in IT units completed in previous year.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>Faculty-wide units of study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>These units of study are available as core, alternate or elective units of study as the case may be in any discipline of Engineering or Information Technology.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG1800 Engineering Disciplines (Intro) Stream A</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1801 Engineering Computing</td>
<td>6</td>
<td>N INFO1000, COSC1001, COSC1002, INFO1003</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1802 Engineering Mechanics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Summer Main</td>
</tr>
</tbody>
</table>

For internal use by University of Sydney staff only.
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1803 Professional Engineering 1</td>
<td>6</td>
<td>N ENGG1061</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG1850 Introduction to Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG3005 Engineering &amp; Industrial Management Fund</td>
<td>6</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG4000 Practical Experience</td>
<td>P 36 Credit Points of Senior Units</td>
<td>Students should have completed three years of their BE program before enrolling in this unit.</td>
<td>Semester 1</td>
<td>Semester 2</td>
<td>Semester 2</td>
<td></td>
</tr>
</tbody>
</table>
Bachelor of Computer Science and Technology

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1600 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT Systems</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N ISO1001, ISO1901, COMP1001, COMP1901, DEC02011</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td>N INFO1905, ISO1102, ISO1901, COMP1002, COMP1902, COMP2100, COMP2160, COMP2500, COMP2111, COMP2811, COMP2002, COMP2902</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INF01903 Informatics (Advanced)</td>
<td>6</td>
<td></td>
<td>Note: INF01903 Informatics (Adv) can be taken as an alternate core unit to INFO1103.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO1103 Foundations of Information Technology</td>
<td>6</td>
<td>N INFO1000 or INFO1001</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO1903 Informatics (Advanced)</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>P ATAR sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP2007 Algorithms and Complexity</td>
<td>6</td>
<td>A INFO1105, MATH1004 or MATH1904</td>
<td>N COMP2907, COMP3309, COMP3609, COMP3111, COMP3181</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2110 Systems Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in INFO1003 or INFO1103 or INFO1100</td>
<td>N INFO2810, INFO2900</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2120 Database Systems 1</td>
<td>6</td>
<td>A Some exposure to programming and some familiarity with data model concepts such as taught in INFO1003 or INFO1103 or INFO1000 or INFO1903</td>
<td>N INFO2810, INFO2900</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

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## School of Information Technologies Stream Tables

### Unit of study  Credit points  A: Assumed knowledge  P: Prerequisites  C: Corequisites  N: Prohibition  Session

**All 2000-level ELEC units of study are recommended electives.**

### Third year core units of study for CS stream

Students are required to complete at least 36 credit points of 3000-level units of study from the core, selected core and recommended elective units listed here for the CS stream.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3615 Software Development Project</td>
<td>6</td>
<td>P INFO3402, N INFO3600, SOFT3300, SOFT3600, SOFT3200, SOFT3700</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3402 Management of IT Projects and Systems</td>
<td>6</td>
<td>A INFO2000, INFO2110, INFO2810, INFO2900, N ISYS3000, ISYS3012, ELEC3606</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CS & IS double stream:** Students enrolled in the double stream must also complete ISYS3401 Analytical Methods and Information Systems as a core unit of study from the CS stream.

### Third year selected core units of study for CS stream

Students must complete at least 12 credit points from the list below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3109 Programming Languages and Paradigms</td>
<td>6</td>
<td>A COMP2007</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP308 Introduction to Artificial Intelligence</td>
<td>6</td>
<td>A COMP2007</td>
<td>N INFO3608, COMP3002, COMP3902</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>COMP308 Intro to Artificial Intelligence (Adv)</td>
<td>6</td>
<td>P Distinction-level results in some 2nd year COMP or MATH or SOFT units.</td>
<td>N COMP3008, COMP3002, COMP3902</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>COMP319 Graphics and Multimedia</td>
<td>6</td>
<td>A COMP2007, MATH1002</td>
<td>N MULT3306, MULT3606, MULT3019, MULT3919, MULT3004, MULT3904, COMP3004, COMP3904</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>COMP356 Computational Methods for Life Sciences</td>
<td>6</td>
<td>P INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP320 Operating Systems Internals</td>
<td>6</td>
<td>A COMP2129, INFO1105</td>
<td>N NETS3004, NETS3604, NETS3009, NETS3909, COMP3009, COMP3909</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC3506 Data Communications and the Internet</td>
<td>6</td>
<td>N NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC310 E-Business Analysis and Design</td>
<td>6</td>
<td>P INFO2120</td>
<td>N EBUS3003, EBUS3001</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>INFO320 Object Oriented Design</td>
<td>6</td>
<td>P INFO2110, INFO1105</td>
<td>N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>INFO315 Human-Computer Interaction</td>
<td>6</td>
<td>A COMP2110</td>
<td>N MULT3007, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802</td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>INFO3404 Database Systems 2</td>
<td>6</td>
<td>A Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience.</td>
<td>N INFO3054, INFO3005, INFO3905, COMP3005, COMP3905</td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>INFO3504 Database Systems 2 (Adv)</td>
<td>6</td>
<td>P Distinction-level result in INFO2120 or INFO2820 or COMP2007 or COMP2907</td>
<td>N INFO3005, INFO3905, COMP3005, COMP3905</td>
<td>Semester 2</td>
<td></td>
</tr>
</tbody>
</table>

**CS & IS double stream:** Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.

### Third year recommend elective units of study for CS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC3607 Embedded Systems</td>
<td>6</td>
<td>A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2902 Digital System Design, P ELEC1601 and ELEC2602</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC3609 Internet Software Platforms</td>
<td>6</td>
<td>P INFO1103, INFO2110, INFO2120</td>
<td>N EBUS4001</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISYS3400 Information Systems Project</td>
<td>6</td>
<td>A INFO2120</td>
<td>P (INFO3402 or ISYS3012) and (ISYS3401 or ISYS3015)</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISYS3401 Analytical Methods &amp; Information Systems</td>
<td>6</td>
<td>A INFO2110, ISYS2140</td>
<td>N ISYS3015</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**All 3000-level and above ELEC units of study are recommended electives.**

### (ii) Stream in Information Systems

#### First year core units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO1003 Foundations of Information Technology</td>
<td>6</td>
<td>N INFO1000 or INF5100</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 or INFO1003.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to both INFO1103 or INFO1003.
Students must complete 24 credit points from the combination of selected core for the CS stream and the IS stream, including at least 6 credit points from the following list:

**Database Systems 2 (Adv)**

- INFO3504
- INFO3005
- INFO3905
- COMP3005
- COMP3905

**Third year selected core units of study for IS stream**

Students must complete at least 6 credit points from the following list:

**ELEC3610**

- E-Business Analysis and Design

**INFO3315**

- Human-Computer Interaction

**INFO3404**

- Database Systems 2

**INFO3504**

- Database Systems 2 (Adv)

CS & IS double stream: Students must complete 24 credit points from the combination of selected core for the CS stream and the IS stream, including at least 6 credit points from the list above.
## Third year recommended elective units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3109 Programming Languages and Paradigms</td>
<td>6</td>
<td>A COMP2007</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP3308 Introduction to Artificial Intelligence</td>
<td>6</td>
<td>A COMP2007, COMP3608, COMP3902</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3608 Intro. to Artificial Intelligence (Adv)</td>
<td>6</td>
<td>P Distinction-level results in some 2nd year COMP or MATH or SOFT units.</td>
<td>N COMP3308, COMP3002, COMP3902</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3419 Graphics and Multimedia</td>
<td>6</td>
<td>A COMP2007, MATH1002</td>
<td>N MULT3306, MULT3606, MULT3019, MULT3919, MULT3004, MULT3904, COMP3004, COMP3964</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3456 Computational Methods for Life Sciences</td>
<td>6</td>
<td>A INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP3520 Operating Systems Internals</td>
<td>6</td>
<td>A COMP2129, INFO1105</td>
<td>N NETS3304, NETS3604, NETS3009, NETS3909, COMP3009, COMP3909</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3615 Software Development Project</td>
<td>6</td>
<td>P INFO3402</td>
<td>N INFO3600, SOFT3300, SOFT3600, SOFT3200, SOFT3700</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3506 Data Communications and the Internet</td>
<td>6</td>
<td>N NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3607 Embedded Systems</td>
<td>6</td>
<td>A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2602 Digital System Design.</td>
<td>P ELEC1601 and ELEC2602</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3609 Internet Software Platforms</td>
<td>6</td>
<td>P INFO1103, INFO2110, INFO2120</td>
<td>N EBUS4001</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3220 Object Oriented Design</td>
<td>6</td>
<td>A INFO2110, INFO1105</td>
<td>N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

*All 3000-level and above ELEC units of study are recommended.*

## Honours

Students who have qualified for the BCST degree may apply to enter the BCST(Honours) year. Note that unlike BIT(Honours) or BE(Honours), the Honours in BCST requires an additional 48 credit points of study. All BCST(Honours) students must complete the following 24 credit points of core units of study. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study; please refer to units listed in the BIT table Fourth Year Selected Core.

### Fourth year Honours core units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO4991 IT Research Thesis A</td>
<td>6</td>
<td>P Enrolment in Honours (BCST or BIT)</td>
<td>C INFO4992 and INFO5993</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO4992 IT Research Thesis B</td>
<td>12</td>
<td>P Enrolment in Honours (BCST or BIT)</td>
<td>C INFO4991 and INFO5993</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO4999 Computer Science Honours Result</td>
<td></td>
<td>P Permission of the Head of Department</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO5993 IT Research Methods</td>
<td>6</td>
<td>A Elementary statistics</td>
<td>N INFO4990</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
Bachelor of Computer Science and Technology (Advanced)

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
</table>

Candidates for the degree of Bachelor of Computer Science and Technology (Advanced) (BCST(Adv)) are required to gain 144 credit points from the units of study set out below. The selection of units must satisfy the degree rules in the Resolutions of the Faculty. In particular, all core units must be completed, along with appropriate amount of elective units of study as recommended by the Faculty. Candidates for the BCST(Adv) degree must complete a stream in either Computer Science or Information Systems, or both, as described in the Tables below.

Candidates in the BCST(Adv) degree must maintain a credit average in each year of enrolment. If this level of result is not achieved candidates will be transferred to the BCST degree program.

Candidates in the BCST(Adv) degree must complete at least 12 credit points of 2000-level core and recommended units, and at least 12 credit points of 3000-level core and recommended units at advanced level.

Enrolment is subject to the following constraint:

1. At most 72 credit points accumulated from first year units (including core and recommended electives) can be counted for degree completion.

Candidates may substitute an appropriate unit from an Advanced Engineering program of the Faculty of Engineering and IT, or the Talented Student Program of the Faculty of Science, if they are eligible to enrol in such units.

(i) Stream in Computer Science

First year core units of study for CS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1001 Fundamentals of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO211</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Data Structures</td>
<td>6</td>
<td>A Programming, as for INFO1103</td>
<td>N INFO1905, SOFT1002, SOFT1902, COMP1002, COMP1902, COMP2111, COMP2811, COMP2002, COMP2902</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

A full list of MATH and STAT units are available from Science Faculty handbook.

First year recommended elective units of study for CS stream.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1103 Fundamentals of Elect and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1003 Foundations of Information Technology</td>
<td>6</td>
<td>N INFO1000 or INF51000</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1903 Informatics (Advanced)</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>P ATAR sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Second year core units of study for CS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP2129 Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1105</td>
<td>N SOFT2130, SOFT2330, SOFT2004, SOFT2904, COMP2004, COMP2904</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP2907 Algorithms and Complexity (Advanced)</td>
<td>6</td>
<td>A INFO1505, MATH1904</td>
<td>P Distinction level result in INFO1105 or INFO1905 or SOFT1002 or SOFT1902</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2110 Systems Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in INFO1003 or INFO1103 or INF51000</td>
<td>N INFO2810, INFO2000, INFO2900</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2620 Database Systems 1 (Advanced)</td>
<td>6</td>
<td>P Distinction level result in INFO1103 or INFO1105 or INFO1905</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

A full list of MATH and STAT units are available from Science Faculty handbook.

Second year recommended elective units of study for CS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO2515 Introduction to IT Security</td>
<td>6</td>
<td>A Computer literacy</td>
<td>N NETS3005, NETS3605, NETS3016, NETS3916, ELEC5610, ELEC5616</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ISYS2140 Information Systems</td>
<td>6</td>
<td>A INFO1003 or INF51000</td>
<td>N ISYS2006, ISYS2007</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

All 2000-level ELEC units of study are recommended.

Third year core units of study for CS stream

Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended elective units of study listed here for the CS stream.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO3402 Management of IT Projects and Systems</td>
<td>6</td>
<td>A INFO2000, INFO2110, INFO2810, INFO2900</td>
<td>N ISYS3000, ISYS3012, ELEC3606</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
A full list of MATH and STAT units are available from Science Faculty handbook.

STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and

of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units; MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

A full list of MATH and STAT units are available from Science Faculty handbook.
### First year recommended elective units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1903 Informatics (Advanced)</td>
<td>6</td>
<td>A HSC Mathematics P ATAR sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Second year core units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP2007 Algorithms and Complexity (Advanced)</td>
<td>6</td>
<td>A INFO1905, MATH1904 P Distinction level result in INFO1105 or INFO2005 or SOFT1002 or SOFT1902</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO2110 Systems Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in INFO1003 or INFO1103 or INFO2005</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO2315 Introduction to IT Security</td>
<td>6</td>
<td>A Computer literacy N NETS3305, NETS3305, NETS3016, NETS3916, ELEC5610, ELEC5616</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO2620 Database Systems 1 (Advanced)</td>
<td>6</td>
<td>P Distinction-level result in INFO1200 or INFO1103 or INFO2120 or INFO3120 or INFO3005</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISYS2140 Information Systems</td>
<td>6</td>
<td>A INFO2100 or INFO2105 N ISYS2006, ISYS2100</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units.

A full list of MATH and STAT units are available from Science Faculty handbook.

### Second year recommended elective units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP2129 Operating Systems and Machine Principles</td>
<td>6</td>
<td>A Programming, as from INFO1103, INFO1005 N SOFT2130, SOFT2300, SOFT2004, SOFT2904, COMP2004, COMP2904</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Third year core units of study for IS stream

Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended elective units of study listed here for the IS stream.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO3402 Management of IT Projects and Systems</td>
<td>6</td>
<td>A INFO2000, INFO2110, INFO2810, INFO2900 N ISYS3000, ISYS3005, ELEC3606</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3600 Major Development Project (Advanced)</td>
<td>12</td>
<td>P INFO3402 N COMP3615, ISYS3000, SOFT3300, SOFT3600, SOFT3200, SOFT3700</td>
<td>Only available to students in BIT, BCST(Adv) or BSc(Adv)</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ISYS3401 Analytical Methods &amp; Information Systems</td>
<td>6</td>
<td>A INFO2110, ISYS2140 N ISYS3015</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Third year selected core units of study for IS stream

Students must complete at least 6 credit points from the following list.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC3610 E-Business Analysis and Design</td>
<td>6</td>
<td>P INFO2120 N EBUS3003, EBUS3001</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3315 Human-Computer Interaction</td>
<td>6</td>
<td>A INFO2110 N MULT3007, MULT3018, MULT3019, MULT3016, SOFT3102, SOFT3005, COMP3102, COMP3802</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3404 Database Systems 2</td>
<td>6</td>
<td>A Introductory database study such as INFO2120 or INFO2820 or INFO2900</td>
<td>Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. N INFO3304, INFO3005, INFO3905, COMP3005, COMP3005</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3504 Database Systems 2 (Adv)</td>
<td>6</td>
<td>P Distinction-level result in INFO2120 or INFO2820 or COMP2007 or COMP2007</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 6 cp from the list above.

### Third year recommended elective units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3109 Programming Languages and Paradigms</td>
<td>6</td>
<td>A COMP2007</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP3308 Introduction to Artificial Intelligence</td>
<td>6</td>
<td>A COMP2007 N COMP3002, COMP3902</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP3608 Intro. to Artificial Intelligence (Adv)</td>
<td>6</td>
<td>P Distinction-level results in some 2nd year COMP or MATH or SOFT units. N COMP3008, COMP3002, COMP3902</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP3419 Graphics and Multimedia</td>
<td>6</td>
<td>A COMP2007, MATH1002 N MULT3006, MULT3005, MULT3019, MULT3018, MULT3004, MULT3004, COMP3004, COMP3904</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP3456 Computational Methods for Life Sciences</td>
<td>6</td>
<td>P INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Unit of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th><strong>A: Assumed knowledge</strong></th>
<th><strong>P: Prerequisites</strong></th>
<th><strong>C: Corequisites</strong></th>
<th><strong>N: Prohibition</strong></th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3520 Operating Systems Internals</td>
<td>6</td>
<td>COMP2129, INFO1105</td>
<td>NETS3304, NETS3604, NETS3009, NETS3909, COMP3009, COMP3909</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC3506 Data Communications and the Internet</td>
<td>6</td>
<td>NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC3607 Embedded Systems</td>
<td>6</td>
<td>A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2902 Digital System Design.</td>
<td>P ELEC1601 and ELEC2602</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC3609 Internet Software Platforms</td>
<td>6</td>
<td>P INFO1103, INFO2110, INFO2120</td>
<td>N EBUS4001</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFO3220 Object Oriented Design</td>
<td>6</td>
<td>A INFO2110, INFO1105</td>
<td>N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

All 3000-level and above ELEC units of study are recommended electives.

Also, appropriate fourth year units of study from BIT table can be taken as recommended electives with permission of the Head of School.

### Honours

Students who have qualified for the BCST(Adv) degree may apply to enter the BCST(Adv)(Honours) year. Note that unlike BIT(Honours) or BE(Honours), the Honours in BCST(Adv) requires an additional 48 credit points of study.

All BCST(Adv)(Honours) students must complete the following 24 credit points of core units of study. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study, please refer to units listed in the BIT table Fourth Year Selected Core.

#### Fourth year Honours core units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th><strong>P: Prerequisites</strong></th>
<th><strong>C: Corequisites</strong></th>
<th><strong>N: Prohibition</strong></th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO4991 IT Research Thesis A</td>
<td>6</td>
<td>P Enrolment in Honours (BCST or BIT)</td>
<td>C INFO4992 and INFO5993</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>INFO4992 IT Research Thesis B</td>
<td>12</td>
<td>P Enrolment in Honours (BCST or BIT)</td>
<td>C INFO4991 and INFO5993</td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>INFO4999 Computer Science Honours Result</td>
<td></td>
<td>P Permission of the Head of Department</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>INFO5993 IT Research Methods</td>
<td>6</td>
<td>A Elementary statistics</td>
<td>N INFO4990</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
### Bachelor of Information Technology

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
</table>
| Candidates for the degree of Bachelor of Information Technology (BIT) are required to gain credit for 192 credit points from the units of study set out below. The selection of units must satisfy the degree rules in the Resolutions of the Faculty. In particular, all core units must be completed, along with an appropriate amount from the elective units of study as recommended by the Faculty. Candidates for the BIT degree must complete a stream in either Computer Science or Information Systems, or both, as described in the Tables below. Enrolment is subject to the following constraints:
| 1. At most 72 credit points accumulated from first year units (core and recommended electives) can be counted for degree completion.  
| 2. At least 84 credit points must be accumulated from 3000-level and above units (including 72cp of core, selected core and recommended electives as outlined in this table).  
| 3. Candidates in the BIT degree must maintain a credit average in each year of enrolment. If this level of result is not achieved candidates will be transferred to the BCST degree program. Through this table, candidates may substitute an advanced equivalent for a non-advanced unit mentioned. They may also substitute an appropriate unit from the Advanced Engineering program of the Faculty of Engineering, or the Talented Student Program of the Faculty of Science, if they are eligible to enrol in such units. |

### (i) Stream in Computer Science

#### First year core units of study for CS stream

| ENGG1905 Professional Engineering and IT | 6 | A HSC Mathematics extension 1 or 2 | Semester 1 |
| ELEC1601 Foundations of Computer Systems | 6 | N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011 | Semester 2 |
| INFO1103 Introduction to Programming | 6 | N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011 | Semester 1 |
| Note: INFO1903 Informatics (Adv) can be taken as an alternate core unit to INFO1103. |
| INFO1105 Data Structures | 6 | A Programming, as for INFO1003 | Semester 2 |
| Note: INFO1905 (advanced version) can be taken as an alternate to INFO1105. |
| Math/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. |
| A full list of MATH and STAT units are available from Science Faculty handbook. |

#### First year recommended elective units of study for CS stream

| ELEC1103 Fundamentals of Elec and Electronic Eng | 6 | A HSC Physics, HSC Mathematics extension 1 or 2 | Semester 1 |
| INFO1003 Foundations of Information Technology | 6 | N INFO1000 or INFO1001 | Semester 1 |
| INFO1903 Informatics (Advanced) | 6 | A HSC Mathematics | Semester 2 |
| Note: ATAR sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry |
| Note: Department permission required for enrolment |

#### Second Year core units of study for CS stream

| COMP2007 Algorithms and Complexity | 6 | A INFO1105, MATH1004 or MATH1904 | Semester 2 |
| Note: COMP2007 (advanced version) can be taken as an alternate to COMP2007. |
| COMP2129 Operating Systems and Machine Principles | 6 | N SOFT2130, SOFT2830, SOFT2904, COMP2004, COMP2904 | Semester 1 |
| INFO2110 Systems Analysis and Modelling | 6 | A Experience with a data model as in INFO1003 or INFO1005 | Semester 2 |
| INFO2120 Database Systems 1 | 6 | A Some exposure to programming and some familiarity with data model concepts such as taught in INFO1003 or INFO1005 or INFO1003 | Semester 1 |
| Note: INFO20820 (advanced version) can be taken as an alternate core unit to INFO2120. |
| Math/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. |
| A full list of MATH and STAT units are available from Science Faculty handbook. |

#### Second year recommended elective units of study for CS stream

| INFO2315 Introduction to IT Security | 6 | A Computer literacy | Semester 2 |
| Note: INFO2315 can be taken as an alternate core unit to INFO1105. |
| ISYS2140 Information Systems | 6 | N ISYS2006, ISYS2007 | Semester 1 |
| All 2000-level ELEC units of study are recommended. |

#### Third year core units of study for CS stream

Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended electives units of study listed here for the CS stream.
### School of Information Technologies Stream Tables

#### Third year selected core units of study for CS stream

Students must complete at least 12 credit points from the following list.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO3402 Management of IT Projects and Systems</td>
<td>6</td>
<td>A INFO2000, INFO2110, INFO2810, INFO2900</td>
<td>N ISYS3000, ISYS3012, ELEC3606</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO3600 Major Development Project (Advanced)</td>
<td>12</td>
<td>P INFO3402</td>
<td>N COMP3615, ISYS3400, SOFT3300, SOFT3600, SOFT3200, SOFT3700</td>
<td>Only available to students in BIT, BCST(Adv) or BSc(Adv)</td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

CS & IS double stream: Students enrolled in the double stream must also complete ISYS3401 Analytical Methods and Information Systems as a core unit of study from the CS stream.

#### Fourth year selected core units of study for CS stream

Students in the BIT Pass degree must complete at least 48 credit points from this list.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5045 Computational Geometry</td>
<td>6</td>
<td>A Data structures, analysis of algorithms</td>
<td>N COMP4045</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5046 Statistical Natural Language Processing</td>
<td>6</td>
<td>A Concepts of Linguistics, elementary statistics, AI techniques.</td>
<td>N COMP4046</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5047 Pervasive Computing</td>
<td>6</td>
<td>A Networking concepts, operating system concepts, programming expertise.</td>
<td>N NETS4047</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5048 Information Visualisation</td>
<td>6</td>
<td>A Discrete mathematics, algorithms and complexity.</td>
<td>N COMP4048</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5318 Knowledge Discovery and Data Mining</td>
<td>6</td>
<td>A COMP5138 and familiarity with basic statistics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5338 Advanced Data Models</td>
<td>6</td>
<td>A COMP5138 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
<td>6</td>
<td>A INFO3220 or COMP5028 or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5416 Advanced Network Technologies</td>
<td>6</td>
<td>A ELEC3506 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

All 3000-level and above ELEC units of study are recommended.

#### Third year recommended elective units of study for CS stream

Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP3109 Programming Languages and Paradigms</td>
<td>6</td>
<td>A COMP2007</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP3308 Introduction to Artificial Intelligence</td>
<td>6</td>
<td>A COMP2007</td>
<td>N COMP3608, COMP3002, COMP3902</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3508 Intro. to Artificial Intelligence (Adv)</td>
<td>6</td>
<td>P Distinction-level results in some 2nd year COMP or MATH or SOFT units.</td>
<td>N COMP3308, COMP3002, COMP3902</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3419 Graphics and Multimedia</td>
<td>6</td>
<td>A COMP2007, MATH1002</td>
<td>N MULT3306, MULT3606, MULT3019, MULT3919, MULT3004, MULT3904, COMP3004, COMP3904</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP3456 Computational Methods for Life Sciences</td>
<td>6</td>
<td>P INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP3520 Operating Systems Internals</td>
<td>6</td>
<td>A COMP2129, INFO1105</td>
<td>N NETS3304, NETS3604, NETS3009, NETS3909, COMP3009, COMP3909</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC3506 Data Communications and the Internet</td>
<td>6</td>
<td>N NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC3609 Internet Software Platforms</td>
<td>6</td>
<td>P INFO1103, INFO2110, INFO2120</td>
<td>N EBUS4001</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3220 Object Oriented Design</td>
<td>6</td>
<td>A INFO2110, INFO1105</td>
<td>N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO3315 Human-Computer Interaction</td>
<td>6</td>
<td>A INFO2110</td>
<td>N MULT3307, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3404 Database Systems 2</td>
<td>6</td>
<td>A Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience.</td>
<td>N INFO3004, INFO3005, INFO3905, COMP3005, COMP3905</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO3504 Database Systems 2 (Adv)</td>
<td>6</td>
<td>P Distinction-level result in INFO2120 or INFO2820 or COMP2007 or COMP2907</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 12 cp from the list above.
## School of Information Technologies Stream Tables

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5424 Information Technology in Biomedicine</td>
<td>6</td>
<td>A Basic programming skills</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5425 Multimedia Storage, Retrieval &amp; Delivery</td>
<td>6</td>
<td>A Algorithms (equivalent to COMP5211).</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5426 Parallel and Distributed Computing</td>
<td>6</td>
<td>A Equivalent of COMP5116</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network.</td>
<td>N ELEC5504, ELEC4504</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor.</td>
<td>N ELEC5501</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5614 Real Time Computing</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems), Ability to program in a high level language.</td>
<td>ELEC5602</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths.</td>
<td>N ELEC5611, NETS3016, NETS3916</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5618 Software Quality Engineering</td>
<td>6</td>
<td>N SOFT3302</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5619 Object Oriented Application Frameworks</td>
<td>6</td>
<td>A Java programming, and some web development experience are essential. Databases strongly recommended</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5620 Model Based Software Engineering</td>
<td>6</td>
<td>A A programming language, basic maths.</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO5991 Services Science Management and Eng</td>
<td>6</td>
<td>A INFO5990</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO5992 Understanding IT Innovations</td>
<td>6</td>
<td>A INFO5990, N PMGT5875</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ISYS5050 Knowledge Management Systems</td>
<td>6</td>
<td>A Information systems concepts, database concepts</td>
<td>N ISYS4050</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

### (ii) Stream in Information Systems

#### First year core units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG1805 Professional Engineering and IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1003 Foundations of Information Technology</td>
<td>6</td>
<td>N INFO1000 or INFO1000</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO1103 Introduction to Programming</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>N SOFT1001, SOFT1901, COMP1001, COMP1901, DECO2011</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1105 Data Structures</td>
<td>6</td>
<td>A Programming, for INFO1103</td>
<td>N INFO1905, SOFT1902, SOFT1902, COMP1002, COMP2102, COMP2102, COMP2600, COMP2600, COMP2600, COMP2600, COMP2600</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Note: INFO1905 (advanced version) can be taken as an alternate core unit to INFO1105.

Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units are required for completion of this degree. An average of at least 60% in each of the assessed units is required. The minimum total credit points from MATH and STAT is 18. MATH and STAT units that are not taken as core units can be taken as other units. Students are required to take MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH1006, MATH1007 and STAT1001. MATH and STAT units that are not taken as core units are required for completion of this degree. MATH units offered in the Science subject area of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT1002. MATH and STAT units that are not taken as core units can be taken as other units. Students are required to take MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH1006, MATH1007 and STAT1001. MATH and STAT units that are not taken as core units are required for completion of this degree. MATH and STAT units that are not taken as core units can be taken as other units. A full list of MATH and STAT units are available from Science Faculty handbook.

#### First year recommended elective units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1103 Fundamentals of Elec and Electronic Eng</td>
<td>6</td>
<td>A HSC Physics, HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC1601 Foundations of Computer Systems</td>
<td>6</td>
<td>A HSC Mathematics extension 1 or 2</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO1903 Informatics (Advanced)</td>
<td>6</td>
<td>A HSC Mathematics</td>
<td>P ATAR sufficient to enter BCST(Adv), BIT or BSc(Adv), or portfolio of work suitable for entry</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

#### Second year core units of study for IS stream

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO2110 Systems Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in INFO1003 or INFO1103 or INFO1100</td>
<td>N INFO2810, INFO2000, INFO2900</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO2315 Introduction to IT Security</td>
<td>6</td>
<td>A Computer literacy</td>
<td>N NETS3305, NETS3605, NETS3016, NETS3916, ELEC5610, ELEC5616</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Unit of study | Credit points | Assumed knowledge | Prerequisites | Corequisites | Prohibition | Session |
---|---|---|---|---|---|---|
ISYS2140 Information Systems | 6 | A INFO1003 or INFO1000 | N ISYS2006, ISYS2007 | Semester 2 |
INFO2120 Database Systems 1 | 6 | A Some exposure to programming and some familiarity with data model concepts such as taught in INFO1003 or INFO1000 or INFO1003 | N INFO2820, INFO2005, INFO2905 | Semester 1 |
Note: INFO2820 (advanced version) can be taken as an alternate core unit to INFO2120. |
Maths/Statistics requirement: A total of 18 credit points (with at least 6 credit points of 2000-level or above) of MATH and/or STAT units of are required for completion of this degree. All 1000-level and 2000-level units offered in the Science subject areas of Mathematics and Statistics can be taken to meet this requirement, however the School recommends students choose from the following units: MATH1001, MATH1002, MATH1003, MATH1004, MATH1005, MATH2069, MATH2063 and STAT2012. MATH and STAT units that are not taken as core units can be taken as other units. |
A full list of MATH and STAT units are available from Science Faculty handbook. |
Second year recommended elective units of study for IS stream |
COMP2007 Algorithms and Complexity | 6 | A INFO1105, MATH1004 or MATH1904 | N COMP2907, COMP3309, COMP3609, COMP3111, COMP3811 | Semester 2 |
COMP2907 Algorithms and Complexity (Advanced) | 6 | A INFO1905, MATH1904 | P Distinction level result in INFO1105 or INFO1905 or SOFT1002 or SOFT1902 | Semester 2 |
COMP2129 Operating Systems and Machine Principles | 6 | A Programming, as from INFO1103, INFO1105 | N SOFT2130, SOFT2830, SOFT2004, SOFT2904, COMP2004, COMP2904 | Semester 1 |
All 2000-level ELEC units of study are recommended electives. |
Third year core units of study for IS stream |
Students are required to complete at least 36 credit points of 3000-level from the core, selected core and recommended electives units of study listed here for the IS stream. |
INFO3402 Management of IT Projects and Systems | 6 | A INFO2000, INFO2110, INFO2810, INFO2900 | N ISYS3000, ISYS3012, ELEC3606 | Semester 1 |
INFO3600 Major Development Project (Advanced) | 12 | P INFO3402 | N COMP3815, ISYS3400, SOFT3300, SOFT3600, SOFT3200, SOFT3700 | Only available to students in BIT, BCST(Adv) or BSc(Adv) | Semester 2 |
ISYS3401 Analytical Methods & Information Systems | 6 | A INFO2110, ISYS2140 | N ISYS3015 | Semester 1 |
Third year selected core units of study for IS stream |
Students must complete at least 6 credit points from the following list. |
ELEC3610 E-Business Analysis and Design | 6 | P INFO2120 | N EBUS3003, EBUS3001 | Semester 1 |
INFO3315 Human-Computer Interaction | 6 | A INFO2110 | N MULT3307, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802 | Semester 2 |
INFO3404 Database Systems 2 | 6 | A Introductory database study such as INFO2120 or INFO2820 or INFO2005 or INFO2905. Students are expected to be familiar with SQL and the relational data model, and to have some programming experience. | N INFO3004, INFO3005, INFO3905, COMP3005, COMP3905 | Semester 2 |
INFO3504 Database Systems 2 (Adv) | 6 | P Distinction-level result in INFO2120 or INFO2820 or COMP2007 or COMP2907 | N INFO3404, INFO3005, INFO3905, COMP3005, COMP3905 | Semester 2 |
CS & IS double stream: Students must complete 24 credit points from the combination of selected core units for the CS stream and the IS stream, including at least 6 cp from the list above. |
Third year recommended elective units of study for IS stream |
COMP3109 Programming Languages and Paradigms | 6 | A COMP2007 | Semester 2 |
COMP3208 Introduction to Artificial Intelligence | 6 | A COMP2007 | N COMP3608, COMP3002, COMP3902 | Semester 1 |
COMP3608 Intro, to Artificial Intelligence (Adv) | 6 | P Distinction-level results in some 2nd year COMP or MATH or SOFT units. | N COMP3608, COMP3002, COMP3902 | Semester 1 |
COMP3419 Graphics and Multimedia | 6 | A COMP2007, MATH1002 | N MULT3308, MULT3606, MULT3019, MULT3919, MULT3004, MULT3904, COMP3004, COMP3904 | Semester 1 |
COMP3456 Computational Methods for Life Sciences | 6 | P INFO1105 and (COMP2007 or INFO2120) and 6 credit points from BIOL or MBLG | Semester 2 |
COMP3520 Operating Systems Internals | 6 | A COMP2129, INFO1105 | N NETS3304, NETS3604, NETS3909, NETS3009, COMP3009, COMP3909 | Semester 1 |
ELEC3506 Data Communications and the Internet | 6 | N NETS2150, NETS2009, NETS2909, NETS3007, NETS3907, ELEC3504, ELEC4501 | Semester 2 |
ELEC3607 Embedded Systems | 6 | A ELEC1101 Foundations of Computer Systems, or ELEC1601 Professional Computer Engineering or ELEC2802 Digital System Design. | P ELEC1601 and ELEC2602 | Semester 1 |
ELEC3609 Internet Software Platforms | 6 | P INFO1103, INFO2110, INFO2120 | N EBUS4001 | Semester 2 |
School of Information Technologies Stream Tables

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO3220 Object Oriented Design</td>
<td>6</td>
<td>A INFO2110, INFO1105 N SOFT3301, SOFT3601, SOFT3101, SOFT3801, COMP3008, COMP3908</td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO3315 Human-Computer Interaction</td>
<td>6</td>
<td>A INFO2110 N MULT3307, MULT3607, MULT3018, MULT3918, SOFT3102, SOFT3802, COMP3102, COMP3802</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

All 3000-level and above ELEC units of study are recommended electives.

Fourth year selected core units of study for IS stream

Students in the BIT Pass degree must complete at least 48 credit points from this list.

| COMP5045 Computational Geometry                  | 6             | A Data structures, analysis of algorithms N COMP4045               | Semester 1|
| COMP5046 Statistical Natural Language Processing | 6             | A Concepts of Linguistics, elementary statistics, AI techniques. N COMP4046 | Semester 1|
| COMP5047 Pervasive Computing                     | 6             | A Networking concepts, operating system concepts, programming expertise. N NETS4047 | Semester 2|
| COMP5048 Information Visualisation               | 6             | A Discrete mathematics, algorithms and complexity. N COMP4048       | Semester 2|
| COMP5318 Knowledge Discovery and Data Mining     | 6             | A COMP5138 and familiarity with basic statistics                   | Semester 1|
| COMP5336 Advanced Data Models                    | 6             | A COMP5138 or equivalent                                           | Semester 2|
| COMP5348 Enterprise Scale Software Architecture   | 6             | A INFO3220 or COMP5028 or equivalent.                             | Semester 1|
| COMP5416 Advanced Network Technologies            | 6             | A ELEC3506 or equivalent                                           | Semester 2|
| COMP5424 Information Technology in Biomedicine   | 6             | A Basic programming skills                                         | Semester 1|
| COMP5425 Multimedia Storage, Retrieval & Delivery| 6             | A Algorithms (equivalent to COMP5211).                            | Semester 1|
| COMP5426 Parallel and Distributed Computing      | 6             | A Equivalent of COMP5116                                          | Semester 1|
| ELEC5508 Wireless Engineering                    | 6             | A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. N ELEC5504, ELEC4504 | Semester 2|
| ELEC5509 Mobile Networks                         | 6             | A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. N ELEC5501 | Semester 1|
| ELEC5514 Networked Embedded Systems              | 6             | A ELEC3607, ELEC3305, ELEC3506 and ELEC5506                      | Semester 2|
| ELEC5614 Real Time Computing                     | 6             | A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems), Ability to program in a high level language. N ELEC4602 | Semester 1|
| ELEC5616 Computer and Network Security           | 6             | A A programming language, basic maths. N ELEC5611, NETS3016, NETS3916 | Semester 1|
| ELEC5618 Software Quality Engineering            | 6             | N SOFT3302                                                       | Semester 1|
| ELEC5679 Object Oriented Application Frameworks   | 6             | A Java programming, and some web development experience are essential. Databases strongly recommended | Semester 2|
| ELEC5620 Model Based Software Engineering         | 6             | A A programming language, basic maths Note: Department permission required for enrolment | Semester 2|
| INFO5991 Services Science Management and Eng      | 6             | A INFO5990                                                       | Semester 1|
| INFO5992 Understanding IT Innovations             | 6             | A INFO5990 N PMGT5875                                            | Semester 1|
| ISYS5050 Knowledge Management Systems             | 6             | A Information systems concepts, database concepts Note: Department permission required for enrolment | Semester 1|

Honours (CS and IS streams)

The BIT may be awarded as an Honours degree. Students may enrol in the Honours course after completion of 144 credit points, if they meet the specified entry conditions. Students enrolled in a BIT degree must apply for enrolment into the Honours program after completion of 144 credit points.

All students in BIT(Honours) must complete the following 24 credit points of core requirements plus 24 credit points from the fourth year selected core list of their respective stream. These units are only available to students enrolled in Honours degrees, those in Research Higher degrees, or those in the Research track in postgraduate coursework degrees. In addition to the core units students must also complete 24 credit points of elective units of study, please refer to the Fourth year selected core units listed in this table.
# School of Information Technologies Stream Tables

## Honours core units of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>INFO4991</strong> IT Research Thesis A</td>
<td>6</td>
<td>Enrolment in Honours (BCST or BIT)</td>
<td>INFO4992 and INFO5993</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td><strong>INFO4992</strong> IT Research Thesis B</td>
<td>12</td>
<td>Enrolment in Honours (BCST or BIT)</td>
<td>INFO4991 and INFO5993</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td><strong>INFO4999</strong> Computer Science Honours Result</td>
<td></td>
<td>Permission of the Head of Department</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td><strong>INFO5993</strong> IT Research Methods</td>
<td>6</td>
<td>Elementary statistics</td>
<td>INFO4990</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>
The Faculty of Engineering and Information Technologies offers postgraduate research degrees at master's and doctorate level:

- Master of Philosophy (MPhil)
- Doctor of Philosophy (PhD).

Research degree resolutions

The University of Sydney (Higher Degree by Research) Rule 2011 and the Academic Board Postgraduate Degree of Doctor of Philosophy resolutions govern research in the Faculty of Engineering and Information Technologies.
Master of Philosophy

Course resolutions
Part 1: Preliminary

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course and stream title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HC051</td>
<td>Master of Philosophy</td>
</tr>
</tbody>
</table>

Part 2: Admission requirements

2 Eligibility for admission to candidature

(1) To be eligible to be admitted to candidature by the Dean or Associate Dean, an applicant must hold or have completed the requirements for:
   (a) a bachelor's degree from the Faculty of Engineering and Information Technologies in the University of Sydney, with first or second class honours; or
   (b) a master's degree by coursework from the Faculty of Engineering and Information Technologies in the University of Sydney, provided that the applicant:
       (i) has completed the course with a minimum weighted average mark of 75%; and
       (ii) has completed a research thesis with a weighting of at least 12 credit points and a minimum grade of Distinction.

(2) The Dean or Associate Dean may admit to candidature an applicant who does not meet the requirements of sub-clause (1), provided that the applicant holds a qualification or qualifications that, in the opinion of the Faculty Graduate Studies Committee, are equivalent to those prescribed in sub-clause (1).

3 Application for admission to candidature

(1) An applicant for admission to candidature must submit to the Faculty:
   (a) satisfactory evidence of the applicant's eligibility for admission;
   (b) a proposed course of research and advanced study, approved by the Head of the Department in which the work is to be undertaken; and
   (c) a statement certifying the applicant's understanding that, subject to the HDR Rule, if the candidature is successful, his or her thesis will be lodged with the University Librarian and made available for immediate public use.

(2) In addition, an applicant for admission to part-time candidature must submit a statement that he or she will have sufficient time available to complete the requirements of the degree in accordance with these resolutions.

4 Credit transfer

The HDR Rule specifies the conditions for the granting of credit for previous studies, including the effect on completion times.

Part 3: Candidature

5 Appointment of supervisor

The Head of Department will appoint a supervisor and associate supervisor for each candidate in accordance with the HDR Rule and Academic Board policies for postgraduate research higher degree supervision.

6 Control of candidature

The HDR Rule specifies the conditions for the control of candidature by the University.

7 Location of candidature and attendance

The HDR Rule specifies the conditions for the location of candidature and attendance by candidates at the University.
Part 4: Requirements

8 Degree requirements

(1) To satisfy the requirements of the degree candidates must:
   (a) complete any specified probationary requirements;
   (b) complete prescribed units of study;
   (c) conduct research on an approved topic; and
   (d) write a thesis embodying the results of the research.

9 The thesis

A candidate shall produce a thesis that meets the requirements specified in the HDR Rule.

Part 5: Enrolment and progression

10 Probation

(1) A candidate is normally accepted for candidature on a probationary basis for a period not exceeding one year according to the provisions of the HDR Rule.

(2) In the probationary period each candidate must:
   (a) complete a specified research methods unit of study;
   (b) develop and present a refined research proposal to the satisfaction of the Supervisor and Head of Department; and
   (c) demonstrate adequate English language competency for the completion of the degree.

11 Time limits, earliest and latest submission dates

The HDR Rule specifies the allowable completion times and submission dates available for full- and part-time candidates in this course.

12 Mode of attendance

The attendance pattern for this course is full-time or part-time according to candidate choice. Visa requirements commonly restrict international students to full-time study only.

13 Discontinuation of candidature

A candidate may discontinue enrolment in a unit of study or the degree subject to the conditions specified by the HDR Rule.

14 Suspension of candidature

A candidate may suspend enrolment from the degree subject to the conditions specified by the HDR Rule.

15 Leave of absence

A candidate may take leave of absence from the degree subject to the conditions specified by the HDR Rule.

16 Progress

A candidate is required to maintain satisfactory progress towards the timely completion of the degree. Progress will be reviewed annually according to the provisions of the HDR Rule.

Part 6: Examination

17 Examination of the thesis

(1) Examination of the thesis will be conducted in general accordance with standards prescribed by Academic Board for the Doctor of Philosophy, except that:
   (a) three copies of the thesis shall be submitted by the candidate;
   (b) two examiners will be appointed by the Faculty, at least one of whom shall be external to the University; and
   (c) the Faculty Graduate Studies Committee will act in place of the PhD Award Sub-Committee.

(2) The thesis will be graded by the examiners and a 'Thesis grade' will be recorded on the academic transcript.

18 Award of the degree

The degree is awarded at the Pass level only.

Part 7: Other

19 Transitional provisions

(1) These course resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.
(2) Candidates who commenced prior to 1 January, 2012 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed within the time limits specified in those resolutions. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.
The Faculty of Engineering and Information Technologies offers coursework degrees at master's, graduate diploma and graduate certificate level.

In the Schools of Aerospace, Mechanical and Mechatronic Engineering, Chemical and Biomolecular Engineering, Civil Engineering and Electrical and Information Engineering:

- Master of Engineering (ME)
- Master of Professional Engineering (MPE)
- Graduate Diploma in Engineering (Professional Engineering) (GradDipPE)
- Graduate Diploma in Engineering (GradDipE)
- Graduate Certificate in Engineering (GradCertE).

In the School of Information Technology:

- Master of Information Technology (MIT)
- Graduate Diploma in Information Technology (GDIT)
- Graduate Certificate in Information Technology (GCIT)
- Master of Information Technology Management (MITM)
- Graduate Diploma in Information Technology Management (GDITM)
- Graduate Certificate in Information Technology Management (GCITM)
- Graduate Diploma in Computing (GDC).

In the School of Civil Engineering:

- Master of Project Management (MPM)
- Master of Project Leadership (MPL)
- Graduate Diploma of Project Management (GDPM)
- Graduate Diploma of Project Leadership (GDPL)
- Graduate Certificate in Project Management (GCPM)
- Graduate Certificate in Project Leadership (GCPL).

Conversion Master's Programs

The Faculty of Engineering and Information Technologies offers a three year Conversion Master's Program, consisting of a Graduate Diploma (Professional Engineering) or Graduate Certificate in Engineering and the Master of Professional Engineering. This program is aimed at students who have a non-engineering background, such as an undergraduate degree in Science, or an overseas Engineering qualification. The complete three-year program is designed so that students initially enrol in the foundation components of an Engineering stream, covering areas that were not part of their original undergraduate degree. This is done in the first year of enrolment in a Graduate Certificate or Diploma. Once the foundation subjects have been completed and entry requirements met, students can then go on to the Master of Professional Engineering degree. This two-year degree covers the specialist and professional practice components of the selected Engineering stream.

Applicants for the Conversion Master's Program must satisfy the entry requirements set out in the tables for the Master of Professional Engineering for each stream.

Where students have completed the required entry subjects in a prior Bachelor's degree, advanced standing of up to one year may be awarded toward the program. Every application is assessed individually and an enrolment program is devised for each student to make sure that all students reach an equivalent level of theoretical, practical, professional and specialisation skills prior to commencement of the MPE.

Students must fulfil the entry requirements as follows:

1. Minimum Entry condition.
   Must have completed a minimum of 48 credit points, or equivalent, of science-related units of study in their bachelor's degree relevant to the Engineering stream chosen;

2. Foundation Subjects.
   2.1 Must have completed 48 credit points of foundation engineering units of study in their bachelor's degree relating to the field of engineering they wish to specialise in; or
   2.2 Must complete 48 credit points of foundation engineering units of study in a Graduate Diploma or Graduate Certificate in Engineering at the University of Sydney.

The complete Conversion Master's Program consists of 144 credit points, and 3.0 years duration of full-time study or equivalent in part-time study.

As a requirement of the Conversion Master's Program, students complete a capstone project, which may either be a 24 credit point research dissertation or a 12 credit point research project. Students will work with an academic supervisor on a current research or industry-based project and write a thesis on their research outcomes. Students at the master's level will develop the experience and professional skills required to critically evaluate the research undertaken while working on their capstone project.

Industrial experience done as a 12-week work placement, or equivalent, is a requirement for completion of the Master of Professional Engineering degree.
The MPE degree is available in the following specialisations:

in the School of Aerospace, Mechanical and Mechatronic Engineering
Aerospace, Biomedical and Mechanical Engineering

in the School of Chemical and Biomolecular Engineering
Chemical and Biomolecular Engineering

in the School of Civil Engineering
Civil, Environmental Fluids, Geotechnical and Structural Engineering

in the School of Electrical and Information Engineering

Coursework degree rules
Detailed course rules and unit of study tables listing all program requirements for the faculty postgraduate courses are shown in the following chapters.
Master of Engineering
Course rules

Graduate Certificate in Engineering

Graduate Diploma in Engineering

Master of Engineering

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG027</td>
<td>Graduate Certificate in Engineering</td>
</tr>
<tr>
<td>HF044</td>
<td>Graduate Diploma in Engineering</td>
</tr>
<tr>
<td>HC048</td>
<td>Master of Engineering</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Embedded courses in this sequence

(1) The embedded courses in this sequence are:
   (a) the Graduate Certificate in Engineering
   (b) the Graduate Diploma in Engineering
   (c) the Master of Engineering

(2) Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred.

4 Admission to candidature

(1) Available places will be offered to qualified applicants in the order in which complete applications are received, according to the following admissions criteria.

(2) Admission to the Graduate Certificate in Engineering requires a bachelor’s degree from the University of Sydney or equivalent qualification.

(3) Admission to the Graduate Diploma in Engineering requires:
   (a) a bachelor’s degree from the University of Sydney or equivalent qualification; or
   (b) completion of the embedded graduate certificate.

(4) Admission to the Master of Engineering requires:
   (a) a Bachelor of Engineering from the University of Sydney or equivalent qualification with a credit average; or
   (b) completion of the embedded graduate diploma or graduate certificate with a minimum credit average.

(5) Additional admission requirement for the Chemical and Biomolecular and the Biomedical streams:
   Admission to the Chemical and Biomolecular Engineering or the Biomedical Engineering requires completion of prerequisites equivalent to 12 credit points of mathematics, six credit points of computing and six credit points of biology, chemistry or related fundamental science units.

(6) In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

5 Requirements for award

(1) The units of study that may be taken for the courses are set out in the table of units of study: Graduate Certificate in Engineering/Graduate Diploma in Engineering/Master of Engineering.

(2) To qualify for the award of the Graduate Certificate in Engineering a candidate must complete 24 credit points of units of study from the prescribed tables.

(3) To qualify for the award of the Graduate Diploma in Engineering a candidate must complete 36 credit points of units of study from the prescribed tables.

(4) To qualify for the award of the Master of Engineering a candidate must complete 48 credit points, including:
   (a) 24 credit points of fundamental and/or specialist units of study from a relevant specialisation; and
   (b) 12 credit points of professional or research pathway units of study from a relevant specialisation; and
   (c) 12 credit points of elective units of study, except for Civil Engineering, Electrical Engineering and Mechanical Engineering specialisation, where these 12 credit points must be chosen from specialist units of study; and
   (d) candidates must complete a specialisation in one of the areas listed below.

6 Specialisations

Completion of a specialisation is a requirement of the Master of Engineering. A specialisation requires the completion of prescribed units of study listed in the table for that specialisation. The specialisations available are:

(a) Chemical and Biomolecular Engineering specialisations
(i) Biophysical Processes
(ii) Chemical and Biomolecular Engineering
(iii) Environmental Engineering
(iv) Sustainable Processing

(b) Civil Engineering specialisations
(i) Civil Engineering
(ii) Environmental Fluids
(iii) Geotechnical Engineering
(iv) Structural Engineering

(c) Electrical and Information Engineering specialisations
(i) Electrical Engineering
(ii) Network Engineering
(iii) Power Engineering
(iv) Wireless Engineering

(d) Aerospace, Mechanical and Mechatronic Engineering specialisations
(i) Biomedical Engineering
(ii) Mechanical Engineering

7 Research Pathway

A candidate for the Master of Engineering must complete 24 credit points of units of study with an average mark of at least 75 or be given approval at the discretion of the postgraduate program director, before taking Research Pathway units.

8 Course transfer

(1) A candidate for the master or graduate diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Dean, and provided the requirements of the shorter award have been met.

(2) A candidate who has had a certificate or diploma in this sequence conferred may apply for transfer of 12 credit points to the Master of Engineering.

9 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Graduate Certificate in Project Management
Graduate Diploma in Project Management
Master of Project Management

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG006</td>
<td>Graduate Certificate in Project Management</td>
</tr>
<tr>
<td>HF023</td>
<td>Graduate Diploma in Project Management</td>
</tr>
<tr>
<td>HC031</td>
<td>Master of Project Management</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Master's type

The master's degree in these resolutions is a professional master’s course, as defined by the Coursework Rule.

4 Embedded courses in this sequence

(1) The embedded courses in this sequence are:
   (a) the Graduate Certificate in Project Management
   (b) the Graduate Diploma in Project Management
   (c) the Master of Project Management

(2) Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred.

5 Admission to candidature

(1) Available places will be offered to qualified applicants in the order in which complete applications are received, according to the following admissions criteria.

(2) Admission to the Graduate Certificate in Project Management requires:
   (a) a bachelor's degree from the University of Sydney or equivalent qualification; or
   (b) relevant industry experience and certifications.

(3) Admission to the Graduate Diploma of Project Management requires:
   (a) a bachelor's degree from the University of Sydney or equivalent qualification; or
   (b) completion of the embedded graduate certificate with a minimum credit average.

(4) Admission to the Master of Project Management requires:
   (a) a bachelor's degree from the University of Sydney or equivalent qualification with a minimum credit average; or
   (b) completion of the embedded graduate diploma with a minimum credit average.

(5) In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

6 Requirements for award

(1) The units of study that are required for the courses are set out in the table of units of study: Graduate Certificate in Project Management / Graduate Diploma of Project Management / Master of Project Management.

(2) To qualify for the award of the Graduate Certificate in Project Management a candidate must complete 24 credit points, including:
   (a) 12 credit points of foundation units of study;
   (b) 6 credit points of specialist units of study; and

(3) To qualify for the award of the Graduate Diploma in Project Management a candidate must complete 36 credit points, including:
   (a) 12 credit points of foundation units of study;
   (b) 12 credit points of specialist units of study;
   (c) 6 credit points of professional practice units of study; and
(d) 6 credit points of elective units of study.

(4) A candidate who has been admitted to the Master of Project Management shall proceed either: by professional practice pathway; or by research practice pathway.

(5) To qualify for the award of the Master of Project Management by professional practice pathway, a candidate must complete 48 credit points, including:
   (a) 12 credit points of foundation units of study;
   (b) 12 credit points of specialist units of study;
   (c) 12 credit points of professional practice units of study; and
   (d) 12 credit points of elective units of study.

(6) Entry into the Master of Project Management research pathway requires special permission from the Program Director. To qualify for the award of the Master of Project Management by research pathway, a candidate must complete 48 credit points, including:
   (a) 12 credit points from foundation units of study;
   (b) 12 credit points from specialisation units of study prescribed by the faculty;
   (c) 12 credit points of research units of study;
   (d) 6 credit points of professional practice units of study; and
   (e) 6 credit points of elective units of study.

7 Specialisations

(1) Completion of a specialisation is not a requirement of the Master of Project Management. A specialisation requires the completion of 12 credit points from units of study listed in the table for that specialisation including the core unit. The specialisations available are:
   (a) International Project Management
   (b) Project Economics and Scheduling Management
   (c) Project Risk Management
   (d) Strategic PM Implementation

8 Cross-institutional study

Cross-institutional study is not available in these courses except where the University of Sydney has a formal cooperation agreement with another university.

9 Satisfactory progress

Progression is subject to the Coursework Rule. A candidate who has failed to meet these progression rules will be transferred to either the Graduate Diploma or the Graduate Certificate in Project Management, depending on the credit points successfully completed.

10 Course transfer

A candidate for the master or graduate diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Director of the Faculty of Engineering and Information Technologies Graduate School, and provided the requirements of the shorter award have been met.

11 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Project Leadership

Graduate Certificate in Project Leadership
Graduate Diploma in Project Leadership
Master of Project Leadership

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

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<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>HG028</td>
<td>Graduate Certificate in Project Leadership</td>
</tr>
<tr>
<td>HF046</td>
<td>Graduate Diploma in Project Leadership</td>
</tr>
<tr>
<td>HC085</td>
<td>Master of Project Leadership</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Master's type

The master's degree in these resolutions is a professional master's course, as defined by the Coursework Rule.

4 Embedded courses in this sequence

(1) The embedded courses in this sequence are:
   (a) the Graduate Certificate in Project Leadership
   (b) the Graduate Diploma in Project Leadership
   (c) the Master of Project Leadership

(2) Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred.

5 Admission to candidature

(1) Available places will be offered to qualified applicants in the order in which complete applications are received, according to the following admissions criteria.

(2) Admission to the Graduate Certificate in Project Leadership requires:
   (a) minimum of 5 years work experience with a middle to senior project management position or similar; and
   (b) a Bachelor degree in any discipline with a credit average or a qualification that is acceptable to the Faculty for entry to the Graduate Certificate program.

(3) Admission to the Graduate Diploma of Project Leadership requires:
   (a) minimum of 5 years work experience with a middle to senior project management position or similar; and
   (b) a bachelor's degree from the University of Sydney or equivalent qualification; or
   (c) completion of the embedded Graduate Certificate of Project Leadership with a minimum credit average.

(4) Admission to the Master of Project Leadership requires:
   (a) minimum of 5 years work experience with a middle to senior project management position or similar; and
   (b) a bachelor's degree from the University of Sydney or equivalent qualification; or
   (c) completion of the embedded Graduate Diploma of Project Leadership with a minimum credit average.

(5) All candidates who receive an offer of admission may be required to attend an interview with the Program Director before commencement.

(6) All enrolled students must complete a Professional Development Plan within their first semester of candidature.

(7) In exceptional circumstances, the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

6 Requirements for award

(1) The units of study that are required for the courses are set out in the table of units of study: Graduate Certificate in Project Leadership / Graduate Diploma of Project Leadership / Master of Project Leadership.

(2) To qualify for the award of the Graduate Certificate in Project Leadership a candidate must complete a set structure of 24 credit points as defined in the degree table.
(3) To qualify for the award of the Graduate Diploma in Project Leadership, a candidate must complete a set structure of 36 credit points as defined in the degree table.

(4) To qualify for the award of the Master of Project Leadership, a candidate must complete a set structure of 48 credit points as defined in the degree table.

7 Cross-institutional study

Cross-institutional study is not available in these courses except where the University of Sydney has a formal cooperation agreement with another university.

8 Satisfactory progress

Progression is subject to the Coursework Rule. Failing to comply with the progression rule may lead to Show Cause which could lead to a change in candidature.

9 Course transfer

A candidate for the Master or Graduate Diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Dean, and provided the requirements of the shorter award have been met.

10 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2012 and students who commenced their candidature prior to 1 January, 2012 who elect to proceed under these resolutions.
Graduate Certificate in Information Technology
Graduate Diploma in Information Technology
Master of Information Technology

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course Resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG025</td>
<td>Graduate Certificate in Information Technology</td>
</tr>
<tr>
<td>HF042</td>
<td>Graduate Diploma in Information Technology</td>
</tr>
<tr>
<td>HC049</td>
<td>Master of Information Technology</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for the courses is full time or part time according to candidate choice.

3 Master's type

The master's degree in these resolutions is a professional master's course, as defined by the Coursework Rule.

4 Embedded courses in this sequence

1. The embedded courses in this sequence are:
   (a) the Graduate Certificate in Information Technology
   (b) the Graduate Diploma in Information Technology
   (c) the Master of Information Technology

2. Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred.

5 Admission to candidature

1. Available places will be offered to qualified applicants based on merit, according to the following admissions criteria.

2. Admission to the Graduate Certificate in Information Technology requires:
   (a) a bachelor's degree with a substantial study in a relevant field of Information Technology; or
   (b) the Bachelor of Engineering from the University of Sydney, or equivalent qualification, with a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering.

3. Admission to the Graduate Diploma in Information Technology requires:
   (a) a bachelor's degree in any aspect of Information Technology; or
   (b) the Bachelor of Engineering from the University of Sydney, or equivalent qualification, with a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering; or
   (c) completion of the embedded graduate certificate with at least a credit average.

4. Admission to the Master of Information Technology requires:
   (a) a bachelor's degree with at least a credit average and a major sequence of study in any aspect of Information Technology; or
   (b) the Bachelor of Engineering from the University of Sydney, or equivalent qualification, with at least a credit average and a major sequence of study in Computer Engineering, Software Engineering or Telecommunications Engineering; or
   (c) completion of the embedded graduate diploma with at least a credit average; or
   (d) completion of the Graduate Diploma in Computing from the University of Sydney with no more than 12 credit points of unit of study failed.

5. In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

6 Requirements for award

1. The units of study that may be taken for these awards are set out in the table of units of study: Master of Information Technology.

2. From the table of units of study and with the approval of the Dean or nominee, a maximum of 18 credit points may be selected from units outside the School of IT, of which no more than 12 credit points may be from outside the Faculty of Engineering and IT.
To qualify for the Graduate Certificate in Information Technology a candidate must complete 24 credit points of the Foundational or Specialist units of study.

To qualify for the Graduate Diploma in Information Technology a candidate must complete 36 credit points, including:

(a) a maximum of 24 credit points of the Foundational units of study; and

(b) a minimum of 12 credit points of the Specialist units of study from the table of units of study excluding Project units and Core Professional Pathway units.

To qualify for the Masters in Information Technology a candidate must complete 48 credit points, including:

(a) all core units of study of either the Professional Pathway or the Research Path; and

(b) maximum 24 credit points of Foundational units of study; and

(c) all prescribed units of study for one defined specialisation or the research path.

7 Specialisations

Completion of a specialisation is a requirement of the Master of Information Technology. A specialisation requires the completion of all core units of study as prescribed by the faculty and at least 18 credit points chosen from units of study listed in the table for the defined specialisation. The specialisations available are:

(a) Business Information Systems
(b) Computer Networks
(c) Computer Science
(d) Database Management Systems
(e) Health Informatics
(f) Multimedia Technology
(g) Project Management
(h) Software Engineering
(i) Telecommunications Engineering.

8 Progression Rules

(1) A candidate for the Master of Information Technology must complete 24 credit points from Foundational or Specialist units of study with at least Credit average marks before taking any Information Technology Project units. Admission to project units of study is subject to availability of supervision and to the approval of the Dean or nominee.

(2) With permission from the Dean or nominee, a candidate for the Master of Information Technology who completed 24 credit points from Foundational or Specialist units of study with an at least Distinction average marks may take Research Path units.

9 Suspension of candidature

A student may seek written permission from the Dean to suspend candidature in the course. Suspension may be granted for a maximum of one year.

10 Cross-institutional study

Cross-institutional study is not available in these courses except where the University of Sydney has a formal cooperation agreement with another university.

11 Course transfer

A candidate for the master or graduate diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Dean, and provided the requirements of the shorter award have been met.

12 Credit for previous study

(1) In addition to the general credit transfer rules of the Coursework Rule, the following restrictions on credit transfer into these courses apply:

(a) where postgraduate study has been undertaken at the University of Sydney in one of the embedded courses of the Master of Information Technology Management and no award has been conferred, credit may be transferred in full, provided the study has been undertaken within the previous three years and subject to approval of the Academic Director;

(b) where study has been undertaken at postgraduate level and no award has been conferred, credit to a maximum of 50% of the prescribed credit points may be transferred to the Graduate Diploma in Information Technology or the Master of Information Technology, provided:

(i) the study has been undertaken at the University of Sydney, or at an external institution recognised by the University of Sydney, within the previous three years; and

(ii) the units of study have been completed at credit level or above; and

(iii) the units are equivalent to Core or Specialist units of study offered under the degree being taken, subject to approval of the Academic Director;

(c) where study has been undertaken at postgraduate level and an award has been conferred, credit to a maximum of 12 credit points may be transferred to the Master of Information Technology, provided:

(i) the study has been undertaken at an external institution recognized by the University of Sydney within the previous three years; and

(ii) the units of study have been completed at credit level or above; and

(iii) the units are equivalent to Core or Specialist units of study offered under the degree being taken, subject to approval of the Academic Director.

13 Satisfactory progress

Progression is subject to the Coursework Rule. A candidate who has failed to meet these progression rules will be transferred to either the Graduate Diploma or the Graduate Certificate in Information Technology, depending on the credit points successfully completed.
14 Time limit

(1) A candidate for the Graduate Certificate in Information Technology shall complete the requirements for the award in a minimum enrolment of one semester and a maximum enrolment of four semesters.

(2) A candidate for the Graduate Diploma in Information Technology shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of six semesters.

(3) A candidate for the Master of Information Technology shall complete the requirements for the award in a minimum of two semesters and a maximum of eight semesters.

15 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Graduate Certificate in Information Technology Management
Graduate Diploma in Information Technology Management
Master of Information Technology Management

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the 'Coursework Rule'), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HG026</td>
<td>Graduate Certificate in Information Technology Management</td>
</tr>
<tr>
<td>HF043</td>
<td>Graduate Diploma in Information Technology Management</td>
</tr>
<tr>
<td>HC050</td>
<td>Master of Information Technology Management</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Master's type

The master's degree in these resolutions is a professional master's course, as defined by the Coursework Rule.

4 Embedded courses in this sequence

(1) The embedded courses in this sequence are:
   (a) the Graduate Certificate in Information Technology Management
   (b) the Graduate Diploma in Information Technology Management
   (c) the Master of Information Technology Management

(2) Providing candidates satisfy the admission requirements for each stage, a candidate may progress to the award of any of the courses in this sequence. Only the longest award completed will be conferred.

5 Admission to candidature

(1) Available places will be offered to qualified applicants based on merit, according to the following admissions criteria.

(2) Admission to the Graduate Certificate in Information Technology Management requires:
   (a) a bachelor's degree in a computing related area, with a minimum of three years professional experience in the IT industry; or
   (b) a bachelor's degree in any discipline, with a minimum of five years professional experience in the IT industry.

(3) Admission to the Graduate Diploma in Information Technology Management requires:
   (a) a bachelor's degree in a computing related area, with a minimum of three years professional experience in the IT industry; or
   (b) a bachelor's degree in any discipline, with a minimum of five years professional experience in the IT industry; or
   (c) completion of the requirements of the embedded graduate certificate with at least a credit average.

(4) Admission to the Master of Information Technology Management requires:
   (a) a bachelor's degree in a computing related area with at least a credit average and a minimum of two years professional experience in the IT industry; or
   (b) a bachelor's degree in any discipline with at least a credit average and with a minimum of five years professional experience in the IT industry; or
   (c) completion of the requirements of the embedded graduate diploma with at least a credit average; or
   (d) completion of the Graduate Diploma in Computing from the University of Sydney with no more than 12 credit points of unit of study failed; or
   (e) completion of the Master of Information Technology from the University of Sydney.

(5) In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

6 Requirements for award

(1) The units of study that may be taken for the courses are set out in the table of units of study: Master of Information Technology Management.

(2) From the table of units of study and with the approval of the Dean or nominee, a maximum of 18 credit points may be selected from units outside the School of IT, of which no more than 12 credit points may be from outside the Faculty of Engineering and IT.
To qualify for the award of the Graduate Certificate in Information Technology Management a candidate must complete 24 credit points of units of study as specified in the degree table.

To qualify for the award of the Graduate Diploma in Information Technology Management a candidate must complete 36 credit points of units of study as specified in the degree table.

To qualify for the award of the Master of Information Technology Management a candidate must complete 48 credit points of units of study as specified in the degree table.

7 Progression rules

1. A candidate must complete 24 credit points of units of study with at least Credit average marks before taking any Information Technology Project units. Admission to project units of study is subject to availability of supervision and to the approval of the Dean or nominee.

2. With permission from the Dean or nominee, a candidate for the Master of Information Technology Management who completed 24 credit points of units of study with at least Distinction average marks may take Research Path units.

8 Cross-institutional study

Cross-institutional study is not available in these courses except where the University of Sydney has a formal cooperation agreement with another university.

9 Course transfer

A candidate for the master's degree or graduate diploma may elect to discontinue study and graduate with a shorter award from this embedded sequence, with the approval of the Dean, and provided the requirements of the shorter award have been met.

10 Credit for previous study

1. In addition to the general credit transfer rules of the Coursework Rule, the following restrictions on credit transfer into these courses apply:

   a. Where postgraduate study has been undertaken at the University of Sydney in one of the embedded courses of the Master of Information Technology and no award has been conferred, credit may be transferred in full, provided the study has been undertaken within the previous three years and subject to approval of the Academic Director.

   b. Where study has been undertaken at postgraduate level and no award has been conferred, credit to a maximum of 50% of the prescribed credit points may be transferred to the Graduate Diploma in Information Technology Management or the Master of Information Technology Management, if:
      i. the study has been undertaken at the University of Sydney, or at an external institution recognized by the University of Sydney, within the previous three years; and
      ii. the units of study have been completed at credit level or above; and
      iii. the units are equivalent to core (additional or mandatory) units of study offered under the degree being taken, subject to approval of the Academic Director.

   c. Where study has been undertaken at postgraduate level and an award has been conferred, credit to a maximum of 12 credit points may be transferred to the Master of Information Technology Management, provided:
      i. the study has been undertaken at an external institution recognized by the University of Sydney within the previous three years; and
      ii. the units of study have been completed at credit level or above; and
      iii. the units are equivalent to core (additional or mandatory) units of study offered under the degree being taken, subject to approval of the Academic Director.

11 Suspension of candidature

A student may seek written permission from the Dean to suspend candidature in the course. Suspension may be granted for a maximum of one year.

12 Satisfactory progress

Progression is subject to the Coursework Rule. A candidate who has failed to meet these progression rules will be transferred to either the Graduate Diploma or the Graduate Certificate in Information Technology Management, depending on the credit points successfully completed.

13 Time limit

1. A candidate for the Graduate Certificate in Information Technology Management shall complete the requirements for the award in a minimum enrolment of one semester and a maximum enrolment of four semesters.

2. A candidate for the Graduate Diploma in Information Technology Management shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of six semesters.

3. A candidate for the Master of Information Technology Management shall complete the requirements for the award in a minimum of two semesters and a maximum of eight semesters.

14 Transitional provisions

1. These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

2. Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF041</td>
<td>Graduate Diploma in Computing</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Admission to candidature

(1) Available places will be offered to qualified applicants based on merit, according to the following admissions criteria.

(2) Admission to candidature requires:

(a) a bachelor's degree from the University of Sydney, or equivalent qualification, with a credit average or above, including units of study with a mathematical foundation demonstrating significant numeracy skills; or

(b) a bachelor's degree from the University of Sydney, or equivalent qualification, with a credit average or above, and employment in the area of IT for a minimum of five years. Applicants must also provide evidence of prior learning which is considered to demonstrate the knowledge and aptitude required to undertake this course.

4 Requirements for award

(1) The units of study that may be taken for the course are set out in Table of units: Graduate Diploma in Computing.

(2) To qualify for the award of the Graduate Diploma in Computing, a candidate must complete 48 credit points.

5 Suspension of candidature

A student may suspend candidature in this course for a maximum of one year.

6 Cross-institutional study

Cross-institutional study is not available in this course except where the University of Sydney has a formal cooperation agreement with another university.

7 Credit for previous study

The credit transfer provisions of the Coursework Rule apply except that where the study has been undertaken at postgraduate level and no award has been conferred, credit to a maximum of 50% of the prescribed credit points may be transferred, provided:

(a) the study has been undertaken at the University of Sydney, or at an external institution recognised by the University of Sydney, within the previous three years; and

(b) the units are equivalent to units of study offered under the degree being taken, subject to approval of the Academic Director.

8 Satisfactory progress

The Dean may require any student who has failed a cumulative total of 18 credit points or more at any stage of enrolment in the Graduate Diploma in Computing to show good cause why he or she should be allowed to re-enrol.

9 Time limit

A candidate for the Graduate Diploma in Computing shall complete the requirements for the award in a minimum enrolment of two semesters and a maximum enrolment of eight semesters.

10 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.
(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement, provided that requirements are completed by 1 January, 2016. The Faculty may specify a later date for completion or specify alternative requirements for completion of candidatures that extend beyond this time.
The Faculty of Engineering and Information Technologies offers the following specialist programs,

1. Master of Professional Engineering
2. Graduate Diploma in Engineering (Professional Engineering)

The Master of Professional Engineering is available in the following specialisations:

- Aerospace
- Biomedical
- Chemical and Biomolecular
- Civil
- Electrical
- Environmental Fluids
- Geotechnical
- Mechanical
- Networking
- Power
- Software
- Structural
- Wireless

The requirements of these specialisations are shown in the following tables.

The Graduate Diploma in Engineering (Professional Engineering) is an entry pathway for MPE. Units of study required to complete this pathway will be subject to the recommendations of the Director of the individual MPE specialist programs.
Course rules

Master of Professional Engineering

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
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<tbody>
<tr>
<td>HC052</td>
<td>Master of Professional Engineering</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Master’s type

This master's degree is a professional master's course, as defined in the Coursework Rule.

4 Streams

(1) The Master of Professional Engineering is available in the following streams:
   (a) Aerospace Engineering
   (b) Biomedical Engineering
   (c) Chemical and Biomolecular Engineering
   (d) Civil Engineering
   (e) Electrical Engineering
   (f) Environmental Fluids
   (g) Geotechnical Engineering
   (h) Mechanical Engineering
   (i) Network Engineering
   (j) Power Engineering
   (k) Software Engineering
   (l) Structural Engineering
   (m) Wireless Engineering

(2) Completion of a stream is a requirement of the course. Candidates wishing to transfer between streams should contact the Faculty student office.

5 Admission to candidature

(1) Available places will be offered to qualified applicants in the order in which complete applications are received, according to the following admissions criteria.

(2) Admission to candidature requires:
   (a) a Bachelor of Engineering from the University of Sydney, or equivalent qualification, with a minimum credit average; or
   (b) a non-engineering bachelor’s degree with a minimum credit average, with studies equivalent to 48 credit points in mathematics, physics, chemistry, biology, geology, computing or statistics, as related to the stream sought for admission.

(3) All candidates for admission must have prior learning equivalent to 96 credit points in total, which, in the estimation of the Dean, is comparable to the requirements for the first two years of a Bachelor of Engineering at this University in the stream sought for admission. Refer to the admission requirement tables in the handbook for a guide to acceptable prior learning units of study.

(4) Applicants, who require additional studies to satisfy the above entry requirements, may be granted conditional admission to the Master of Professional Engineering subject to completion of the Graduate Certificate in Engineering or the Graduate Diploma in Engineering with a credit average.

(5) In exceptional circumstances the Dean may admit applicants without these qualifications who, in the opinion of the faculty, have qualifications and evidence of experience and achievement sufficient to successfully undertake the award.

6 Requirements for award

(1) The units of study that may be taken for the course are set out in the tables of units of study: Master of Professional Engineering.

(2) To qualify for the award of the Master of Professional Engineering a candidate must complete 96 credit points, including core and elective units of study as listed in the table of units of study for each stream.

7 Credit for previous study

(1) Candidates transferring from the Master of Engineering to the Master of Professional Engineering may transfer up to 24 credit points provided units are equivalent to units of study offered in the Master of Professional Engineering. Any additional credit is subject to the approval by the Director of the Faculty of Engineering and Information Technologies School of Graduate Studies.

(2) A maximum of 36 credit points may be granted towards the Master of Professional Engineering from external postgraduate studies where no award has been, or will be made, provided the studies are acceptable to the Program Director and are equivalent to units of study offer in the Master of Professional Engineering.
(3) Candidates enrolled in the Graduate Certificate or Graduate Diploma of Engineering (Professional Engineering) in conjunction with the Master of Professional Engineering may be granted credit up to 18 credit points from prior learning.

(4) Candidates who have completed units of study in the Master of Professional Engineering are not able to automatically transfer credit to a Master of Engineering program. Credit for any applicable units of study will be determined by the Director of the Faculty of Engineering and Information Technologies School of Graduate Studies.

8 Transitional provisions

(1) These resolutions apply to students who commenced their candidature after 1 January, 2011 and students who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.

9 Transferring out of the MPE

(1) Students transferring out of the MPE must have completed 48 credit points of specialist units of study to graduate with the ME. If there are foundation units in the student’s academic record, they will be awarded a Grad Dip Eng (Professional).
Graduate Diploma in Engineering (Professional Engineering)

These resolutions must be read in conjunction with applicable University By-laws, Rules and policies including (but not limited to) the University of Sydney (Coursework) Rule 2000 (the ‘Coursework Rule’), the Resolutions of the Faculty, the University of Sydney (Student Appeals against Academic Decisions) Rule 2006 (as amended) and the Academic Board policies on Academic Dishonesty and Plagiarism.

Course resolutions

1 Course codes

<table>
<thead>
<tr>
<th>Code</th>
<th>Course title</th>
</tr>
</thead>
<tbody>
<tr>
<td>HF045</td>
<td>Graduate Diploma in Engineering (Professional Engineering)</td>
</tr>
</tbody>
</table>

2 Attendance pattern

The attendance pattern for this course is full time or part time according to candidate choice.

3 Admission to candidature

(1) The Graduate Diploma in Engineering (Professional Engineering) is an entry program for the Master of Professional Engineering as part of a conversion Masters program. Available places will be offered to qualified applicants in the order in which complete applications are received, according to the following admissions criteria.

(2) Admission to the degree requires a Bachelor of Engineering degree or a Bachelor of Science degree or an equivalent qualification in a relevant discipline, from the University of Sydney or equivalent institution.

(3) In exceptional circumstances the Dean may admit applicants without these qualifications but whose evidence of experience and achievement is deemed by the Dean to be equivalent.

4 Requirements for award

(1) The units of study that are required to be taken for the course are determined by the Director of the Faculty of Engineering and Information Technologies School of Graduate Studies. These units of study will be prescribed in order to meet the assumed knowledge entry requirements of the Master of Professional Engineering.

(2) To qualify for the award of the graduate diploma a candidate must complete 48 credit points.

5 Credit for previous study

Candidates may apply for credit to a maximum of 18 credit points from prior learning.

6 Transitional provisions

(1) These resolutions apply to persons who commenced their candidature after 1 January, 2011 and persons who commenced their candidature prior to 1 January, 2011 who elect to proceed under these resolutions.

(2) Candidates who commenced prior to 1 January, 2011 may complete the requirements in accordance with the resolutions in force at the time of their commencement.
Master of Engineering specialisations

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME5202 Advanced Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5101 Power Plant Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5271 Computational Nanotechnology</td>
<td>6</td>
<td>A Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5602 Product Life Cycle Design</td>
<td>6</td>
<td>A Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5912 Crash Analysis using LS-DYNA</td>
<td>6</td>
<td>A Computer Aided Drafting, Basic FEA principles and Solid Mechanics Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5921 Biomedical Engineering Tech 2</td>
<td>6</td>
<td>A A bachelor's degree, ideally in the engineering or science field, is advisory, but not essential.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5961 Biomaterials Engineering</td>
<td>6</td>
<td>A Chemistry, biology, materials engineering, and engineering design at least at the Junior level.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5971 Applied Tissue Engineering</td>
<td>6</td>
<td>A Biology, chemistry at a junior level and intermediate physiology or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5981 Computational Biomedical Engineering</td>
<td>6</td>
<td>AMME5301,AMME5302,AMME5500,MECH5361</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td>AMME5990 Biomedical Engineering Tech 1</td>
<td>6</td>
<td>A Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AERO5200 Advanced Aerodynamics</td>
<td>6</td>
<td>A BE in the area of Aerospace Engineering or related Engineering field. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AERO5301 Applied Finite Element Analysis</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AERO5400 Advanced Aircraft Design Analysis</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AERO5500 Flight Mechanics Test and Evaluation Adv</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering Field. P AERO5510</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AERO5760 Spacecraft and Satellite Design</td>
<td>6</td>
<td>A BE in Aerospace Engineering or Equivalent. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5255 Air Conditioning and Refrigeration (Adv)</td>
<td>6</td>
<td>A Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. N MECH4255</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5265 Advanced Combustion</td>
<td>6</td>
<td>P MECH5262 N MECH4265</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5275 Advanced Renewable Energy</td>
<td>6</td>
<td>A The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5305 Smart Materials</td>
<td>6</td>
<td>A Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5310 Advanced Engineering Materials</td>
<td>6</td>
<td>N MECH4310</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
</tr>
<tr>
<td>---------------------------------------</td>
<td>---------------</td>
<td>-------------------------------------------------------------------------------------</td>
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<td>--------------------------------------------------------------------------------</td>
<td>--------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>MECH5416 Advanced Design and Analysis</td>
<td>6</td>
<td>A Eng Mechanics, balance of forces and moments Mechanics of Solids, 2 and 3 dimensional</td>
<td>Semester 1 stress and strain Engineering Dynamics - dynamic forces and moments. Mechanical Design, approach to design problems and report writing, and preparation of engineering drawing Mechanical design intermediate, means of applying fatigue analysis to a wide range of machine components</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH5701 Computers in Real Time Control and Inst</td>
<td>6</td>
<td>N MECH4730, MECH4710</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH5720 Sensors and Signals</td>
<td>6</td>
<td>A Strong MATLAB skills</td>
<td>N MECH4720</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MTRX5700 Experimental Robotics</td>
<td>6</td>
<td>A Undergraduate degree level assumed knowledge in Mechatronic Engineering.</td>
<td>N MTRX4700</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Professional Pathway Units

1. Candidates must complete 12 credit points from the following table of professional pathway units.
2. Additional specialist units or elective units from the postgraduate tables may be taken if these units have already been completed.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO5660 Safety Systems Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5601 Professional Engineering</td>
<td>6</td>
<td>A Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

or Research Pathway Units

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by a candidate obtaining a distinction average (WAM of 75 or higher) in their first 24 credits of their ME studies.

Candidates may complete ENGG5219 in place of AMME5220 AND AMME5221.

Master of Engineering (Biomedical)

Candidates are required to complete 36 credit points of specialist core units and specialist elective units.

Specialist Core Units

Candidates must complete 24 credit points of specialist core units from the following table.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME56921 Biomedical Engineering Tech 2</td>
<td>6</td>
<td>A A bachelors degree, ideally in the engineering or science field, is advisory, but not essential.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME56961 Biomedical Engineering</td>
<td>6</td>
<td>A Chemistry, biology, materials engineering, and engineering design at least at the Junior level.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME56981 Computational Biomedical Engineering</td>
<td>6</td>
<td>A AMME5301,AMME5302,AMME5500,MECH5361</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME56990 Biomedical Engineering Tech 1</td>
<td>6</td>
<td>A Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Specialist Elective Units

An additional 12 credit points of specialist elective units of study must be chosen from the following list.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME56202 Advanced Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME56971 Applied Tissue Engineering</td>
<td>6</td>
<td>A Biology, chemistry at a junior level and intermediate physiology or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5310 Advanced Engineering Materials</td>
<td>6</td>
<td>N MECH4310</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME56002 Product Life Cycle Design</td>
<td>6</td>
<td>A Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Professional Pathway Units

1. Candidates must complete 12 credit points of professional pathway units offered from the table below.
2. Additional specialist units or elective units from the postgraduate tables may be taken if these units have already been completed.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO5660 Safety Systems Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5601 Professional Engineering</td>
<td>6</td>
<td>A Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

or Research Pathway Units

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by obtaining a distinction (WAM 75 or higher) average in the first 24 credits of their ME studies.

Candidates may complete ENGG5219 in place of AMME5220 AND AMME5221.
# Master of Professional Engineering specialisations

## Master of Professional Engineering (Aerospace)

Candidates for the degree Master of Professional Engineering in Aerospace Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

### Aerospace Core Units of Study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO5210 Foundation of Aerodynamics</td>
<td>6</td>
<td>A: Mathematics and Physics to the level of Bachelor of Science or equivalent. Linear Mathematics and Vector Calculus, Partial Differential Equations (Intro).</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5211 Foundation of Propulsion Systems</td>
<td>6</td>
<td>A: Mathematics and Physics to a level of Bachelor of Science or equivalent.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5310 Foundation of Aerospace Structures</td>
<td>6</td>
<td>A: Mathematics and Physics to a level of Bachelor of Science or equivalent, Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5410 Foundation of Aerospace Design</td>
<td>6</td>
<td>A: Mathematics, Physics and Solid Mechanics assumed knowledge at the level of Bachelor of Science or equivalent.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5510 Foundation of Flight Mechanics</td>
<td>6</td>
<td>A: Mathematics, Physics and Dynamics assumed knowledge at the level of Bachelor of Science or equivalent.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMME5501 Safety Systems Management</td>
<td>6</td>
<td></td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO5301 Applied Finite Element Analysis</td>
<td>6</td>
<td>A: BE in area of Aerospace Engineering or related Engineering field.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5400 Advanced Aircraft Design Analysis</td>
<td>6</td>
<td>A: BE in area of Aerospace Engineering or related Engineering field.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMME5601 Professional Engineering</td>
<td>6</td>
<td>A: Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH2661 Engineering Management</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5217 Practical Experience</td>
<td>P: Students will have completed a minimum of 48cp towards the MPE.</td>
<td>Semester 1, Semester 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace AMME5220, AMME5221 with ENGG5222, ENGG5223, Engineering Dissertation A & B.

### Aerospace Elective Units of Study

Candidates must complete 24 credit points from the following aerospace elective units.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AERO5010 Optimisation Methods in Engineering</td>
<td>6</td>
<td>A: BE in the area of Aerospace or related Engineering field.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5200 Advanced Aerodynamics</td>
<td>6</td>
<td>A: BE in the area of Aerospace Engineering or related Engineering field.</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AERO5760 Spacecraft and Satellite Design</td>
<td>6</td>
<td>A: BE in Aerospace Engineering or Equivalent.</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMME5202 Advanced Computational Fluid Dynamics</td>
<td>6</td>
<td>A: Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A: General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH5305 Smart Materials</td>
<td>6</td>
<td>A: Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MECH5310 Advanced Engineering Materials</td>
<td>6</td>
<td>N: MECH4310</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## Master of Professional Engineering (Aerospace)
Candidates for the degree Master of Professional Engineering in Aerospace Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

Aerospace Core Units of Study

First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER0S210 Foundations of Aerodynamics</td>
<td>6</td>
<td>A Mathematics and Physics to the level of Bachelor of Science or equivalent. Linear Mathematics and Vector Calculus, Partial Differential Equations (Intro).</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AER0S211 Foundations of Propulsion Systems</td>
<td>6</td>
<td>A Mathematics and Physics to a level of Bachelor of Science or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AER0S310 Foundations of Aerospace Structures</td>
<td>6</td>
<td>A Mathematics and Physics to a level of Bachelor of Science or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AER0S410 Foundations of Aerospace Design</td>
<td>6</td>
<td>A Mathematics, Physics and Solid Mechanics assumed knowledge at the level of Bachelor of Science or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AER0S510 Foundations of Flight Mechanics</td>
<td>6</td>
<td>A Mathematics, Physics and Dynamics assumed knowledge at the level of Bachelor of Science or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AER0S660 Safety Systems Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5501 Foundations: System Dynamics and Control</td>
<td>6</td>
<td>A AMME5500</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER0S301 Applied Finite Element Analysis</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AER0S400 Advanced Aircraft Design Analysis</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5501 Professional Engineering</td>
<td>6</td>
<td>A Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5217 Practical Experience</td>
<td></td>
<td>P Students will have completed a minimum of 48cp towards the MPE.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace AMME5220, AMME5221 with ENGG5222, ENGG5223, Engineering Dissertation A & B.

Aerospace Elective Units of Study

Candidates must complete 24 credit points from the following aerospace elective units.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER0S510 Optimisation Methods in Engineering</td>
<td>6</td>
<td>A BE in the area of Aerospace or related Engineering field. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AER0S200 Advanced Aerodynamics</td>
<td>6</td>
<td>A BE in the area of Aerospace Engineering or related Engineering field. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AER0S500 Flight Mechanics Test and Evaluation Adv</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field. P AER0S510</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AER0S760 Spacecraft and Satellite Design</td>
<td>6</td>
<td>A BE in Aerospace Engineering or Equivalent. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5202 Advanced Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
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<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
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</tr>
<tr>
<td>MECH5305 Smart Materials</td>
<td>6</td>
<td>A Fundamental knowledge in materials science and engineering: 1) atomic and crystal structures 2) metallurgy 3) structure-property relationship 4) mechanics of engineering materials 5) solid mechanics</td>
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<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>MECH5310 Advanced Engineering Materials</td>
<td>6</td>
<td>N MECH4310</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Master of Professional Engineering (Mechanical)

Candidates for the degree Master of Professional Engineering in Mechanical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

Mechanical Core Units of Study

First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH5261 Foundations of Fluid Mechanics</td>
<td>6</td>
<td>A Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series; Thermo Fluids fundamentals</td>
<td></td>
<td>N MECH3261</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
### Mechanical Elective Units of Study

Candidates must complete 36 credit points from the following elective units of study.

#### Thermofluids

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMME5010</td>
<td>6</td>
<td>A</td>
<td>AMME5000</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH5202</td>
<td>6</td>
<td>A</td>
<td>Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows; Basic computer programming skills.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5101</td>
<td>6</td>
<td>A</td>
<td>Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECH3661 Engineering Management</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5217</td>
<td>6</td>
<td>P</td>
<td>Students will have completed a minimum of 48cp towards the MPE.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A and B and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.

#### Materials

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>MECH5010</td>
<td>6</td>
<td>A</td>
<td>Atomic and crystal structures, mechanics of engineering materials 1 and 2, solid mechanics</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH5025</td>
<td>6</td>
<td>A</td>
<td>Mechanical design intermediate, means of applying fatigue analysis to a wide range of machine components</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>AMME5271</td>
<td>6</td>
<td>A</td>
<td>A</td>
<td>AMME5301, AMME5302</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH6010</td>
<td>6</td>
<td>A</td>
<td>Chemistry, biology, materials engineering, and engineering design at least at the Junior level.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5202</td>
<td>6</td>
<td>A</td>
<td>General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

#### Design and Manufacturing

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>AER0510</td>
<td>6</td>
<td>A</td>
<td>BE in the area of Aerospace or related Engineering field.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5302</td>
<td>6</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5301</td>
<td>6</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5300</td>
<td>6</td>
<td>A</td>
<td>A</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
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</tr>
<tr>
<td>AERO5301 Applied Finite Element Analysis</td>
<td>6</td>
<td>A BE in area of Aerospace Engineering or related Engineering field.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>MECH5416 Advanced Design and Analysis</td>
<td>6</td>
<td>A Eng Mechanics, balance of forces and moments Mechanics of Solids, 2 and 3 dimensional stress and strain Engineering Dynamics - dynamic forces and moments. Mechanical Design, approach to design problems and report writing, and preparation of engineering drawing. Mechanical design intermediate, means of applying fatigue analysis to a wide range of machine components</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>AMME5602 Product Life Cycle Design</td>
<td>6</td>
<td>A Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Note: Department permission required for enrolment |                  |                |                | Semester 2    |
| AMME5912 Crash Analysis using LS-DYNA             | 6             | A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.  
Note: Department permission required for enrolment |                  |                |                | Semester 1    |
| Mechatronics                                     |               |                     |                  |                |                |               |
| MECH5416 Advanced Design and Analysis            | 6             | A Eng Mechanics, balance of forces and moments Mechanics of Solids, 2 and 3 dimensional stress and strain Engineering Dynamics - dynamic forces and moments. Mechanical Design, approach to design problems and report writing, and preparation of engineering drawing. Mechanical design intermediate, means of applying fatigue analysis to a wide range of machine components |                  |                |                | Semester 1    |
| MECH5701 Computers in Real Time Control and Inst | 6             | N MECH4730, MECH4710 |                  |                |                | Semester 1    |
| MECH5720 Sensors and Signals                     | 6             | A Strong MATLAB skills  
N MECH4720 |                  |                |                | Semester 1    |
| MTRX5700 Experimental Robotics                   | 6             | A Undergraduate degree level assumed knowledge in Mechatronic Engineering.  
N MTRX4700 |                  |                |                | Semester 1    |
| AERO5760 Spacecraft and Satellite Design         | 6             | A BE in Aerospace Engineering or Equivalent.  
Note: Department permission required for enrolment |                  |                |                | Semester 2    |
| AMME5602 Product Life Cycle Design               | 6             | A Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful. |                  |                |                | Semester 2    |
| AMME5902 Advanced Computer Aided Manufacturing    | 6             | A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline. |                  |                |                | Semester 2    |
| ENGG5202 Sustainable Design, Eng and Mgt         | 6             | A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline. |                  |                |                | Semester 1    |
School of Chemical and Biomolecular Engineering

Master of Engineering specialisations

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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</thead>
<tbody>
<tr>
<td><strong>School of Chemical and Biomolecular Engineering</strong></td>
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<tr>
<td>The School of Chemical and Biomolecular Engineering offers the ME in the following specialisations.</td>
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</tr>
<tr>
<td>1. Master of Engineering (Environmental)</td>
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<tr>
<td>2. Master of Engineering (Biophysical Processes)</td>
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<tr>
<td>3. Master of Engineering (Sustainable Processing)</td>
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<tr>
<td>4. Master of Engineering (Chemical and Biomolecular)</td>
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<tr>
<td>5. To qualify for a specialisation in Chemical and Biomolecular, Biophysical Processes, Environmental or Sustainable Processing, 12 credit points of relevant specialist units must be completed.</td>
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<tr>
<td><strong>Fundamental Units</strong></td>
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</tr>
<tr>
<td>Candidates in all streams are required to complete 12 credit points of fundamental units of study from the table below or as determined by the Director of the ME program.</td>
<td></td>
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<tr>
<td>CHNG5001 Process Systems Engineering</td>
<td>6</td>
<td>A Mathematics, physics and modeling. Assumed knowledge at the bachelor of Science level.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5603 Analysis, Modelling, Control: BioPhy Sys</td>
<td>6</td>
<td>A It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus and MATH 1003 Integral Calculus</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5601 Membrane Science</td>
<td>6</td>
<td></td>
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<td>Semester 1</td>
</tr>
<tr>
<td><strong>Master of Engineering (Environmental)</strong></td>
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<tr>
<td><strong>Specialist Units</strong></td>
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<tr>
<td>Candidates must complete 12 credit points from the following specialist units.</td>
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</tr>
<tr>
<td>CHNG5004 Particles and Surfaces</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5005 Wastewater Eng - Systems and Practice</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve ‘real’ chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources. P CHNG5801 Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>6</td>
<td>A Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.</td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>Master of Engineering (Biophysical Processes)</strong></td>
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</tr>
<tr>
<td><strong>Specialist Units</strong></td>
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</tr>
<tr>
<td>Candidates must complete 12 credit points from the following specialist units.</td>
<td></td>
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</tr>
<tr>
<td>CHNG5602 Cellular Biophysics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5604 Membrane Science Laboratory</td>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5605 Bio-Products: Laboratory to Marketplace</td>
<td>6</td>
<td></td>
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<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>Master of Engineering (Sustainable Processing)</strong></td>
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</tr>
<tr>
<td><strong>Specialist Units</strong></td>
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</tr>
<tr>
<td>Candidates must complete 12 credit points from the following specialist units.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>CHNG5003 Green Engineering</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
### Master of Engineering (Chemical and Biomolecular Engineering)

#### Specialist Units

Candidates must complete 12 credit points from the units listed in the above specialist unit tables.

Other postgraduate units from the school of Chemical and Biomolecular Engineering may be approved by the Director of the ME Program as alternates to the above specialist units.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHNG5005 Wastewater Eng - Systems and Practice</td>
<td>6</td>
<td>Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.</td>
<td>CHNG5801 Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

#### Elective Units

1. Candidates in all streams must complete 12 credit points of elective units.
2. Electives may be taken from fundamental units, specialist units, project management units or professional practice units of study listed in the postgraduate tables in the Faculty of Engineering and IT Handbook.

#### Professional Pathway Units

Candidates in all streams must complete 12 credit points of professional pathway units from the specialist units in the tables above.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5219</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Candidates may complete ENGG5219 in place of CHNG5220 AND CHNG5221.

#### or Research Pathway Units

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by obtaining a distinction (WAM 75 or higher) average in the first 24 credits of their ME studies.

School of Chemical and Biomolecular Engineering
Master of Professional Engineering specialisations

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A: Assumed Knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHNG5701 Found of Conservation &amp; Transport Proc</td>
<td>6</td>
<td>A Calculus, computations (Matlab, Excel), Mass and Energy Balances</td>
<td>N CHNG2801</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5703 Found of Energy and Fluid Systems</td>
<td>6</td>
<td>A Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>N CHNG2803</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5802 Found of Operation &amp; Improving Ind Systems</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5803 Found of Chem &amp; Biological Processes</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to understand basic principles of physical chemistry. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5704 Found of Chem &amp; Biological Syst Behaviour</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to understand basic principles of physical chemistry. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5801 Foundations of Process Design</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to understand basic principles of physical chemistry. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5802 Found of Biochemical Eng</td>
<td>6</td>
<td>A First year mathematics (MATH1001 Differential Calculus; MATH1002 Linear Algebra; MATH1003 Integral Calculus; MATH1005 Statistics; or equivalents). -First year chemistry (CHEM1101 Chemistry 1A; CHEM1102 Chemistry 1B; or equivalents).</td>
<td>N CHNG3804</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5803 Foundation of Prod Formulation &amp; Design</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to understand basic principles of physical chemistry. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5804 Found of Manag of Industrial Syst</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to understand basic principles of physical chemistry. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information</td>
<td>P CHNG5701, CHNG5702, CHNG5703 and CHNG5705</td>
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<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Core Units of Study

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
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</tr>
<tr>
<td>CHNG5112 Found of Chemical Eng Design A</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed.</td>
<td>P CHNG5801, CHNG5802, CHNG5805, CHNG5806</td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>CHNG5116 Found of Chemical Eng Design B</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed.</td>
<td>P CHNG5112 Chemical Engineering Design A</td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>ENGG5217 Practical Experience</td>
<td></td>
<td>P Students will have completed a minimum of 48cp towards the MPE.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
</tbody>
</table>

Candidates entering the program with an undergraduate chemical engineering degree who have achieved a minimum 75% average in their first 48 credit points of the MPE program will be permitted to replace CHNG5220, CHNG5221 and 12 cr pts of elective units with ENGG5222 Dissertation A and ENGG5223 Dissertation B or ENGG5218 Dissertation.

**Elective Units of Study**

Candidates must complete a minimum of 6 credit points from the following list of Management elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5204 Engineering Professional Practice</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5216 Management of Engineering Innovation</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Candidates must complete a minimum of 24 credit points from the following list of specialist elective units of study or other electives recommended by the School of Chemical and Biomolecular Engineering.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHNG5004 Particles and Surfaces</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5601 Membrane Science</td>
<td>6</td>
<td>A It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus, MATH 1003 Integral Calculus and Modeling</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CHNG5602 Cellular Biophysics</td>
<td>6</td>
<td>A Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5003 Green Engineering</td>
<td>6</td>
<td>A Ability to conduct mass and energy balances, and the integration of these concepts to solve &quot;real&quot; chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.</td>
<td>P CHNG5801</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>CHNG5008 Chemical &amp; Biomolecular Engineering Adv</td>
<td>6</td>
<td>P CHNG5801</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5605 Bio-Products: Laboratory to Marketplace</td>
<td>6</td>
<td>A Mathematics, physics and modeling. Assumed knowledge at the bachelor of Science level. This unit of study is for Masters students and can be selected as an elective by 4th year students.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CHNG5001 Process Systems Engineering</td>
<td>6</td>
<td>A Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed.</td>
<td>P CHNG5112 Chemical Engineering Design A</td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
</tbody>
</table>
# Master of Engineering specialisations

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Civil Engineering</strong></td>
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</tr>
<tr>
<td>The School of Civil Engineering offers the ME in the following specialisations.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1. Master of Engineering (Geotechnical)</td>
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</tr>
<tr>
<td>2. Master of Engineering (Structural)</td>
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<tr>
<td>3. Master of Engineering (Environmental Fluids)</td>
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</tr>
<tr>
<td>4. Master of Engineering (Civil)</td>
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</tr>
<tr>
<td>5. To qualify for a Civil, Structural, Geotechnical, or Environmental Fluids specialisation, 12 credit points of the relevant Fundamental Units and 24 credits points of the relevant Specialist Units must be completed.</td>
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<tr>
<td>Requirements for these specialisations are shown in the following tables.</td>
<td></td>
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</tr>
<tr>
<td><strong>Master of Engineering (Structural)</strong></td>
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</tr>
<tr>
<td><strong>Fundamental Units (Structural)</strong></td>
<td></td>
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</tr>
<tr>
<td>Candidates need to complete 12 credit points of fundamental units from the table below.</td>
<td></td>
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</tr>
<tr>
<td>CIVL5266 Steel Structures - Stability</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5269 Concrete Structures - Strength &amp; Service</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5458 Numerical Methods in Civil Engineering</td>
<td>6</td>
<td></td>
<td>BE or equivalent.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>Specialist Units (Structural)</strong></td>
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</tr>
<tr>
<td>Candidates must complete 24 credit points of specialist units from the table below.</td>
<td></td>
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<tr>
<td>CIVL5257 Concrete Structures: Prestressed</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5264 Composite Steel-Concrete Structures</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5267 Steel Structures - Advanced Design</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5268 Structural Dynamics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td><strong>Master of Engineering (Geotechnical)</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fundamental Units (Geotechnical)</strong></td>
<td></td>
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</tr>
<tr>
<td>Candidates need to complete 12 credit points of fundamental units from the table below.</td>
<td></td>
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</tr>
<tr>
<td>CIVL5351 Geoenvironmental Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL542 Foundation Engineering</td>
<td>6</td>
<td></td>
<td>BE or equivalent.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5458 Numerical Methods in Civil Engineering</td>
<td>6</td>
<td></td>
<td>BE or equivalent.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td><strong>Specialist Units (Geotechnical)</strong></td>
<td></td>
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</tr>
<tr>
<td>Candidates must complete 24 credit points of specialist units from the table below.</td>
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</tr>
<tr>
<td>CIVL5450 Analysis and Design of Pile Foundations</td>
<td>6</td>
<td></td>
<td>BE or equivalent.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5451 Computer Methods in Geotechnical Eng</td>
<td>6</td>
<td></td>
<td>BE or equivalent.</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5454 Rock Engineering</td>
<td>6</td>
<td></td>
<td>Undergraduate geology and soil mechanics.</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Master of Engineering (Environmental Fluids)

Candidates need to complete 12 credit points of fundamental units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5455 Engineering Behaviour of Soils</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Fundamental Units (Environmental Fluids)

Candidates need to complete 12 credit points of fundamental units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5351 Geoenvironment Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>6</td>
<td>A Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5670 Reservoir Stream &amp; Coastal Eng</td>
<td>6</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AMME5202 Advanced Computational Fluid Dynamics</td>
<td>6</td>
<td>A Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Specialist Units (Environmental Fluids)

Candidates must complete 24 credit points of specialist units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHNG5005 Wastewater Eng - Systems and Practice</td>
<td>6</td>
<td>Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5666 Open Channel Flow &amp; Hydraulic Structures</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5669 Applied Fluid Engineering Computing</td>
<td>6</td>
<td>A Understanding of fluid mechanics at the undergraduate level; Appreciation of fluid flow problems relevant to Civil and Environmental Engineering applications, Basic computer skills and some understanding of numerical methods. CIVL5511.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5668 Wind Engineering for Design-Fundamentals</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Master of Engineering (Civil)

Fundamental Units (Civil)

Candidates need to complete 12 credit points of fundamental units from the tables of fundamental units listed for the above or alternate units as advised by the ME Program Director.

Specialist Units (Civil).

Candidates must complete 24 credit points of units from the tables of specialist units listed above.

Elective Units (all streams)

1. Candidates may complete 12 credit points of elective units.
2. Electives may be taken from Fundamental Units, Specialist Units, Project Management Units or Professional Practice units of study listed in the Postgraduate Tables in the Faculty of Engineering and IT Handbook.

Research Pathway Units

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by obtaining a distinction (WAM 75 or higher) average in the first 24 credits of their ME studies.

Candidates may complete ENGG5219 Engineering Project in place of CIVL5220 and CIVL5221.
Master of Professional Engineering specialisations

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Master of Professional Engineering (Civil)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Candidates for the degree Master of Professional Engineering in Civil Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.</td>
<td></td>
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</tbody>
</table>

**Civil Core Units of Study**

### First Year

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>As/Pr/Cr</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5204</td>
<td>Engineering Professional Practice</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5205</td>
<td>Professional Practice in PM</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5507</td>
<td>Foundations of Concrete Structures 1</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5511</td>
<td>Foundations of Fluid Mechanics</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5512</td>
<td>Foundation of Eng Design &amp; Construction</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5508</td>
<td>Foundations of Steel Structures 1</td>
<td>6</td>
<td>A</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>As/Pr/Cr</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5510</td>
<td>Foundations of Civil Engineering Design</td>
<td>6</td>
<td>A</td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5217</td>
<td>Practical Experience</td>
<td></td>
<td>P</td>
<td>Semester 1</td>
</tr>
<tr>
<td></td>
<td>Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace CIVL5220, CIVL5221 and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Recommended Elective Units of Study**

Candidates must complete 18 credit points from the following elective units of study.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>As/Pr/Cr</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5266</td>
<td>Steel Structures - Stability</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5268</td>
<td>Structural Dynamics</td>
<td>6</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5269</td>
<td>Concrete Structures - Strength &amp; Service</td>
<td>6</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5351</td>
<td>Geoenvironmental Engineering</td>
<td>6</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5452</td>
<td>Foundation Engineering</td>
<td>6</td>
<td>A</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5458</td>
<td>Numerical Methods in Civil Engineering</td>
<td>6</td>
<td>A</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
### Session A: Assumed knowledge

**Credit points**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5513 Foundations of Structural Analysis</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5514 Foundations of Geotechnical Engineering</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5679 Reservoir Stream &amp; Coastal Eng</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

### Credit

Candidates must complete 24 credit points from the following advanced elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5257 Concrete Structures: Prestressed</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5267 Steel Structures - Advanced Design</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5268 Structural Dynamics</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5450 Analysis and Design of Pile Foundations</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5451 Computer Methods in Geotechnical Eng</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5668 Wind Engineering for Design-Fundamentals</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5642 Composite Steel-Concrete Structures</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5455 Engineering Behaviour of Soils</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5454 Rock Engineering</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5666 Open Channel Flow &amp; Hydraulic Structures</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5669 Applied Fluid Engineering Computing</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

---

### Master of Professional Engineering (Environmental Fluids)

Candidates for the degree Master of Professional Engineering in Environmental Fluids Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

#### Core Units of Study

**First Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5501, CIVL5502, CIVL5508</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5504 Foundations of Fluid Mechanics</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5512 Foundation of Eng Design &amp; Construction</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5505 Foundations of Intro. Fluid Mechanics</td>
<td>Semester 2</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
</tr>
<tr>
<td>---------------</td>
<td>---------------</td>
</tr>
<tr>
<td>CIVL5508</td>
<td>6</td>
</tr>
<tr>
<td>ENGG5204</td>
<td>6</td>
</tr>
<tr>
<td>ENGG5205</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5665</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5668</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5666</td>
<td>6</td>
</tr>
<tr>
<td>ENGG5217</td>
<td>P</td>
</tr>
<tr>
<td>CIVL5510</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5669</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Speciallntended Elective Units of Study</td>
<td></td>
</tr>
<tr>
<td>CIVL5351</td>
<td>6</td>
</tr>
<tr>
<td>AMME5202</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5670</td>
<td>6</td>
</tr>
<tr>
<td>Recommended Elective Units of Study</td>
<td></td>
</tr>
<tr>
<td>CIVL5257</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5264</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5267</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5450</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5451</td>
<td>6</td>
</tr>
<tr>
<td>CIVL5454</td>
<td>6</td>
</tr>
<tr>
<td>ENGG5601</td>
<td>6</td>
</tr>
</tbody>
</table>
Candidates for the degree Master of Professional Engineering in Geotechnical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

### Core Units of Study

#### First Year

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5507 - Foundations of Concrete Structures 1</td>
<td>6</td>
<td>A CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatibility of strains, and elastic beam theory.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5508 - Foundations of Steel Structures 1</td>
<td>6</td>
<td>A There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2330 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties : centroid, Ix, Iy, Zx, Zy, Sx, Sy, rx, ry, J, Ag; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures.</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5511 - Foundations of Fluid Mechanics</td>
<td>6</td>
<td>A This unit of study assumes previous study of the fundamental principles of fluid dynamics obtained from CIVL5505 Foundations of Fluid Mechanics and Inviscid Flow or equivalent introductory fluid mechanics subject.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5512 - Foundation of Eng Design &amp; Construction</td>
<td>6</td>
<td>A Basic knowledge of construction operations including excavation, embankments and other earthworks, hauling and associated procedures - drilling and blasting, survey, reinforced concrete construction (including formwork and formwork substitutes), interpretation of engineering drawings.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5204 - Engineering Professional Practice</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5205 - Professional Practice in PM</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5455 - Engineering Behaviour of Soils</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5450 - Analysis and Design of Pile Foundations</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5451 - Computer Methods in Geotechnical Eng</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5510 - Foundations of Civil Engineering Design</td>
<td>6</td>
<td>A CIVL3205 and CIVL3206 or equivalent</td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5217 - Practical Experience</td>
<td></td>
<td>P Students will have completed a minimum of 48cp towards the MPE.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5454 - Rock Engineering</td>
<td>6</td>
<td>A Undergraduate geology and soil mechanics.</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace CIVL5220, CIVL5221 and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.

### Recommended Specialist Elective Units of Study

Candidates must complete 12 credit points from the following specialist elective units of study.

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5351 - Geoenvironmental Engineering</td>
<td>6</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5452 - Foundation Engineering</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5458 - Numerical Methods in Civil Engineering</td>
<td>6</td>
<td>A BE or equivalent.</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

### Recommended Elective Units of Study

Candidates must complete 6 credit points from the following Civil elective units of study.

<table>
<thead>
<tr>
<th>Unit of Study</th>
<th>Credit Points</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5257 - Concrete Structures: Prestressed</td>
<td>6</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5264 - Composite Steel-Concrete Structures</td>
<td>6</td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5267 - Steel Structures - Advanced Design</td>
<td>6</td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5268 - Structural Dynamics</td>
<td>6</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Candidates for the degree Master of Professional Engineering in Structural Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

### Core Units of Study

**First Year**

- **ENGG5204 Engineering Professional Practice**
  - Credit points: 6
  - Notes: A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **ENGG5205 Professional Practice in PM**
  - Credit points: 6
  - Notes: A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5507 Foundations of Concrete Structures 1**
  - Credit points: 6
  - Notes: A CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatibility of strains, and elastic beam theory. This UoS is only available to students in the MPE degree who do not have a Civil Engineering background
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1, Semester 2

- **CIVL5511 Foundations of Fluid Mechanics**
  - Credit points: 6
  - Notes: A This unit of study assumes previous study of the fundamental principles of fluid dynamics obtained from CIVL5505 Foundations of Fluid Mechanics and Inviscid Flow or equivalent introductory fluid mechanics subject.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5508 Foundations of Steel Structures 1**
  - Credit points: 6
  - Notes: A There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3205 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation of stress and strain, and being able to determine stresses and strains in simple sections under axial force, bending moments, shear and torsion; calculating and understanding the physical significance of geometric section properties: centroid,Ix, Iy, Iz, Sx, Sy, Ix, ry, rx, J; knowledge of the basic elastic-plastic material properties of steel, E, G, fy, fu; and knowledge of loading of structures. This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5512 Foundation of Eng Design & Construction**
  - Credit points: 6
  - Notes: A Basic knowledge of construction operations including excavation, embankments and other earthworks, hauling and associated procedures - drilling and blasting, survey, reinforced concrete construction (including formwork and formwork substitutes), interpretation of engineering drawings.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5269 Structural Dynamics**
  - Credit points: 6
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 2

**Second Year**

- **ENGG5217 Practical Experience**
  - Notes: P Students will have completed a minimum of 48cp towards the MPE.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1, Semester 2

- **CIVL5510 Foundations of Civil Engineering Design**
  - Credit points: 6
  - Notes: A CIVL3205 and CIVL3206 or equivalent This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 2

- **CIVL5257 Concrete Structures: Prestressed**
  - Credit points: 6
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5267 Steel Structures - Advanced Design**
  - Credit points: 6
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1

- **CIVL5264 Composite Steel-Concrete Structures**
  - Credit points: 6
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 2

Students entering the MPE with an engineering undergraduate degree who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace CIVL5220, CIVL5221 and 12 credit points of elective units of study with ENGG5222, ENGG5223 Dissertation A and B or ENGG5218 Dissertation.

### Specialist Elective Units of Study

Candidates must complete 12 credit points from the following specialist elective units of study.

- **CIVL5266 Steel Structures - Stability**
  - Credit points: 6
  - A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition
  - Session: Semester 1, Semester 2
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5458 Numerical Methods in Civil Engineering</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Recommended Elective Units of Study**

Candidates must complete 6 credit points from the following Civil elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIVL5450 Analysis and Design of Pile Foundations</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5451 Computer Methods in Geotechnical Eng</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5454 Rock Engineering</td>
<td>6</td>
<td>Undergraduate geology and soil mechanics.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5455 Engineering Behaviour of Soils</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5665 Advanced Water Resources Management</td>
<td>6</td>
<td>Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5666 Open Channel Flow &amp; Hydraulic Structures</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5668 Wind Engineering for Design-Fundamentals</td>
<td>6</td>
<td>BE or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>CIVL5669 Applied Fluid Engineering Computing</td>
<td>6</td>
<td>Understanding of fluid mechanics at the undergraduate level; Appreciation of fluid flow problems relevant to Civil and Environmental Engineering applications; Basic computer skills and some understanding of numerical methods. CIVL5511.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>CIVL5670 Reservoir Stream &amp; Coastal Eng</td>
<td>6</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
School of Electrical and Information Engineering

Master of Engineering specialisations.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Electrical and Information Engineering</strong></td>
<td></td>
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</tr>
<tr>
<td>The School of Electrical and Information Engineering offers the ME in the following specialisations.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>1. Master of Engineering (Wireless Engineering)</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2. Master of Engineering (Network Engineering)</td>
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<td></td>
</tr>
<tr>
<td>3. Master of Engineering (Power Engineering)</td>
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<td></td>
</tr>
<tr>
<td>4. Master of Engineering (Electrical Engineering)</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>5. To qualify for an Electrical, Wireless, Network or Power specialisation 36 credit points of the relevant Specialist units must be completed.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Master of Engineering (Wireless Engineering)**

**Specialist Units (Wireless)**

Candidates must complete 36 credit points of specialist units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5101 Antennas and Propagation</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5403 Radio Frequency Engineering</td>
<td>6</td>
<td>A Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design, ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5507 Error Control Coding</td>
<td>6</td>
<td>A Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra.</td>
<td></td>
<td></td>
<td>ELEC4503</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network.</td>
<td></td>
<td></td>
<td>ELEC4504</td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor.</td>
<td></td>
<td></td>
<td>ELEC5501</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
<td>6</td>
<td>A Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed.</td>
<td></td>
<td></td>
<td>ELEC5502</td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Master of Engineering (Network Engineering)**

**Specialist Units (Network)**

Candidates must complete 36 credit points of specialist units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor.</td>
<td></td>
<td></td>
<td>ELEC5501</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5512 Optical Networks</td>
<td>6</td>
<td>A ELEC3503 Introduction to Digital Communications</td>
<td></td>
<td></td>
<td>ELEC3506</td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5614 Real Time Computing</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems), Ability to program in a high level language.</td>
<td></td>
<td></td>
<td>ELEC4602</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
### Master of Engineering (Power Engineering)

#### Specialist Units (Power)

Candidates must complete 36 credit points of specialist units from the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5203 Topics in Power Engineering</td>
<td>6</td>
<td>A (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives)</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5204 Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment.</td>
<td></td>
<td>N ELEC4201</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5205 High Voltage Engineering</td>
<td>6</td>
<td>A The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals equivalent to ELEC3105. Recommended: ELEC5204 Power Systems</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5206 Sustainable Energy Systems</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
<td>6</td>
<td>A This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory.</td>
<td></td>
<td>N ELEC4301</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths.</td>
<td></td>
<td>N ELEC5611, NETS3916</td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

#### Master of Engineering (Electrical)

#### Specialist Units (Electrical)

Candidates must complete 36 credit points of specialist units from the tables of recommended elective units listed below.

#### Elective Units (all streams)

1. Candidates must complete 12 credit points of additional units not already taken as specialisation from the table of recommended elective units below.

2. Candidates can replace the 12 credit of electives with the Research Pathway.

#### Recommended Elective Units of Study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5101 Antennas and Propagation</td>
<td>6</td>
<td>N ELEC5522</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5203 Topics in Power Engineering</td>
<td>6</td>
<td>A (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives).</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5204 Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment.</td>
<td></td>
<td>N ELEC4201</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5205 High Voltage Engineering</td>
<td>6</td>
<td>A The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals equivalent to ELEC3105. Recommended: ELEC5204 Power Systems</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5206 Sustainable Energy Systems</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
<td>6</td>
<td>A This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory.</td>
<td></td>
<td>N ELEC4301</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5402 Digital Integrated Circuit Design</td>
<td>6</td>
<td>A Electronic circuit design and physics of electronic devices.</td>
<td></td>
<td>N ELEC4402</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5403 Radio Frequency Engineering</td>
<td>6</td>
<td>A Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design, ELEC3503 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design.</td>
<td></td>
<td>N ELEC5261</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5501 Error Control Coding</td>
<td>6</td>
<td>A Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra.</td>
<td></td>
<td>N ELEC4950</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network.</td>
<td></td>
<td>N ELEC5504, ELEC4504</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor.</td>
<td></td>
<td>N ELEC5501</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
<td>6</td>
<td>A Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed.</td>
<td></td>
<td>N ELEC5502</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5511 Optical Communication Systems</td>
<td>6</td>
<td>A (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics) or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
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</tr>
<tr>
<td>ELEC5512 Optical Networks</td>
<td>6</td>
<td>A ELEC3503 Introduction to Digital Communications</td>
<td>N ELEC3506</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5613 Image Processing and Computer Vision</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC614 Real Time Computing</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems), Ability to program in a high level language.</td>
<td>N ELEC4602</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC615 Advanced Computer Architecture</td>
<td>6</td>
<td>A Equivalent to ELEC4605 Computer Engineering or ELEC4601 Computer Design. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths.</td>
<td>N ELEC3611, NETS3201, NETS3216</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC618 Software Quality Engineering</td>
<td>6</td>
<td>N SOFT3302</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC619 Object Oriented Application Frameworks</td>
<td>6</td>
<td>A Java programming, and some web development experience are essential. Databases strongly recommended</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC620 Model Based Software Engineering</td>
<td>6</td>
<td>A A programming language, basic maths</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC621 Digital Systems Design</td>
<td>6</td>
<td>A Basic knowledge of digital logic, computer architecture and microprocessor systems is required. Equivalent to ELEC2602 and ELEC3608. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5701 Technology Venture Creation</td>
<td>6</td>
<td>N ENGG4003</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5476 Advanced Network Technologies</td>
<td>6</td>
<td>A ELEC3506 or equivalent</td>
<td></td>
<td></td>
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<td>Semester 2</td>
</tr>
<tr>
<td>COMP5426 Parallel and Distributed Computing</td>
<td>6</td>
<td>A Equivalent of COMP5116</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5047 Pervasive Computing</td>
<td>6</td>
<td>A Networking concepts, operating system concepts, programming expertise.</td>
<td>N NETS4047</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

or Research Pathway Units

1. School permission is required to complete this pathway.
2. Admission to this pathway is determined by obtaining a distinction(WAM 75 or higher) average in the first 24 credits of their ME studies.

Candidates can complete ENGG5219 Engineering Project in place of ELEC5220 and ELEC5221.
Master of Professional Engineering specialisations.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Master of Professional Engineering (Electrical)</strong></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Candidates for the degree of Master of Professional Engineering in Electrical Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td><strong>Electrical Core Units of Study</strong></td>
<td></td>
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</tr>
<tr>
<td><strong>First Year</strong></td>
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</tr>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5204 Engineering Professional Practice</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>At least 4 of the following 8 units of study:</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5730 Foundations of Eng Electromagnetics</td>
<td>6</td>
<td>A Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5732 Foundations of Electricity Networks</td>
<td>6</td>
<td>A This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5734 Foundations Elec Energy &amp; Conversion Sys</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5735 Foundations of Control</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform, ELEC2302 and MATH2061 or equivalent.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5736 Foundations of Digital Signal Processing</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5737 Foundations of Electronic Circuit Design</td>
<td>6</td>
<td>A A background in basic electronics and circuit theory is assumed.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5739 Foundations of Communications</td>
<td>6</td>
<td>A Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5741 Foundations of Embedded Systems</td>
<td>6</td>
<td>A ELEC1601 AND ELEC2602 or equivalent. Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>Session</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
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<tr>
<td>Second Year</td>
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<tr>
<td>ENGG5217 Practical Experience</td>
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</tr>
<tr>
<td>Students who have achieved a WAM of 75% or higher</td>
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</tr>
<tr>
<td>In their first 48 credits of study are eligible</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>for the Research Pathway and can replace ENGG5220</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Engineering Project A &amp; B and the 12 credit</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>points selection from the list of ENGG5214,</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ENGG5215 and ENGG5216 with ENGG5222 and ENGG5233</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>A &amp; B or ENGG5218 Dissertation.</td>
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</tr>
<tr>
<td>At least 2 of the following 5 units of study:</td>
<td></td>
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</tr>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5216 Management of Engineering Innovation</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Electrical Recommended Elective Units.</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Candidates must complete 36 credit points from</td>
<td></td>
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</tr>
<tr>
<td>the following table of elective units of study.</td>
<td></td>
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</tr>
<tr>
<td>ELEC5101 Antennas and Propagation</td>
<td>6</td>
<td>N ELEC5522</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5203 Topics in Power Engineering</td>
<td>6</td>
<td>A (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5204 Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5205 High Voltage Engineering</td>
<td>6</td>
<td>A The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals equivalent to ELEC3105. Recommended: ELEC5204 Power Systems</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5206 Sustainable Energy Systems</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
<td>6</td>
<td>A This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory.</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5402 Digital Integrated Circuit Design</td>
<td>6</td>
<td>A Electronic circuit design and physics of electronic devices. N ELEC4402 Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5403 Radio Frequency Engineering</td>
<td>6</td>
<td>A Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design, ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3105 - Circuit Theory and Design. N ELEC5921</td>
<td>Semester 1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ELEC5507 Error Control Coding</td>
<td>6</td>
<td>A Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. N ELEC4503</td>
<td>Semester 1</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. N ELEC5504, ELEC4504</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. N ELEC5501</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
<td>6</td>
<td>A Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. N ELEC5505</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5511 Optical Communication Systems</td>
<td>6</td>
<td>A (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics) or equivalent</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5512 Optical Networks</td>
<td>6</td>
<td>A ELEC3503 Introduction to Digital Communications N ELEC5506</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5613 Image Processing and Computer Vision</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC3602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems. Note: Department permission required for enrolment</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Candidates must complete 36 credit points from the following table of elective units of study.

### Network Recommended Elective Units

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5614 Real Time Computing</td>
<td>6</td>
<td>A Software Construction (or Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language.</td>
<td>ELEC3607</td>
<td>N ELEC4602</td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5615 Advanced Computer Architecture</td>
<td>6</td>
<td>A Equivalent to ELEC4605 Computer Engineering or ELEC4601 Computer Design.</td>
<td>ELEC4601</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A Programming language, basic maths. N ELEC5611, NETS3016, NETS3916</td>
<td>ELEC5611</td>
<td>Semester 1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Master of Professional Engineering (Network)**

Candidates for the degree of Master of Professional Engineering in Network Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

**Network Core Units of Study**

### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ENGG5204 Engineering Professional Practice</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5736 Foundations of Digital Signal Processing</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, continuous linear time-invariant systems and their time and frequency domain representations, Fourier transform, sampling of continuous time signals. N ELEC3303, ELEC3305</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5739 Foundations of Communications</td>
<td>6</td>
<td>A Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. N ELEC3303</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5740 Foundations of Data Comm &amp; the Internet</td>
<td>6</td>
<td>A as graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience. N ELEC3304, ELEC4501</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5744 Foundations of Digital Comm Systems</td>
<td>6</td>
<td>A ELEC3305 Communications or equivalent N ELEC4502</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
</tbody>
</table>

### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5217 Practical Experience</td>
<td>6</td>
<td>A Students will have completed a minimum of 48cp towards the MPE.</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5216 Management of Engineering Innovation</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
</tbody>
</table>

**At least 2 of the following 5 units of study:**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
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<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
</tbody>
</table>

Network Recommended Elective Units.

Candidates must complete 36 credit points from the following table of elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5608 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. N ELEC5304, ELEC4504</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
<tr>
<td>ELEC5609 Mobile Networks</td>
<td>6</td>
<td>A As students need to know the concepts of data communications and mobile communications, which could be gained in one of the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. N ELEC5501</td>
<td></td>
<td></td>
<td>Semester 1</td>
<td></td>
</tr>
<tr>
<td>ELEC5612 Optical Networks</td>
<td>6</td>
<td>A ELEC3303 Introduction to Digital Communications N ELEC5506</td>
<td></td>
<td></td>
<td>Semester 2</td>
<td></td>
</tr>
</tbody>
</table>
Candidates must complete 36 credit points from the following table of elective units of study.

**Power Recommended Elective Units.**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5614 Real-Time Computing</td>
<td>6</td>
<td>A SOFT213D Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. N ELEC4602</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths. N ELEC5611, NETS3016, NETS3916</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Unit of study**

**Credit points**

<table>
<thead>
<tr>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5514 Networked Embedded Systems</td>
<td>6</td>
<td>A ELEC3607, ELEC3305, ELEC3506 and ELEC5508</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td>A This unit assumes a competence in fundamental communications theory on modulation and equalization, digital signal processing techniques on filtering and FFT/IFFT, error-control coding and linear algebra.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5614 Real-Time Computing</td>
<td>6</td>
<td>A SOFT213D Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. N ELEC4602</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths. N ELEC5611, NETS3016, NETS3916</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Master of Professional Engineering (Power)**

Candidates for the degree of Master of Professional Engineering in Power Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

**Power Core Units of Study**

**First Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ENGG5204 Engineering Professional Practice</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5732 Foundations of Electricity Networks</td>
<td>6</td>
<td>A This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics N ELEC3201, ELEC3203 This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5733 Foundations of Power Electronics &amp; Apps</td>
<td>6</td>
<td>A Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals. Software such as MATLAB to perform signal analysis and filter design. Familiarity with the use of basic laboratory equipment such as oscilloscope, function generator, power supply, etc. N ELEC3202, ELEC3204 This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5734 Foundations Elec Energy &amp; Conversion Sys</td>
<td>6</td>
<td>A Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5735 Foundations of Control</td>
<td>6</td>
<td>A Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. ELEC2302 and MATH2061 or equivalent. N ELEC3302, ELEC3304, AMME3500 This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5217 Practical Experience</td>
<td>P Students will have completed a minimum of 48cp towards the MPE.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A & B and 12 credit points selection from the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG535218 Dissertation.

**At least 2 of the following 5 units of study:**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>A Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5216 Management of Engineering Innovation</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Power Recommended Elective Units.**

Candidates must complete 36 credit points from the following table of elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5520 Topics in Power Engineering</td>
<td>6</td>
<td>A (ELEC3201 Electrical Energy Systems or ELEC3203 Power Engineering) and (ELEC3202 Power Electronics and Drives or ELEC3204 Power Electronics and Drives).</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Candidates must complete 36 credit points from the following table of elective units of study.

### Wireless Recommended Elective Units

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5204 Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5205 High Voltage Engineering</td>
<td>6</td>
<td>A The following</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5206 Sustainable Energy Systems</td>
<td>6</td>
<td>A Following concepts</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
<td>6</td>
<td>A This unit assumes</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Master of Professional Engineering (Wireless)

Candidates for the degree of Master of Professional Engineering in Wireless Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

### Wireless Core Units of Study

#### First Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5202 Sustainable Design, Eng and Mgt</td>
<td>6</td>
<td>A General knowledge</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5204 Power Systems Analysis and Protection</td>
<td>6</td>
<td>A The unit assumes</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

#### Second Year

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5217 Practical Experience</td>
<td>6</td>
<td>A Students will have</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

Students who have achieved a WAM of 75% or higher in their first 48 credits of study are eligible for the Research Pathway and can replace ENGG5220, ENGG5221 Engineering Project A & B and the 12 credit points selection from the list of ENGG5214, ENGG5215 and ENGG5216 with ENGG5222 and ENGG5223 Dissertation A & B or ENGG5218 Dissertation.

At least 2 of the following 5 units of study:

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td>A Basic engineering</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5205 Professional Practice in PM</td>
<td>6</td>
<td>A Basic engineering</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

#### Wireless Recommended Elective Units

Candidates must complete 36 credit points from the following table of elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5101 Antennas and Propagation</td>
<td>6</td>
<td>N ELEC522</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
Candidates must complete 18 credit points from the following table of elective units of study.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5403 Radio Frequency Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5507 Error Control Coding</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5515 Gigabits Wireless Systems</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Master of Professional Engineering (Software)

Candidates for the degree of Master of Professional Engineering in Software Engineering are required to gain credit for the core units of study set out below. Additional credit necessary shall be gained by completing additional credit points of recommended elective units as shown in the elective table below. To be eligible for the award of the degree students must gain credit for a total of not less than 96 credit points.

#### Software Core Units of Study

**First Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO5990 Professional Practice in IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5028 Object-Oriented Design</td>
<td>6</td>
<td>Intermediate level of object oriented programming such as Java</td>
<td>INFO3220</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5615 Software Engineering Project</td>
<td>6</td>
<td>INF0607, INF03600</td>
<td>COMP3615, INF03200</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5742 Foundations: Internet Software Platforms</td>
<td>6</td>
<td>INFO1103, INFO2110 and INFO2120 or equivalent</td>
<td>EBUS4001</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5047 Pervasive Computing</td>
<td>6</td>
<td>Networking concepts, operating system concepts, programming expertise</td>
<td>NETS4047</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
<td>6</td>
<td>INFO3220 or COMP5028 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Second Year**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC5618 Software Quality Engineering</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5619 Object Oriented Application Frameworks</td>
<td>6</td>
<td>Java programming, and some web development experience are essential. Databases strongly recommended</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5620 Model Based Software Engineering</td>
<td>6</td>
<td>A programming language, basic maths</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**At least 2 of the following 4 units of study:**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5214 Management of Technology</td>
<td>6</td>
<td>As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ENGG5216 Management of Engineering Innovation</td>
<td>6</td>
<td>As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO6007 Project Management in IT</td>
<td>6</td>
<td>INF59000 or COMP5206 or INFO5990</td>
<td>INF59014, PMGT5871</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Software Recommended Elective Units.**

Candidates must complete 18 credit points from the following table of elective units of study.
<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5338 Advanced Data Models</td>
<td>6</td>
<td>A COMP5138 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5426 Parallel and Distributed Computing</td>
<td>6</td>
<td>A Equivalent of COMP5116</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5613 Image Processing and Computer Vision</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5614 Real Time Computing</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. N ELEC4602</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5615 Advanced Computer Architecture</td>
<td>6</td>
<td>A Equivalent to ELEC4605 Computer Engineering or ELEC4601 Computer Design. Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths. N ELEC5611, NETS3016, NETS3916</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
</tbody>
</table>
The School of Civil Engineering offers the following graduate programs in Project Management.

Master of Project Management
Graduate Diploma in Project Management
Graduate Certificate in Project Management

These programs are available on-campus (check session details) and online (internet-based) delivery.

The requirements of each program are shown in the following tables.

### Master of Project Management
Candidates for the degree of Master of Project Management shall complete units of study totalling 48cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 12cpts of Electives and 12cpts of Pathway units.

Candidates for the Graduate Diploma in Project Management shall complete units of study totalling 36cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 6cpts of Electives and 6cpts of Professional Practice units.

Candidates for the Graduate Certificate in Project Management shall complete units of study totalling 24cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 6cpts Specialisation, 6cpts of Electives or 6cpts of Professional Practice units.

For students admitted to the Graduate Diploma, after completing the requirements above, may proceed to the Master of Project Management by achieving Credit average results or above.

Students admitted to the Master of Project Management may take the professional practice pathway or the research practice pathway. It is mandatory for all Master's students to complete PMGT5872.

The Master of Project Management can be taken as a generic degree or with specialisations in Project Economics and Scheduling Management, International Project Management, Project Risk Management, or Strategic Project Management Implementation.

### Foundation units for Master, Graduate Diploma and Graduate Certificate in Project Management
Candidates for Grad Cert, Grad Dip and Master of Project Management must complete at least 12 credit points from the foundation units of study listed.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5886 System Dynamics Modelling for PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5887 Computer Applications in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5877 Management of Project Organisations</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5871 Project Process Planning and Control</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2 Summer Late Winter Main</td>
</tr>
</tbody>
</table>

### Specialisations for the Master of Project Management
Candidates wishing to have a specialisation within the Master of Project Management will take 12 credit points of units of study from one of the tables listed below. Candidates must complete one of the core units.

#### Project Economics and Scheduling Management
Candidates wishing to specialise in Project Economics and Scheduling Management must complete a minimum of 12 credit points from the Table below, including a core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5873 Project Economics and Finance</td>
<td>6</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5889 Integrated Cost and Scheduling Control</td>
<td>6</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
<td>6</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

#### International Project Management
Candidates wishing to specialise in International Project Management need to complete a minimum of 12 credit points from the Table below, including the core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5888 Global Project Management</td>
<td>6</td>
<td>Semester 1 Semester 2 Summer Early</td>
</tr>
</tbody>
</table>
The School of Civil Engineering offers the following graduate programs in Project Leadership.

Master of Project Leadership
Graduate Diploma in Project Leadership
Graduate Certificate in Project Leadership

These programs are available on-campus (check session details) and online (internet-based) delivery.

The requirements of each program are shown in the following tables.

## Master of Project Leadership

Candidates for the degree of Master of Project Leadership shall complete units of study totalling 48cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 12cpts of Electives and 12cpts of Pathway units.

Candidates for the Graduate Diploma in Project Leadership shall complete units of study totalling 36cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 6cpts of Electives and 6cpts of Professional Practice units.

### Unit of study

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Project Risk Management

Candidates wishing to specialise in Project Risk Management must complete a minimum of 12 credit points from the Table below, including the core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5891 Project Risk Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Strategic Project Management Implementation

Candidates wishing to specialise in Strategic Project Management Implementation must complete a minimum of 12 credit points from the Table below, including the core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5876 Strategic Delivery of Change</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5879 Strategic Portfolio &amp; Program Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5875 Project Innovation Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Professional Practice Pathway

Candidates must complete 12 credit points from the units of study in the following Table. PMGT5872 is mandatory for Masters students.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5872 People and Leadership</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5869 Advanced Knowledge in Project Management</td>
<td>6</td>
<td>PMBoK Guide</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5876 Strategic Delivery of Change</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5879 Strategic Portfolio &amp; Program Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Research Practice Pathway

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5892 Project Management Industrial Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment Students must have a credit average for admission into this unit.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Master of Project Leadership

Candidates for the degree of Master of Project Leadership shall complete units of study totalling 48cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 12cpts of Electives and 12cpts of Pathway units.

Candidates for the Graduate Diploma in Project Leadership shall complete units of study totalling 36cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 12cpts Specialisation, 6cpts of Electives and 6cpts of Professional Practice units.
Candidates for the Graduate Certificate in Project Leadership shall complete units of study totalling 24cpts chosen from units of study approved by the Faculty, of which 12cpts are Foundation, 6cpts Specialisation, 6cpts of Electives or 6cpts of Professional Practice units.

For students admitted to the Graduate Diploma, after completing the requirements above, may proceed to the Master of Project Leadership by achieving a credit average or above.

Students admitted to the Master of Project Leadership may take the professional practice pathway or the research practice pathway. It is mandatory for all Master's students to complete PMGT5872.

The Master of Project Leadership can be taken as a generic degree or with specialisations in Project Economics and Scheduling Management, International Project Management, Project Risk Management, or Strategic Project Management Implementation.

Foundation units for Master, Graduate Diploma and Graduate Certificate in Project Leadership
Candidates for Grad Cert, Grad Dip and Master of Project Leadership must complete at least 12 credit points from the foundation units of study listed.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5886 System Dynamics Modelling for PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5887 Computer Applications in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5877 Management of Project Organisations</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>
| PMGT5871 Project Process Planning and Control | 6             |                      |                  |                |                 | Semester 1 Summer Late Semester 2
|                                |               |                      |                  |                |                 | Winter Main          |

Specialisations for the Master of Project Leadership
Candidates wishing to have a specialisation within the Master of Project Leadership will take 12 credit points of units of study from one of the tables listed below. Candidates must complete one of the core units.

Project Economics and Scheduling Management
Candidates wishing to specialise in Project Economics and Scheduling Management must complete a minimum of 12 credit points from the Table below, including a core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5873 Project Economics and Finance</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Core unit of study for this specialisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMGT5889 Integrated Cost and Scheduling Control</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Core unit of study for this specialisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMGT6887 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

International Project Leadership
Candidates wishing to specialise in International Project Management need to complete a minimum of 12 credit points from the Table below, including the core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5888 Global Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Core unit of study for this specialisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5215 International Eng Strategy &amp; Operations</td>
<td>6</td>
<td>A As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PMGT5887 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

Project Risk Management
Candidates wishing to specialise in Project Risk Management must complete a minimum of 12 credit points from the Table below, including the core unit.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5891 Project Risk Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Core unit of study for this specialisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ENGG5203 Quality Engineering and Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT5893 Statistical Methods in PM</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT6887 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

Strategic Project Management Implementation
Candidates wishing to specialise in Strategic Project Management Implementation must complete a minimum of 12 credit points from the Table below, including the core unit.
# School of Civil Engineering (Project Management Group)

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMGT5876 Strategic Delivery of Change</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Core unit of study for this specialisation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>PMGT5879 Strategic Portfolio &amp; Program Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>Project Innovation Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

### Professional Practice Pathway

Candidates must complete 12 credit points from the units of study in the following Table. PMGT5872 is mandatory for Masters students.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>ENGG5205 Professional Practice in PM</td>
<td>6</td>
<td>Basic engineering or science knowledge. At least 2-3 years of work experience preferred.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5872 People and Leadership</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT6869 Advanced Knowledge in Project Management</td>
<td>6</td>
<td>PMBoK Guide</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5876 Strategic Delivery of Change</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT5879 Strategic Portfolio &amp; Program Management</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Research Practice Pathway

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
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</tr>
</thead>
<tbody>
<tr>
<td>PMGT5892 Project Management Industrial Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment Students must have a credit average for admission into this unit.</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>
The School of Information Technologies offers the postgraduate degree programs outlined in the table below.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>School of Information Technology</strong></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td><strong>Master of Information Technology</strong></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
| Core and elective units of study for the Master of Information Technology, Diploma in Information Technology and Graduate Certificate in Information Technology as shown in the following tables. Candidates for the degree of Master of Information Technology are required to complete 48 credit points from the units of study set out below, and complete a defined major. Enrolment is subject to the following constraints:
| 1. A total of 48 credit points must be completed |
| 2. A maximum of 24 credit points can be selected from foundational units of study |
| 3. At least 24 credit points should come from specialist units of study or IT project units of study |
| 4. Every student must complete a defined major in the Master of Information Technology, which requires them to complete at least 18 credit points of core units in the designated major and INFO5990 |
| 5. After completing 24 credit points of course work, students who achieve Credit average results or above in their coursework may select 12 credit points of IT project units of study among their specialist units. |
| 6. After completing 24 credit points of course work, students who have Distinction average results or above may be eligible for the research path subject to the approval of the Head of the School of Information Technologies and the Dean |
| 7. Students who pursue the research path must study INFO5993 and select 18 credit points from IT research project units of study |
| 8. A maximum of 18 credit points may be selected with the approval of the Program Director, from units outside the School of Information Technology and IT. |

<table>
<thead>
<tr>
<th>Foundational units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPS528 Object-Oriented Design</td>
</tr>
<tr>
<td>COMPS5114 Digital Media Fundamentals</td>
</tr>
<tr>
<td>COMPS5116 Internet Protocols</td>
</tr>
<tr>
<td>COMPS5138 Relational Database Management Systems</td>
</tr>
<tr>
<td>COMPS5206 Introduction to Information Systems</td>
</tr>
<tr>
<td>COMPS5211 Algorithms</td>
</tr>
<tr>
<td>COMPS5214 Software Development in Java</td>
</tr>
<tr>
<td>INFOS501 System Analysis and Modelling</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Specialist units</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMPS5045 Computational Geometry</td>
</tr>
<tr>
<td>COMPS5046 Statistical Natural Language Processing</td>
</tr>
<tr>
<td>COMPS5047 Pervasive Computing</td>
</tr>
<tr>
<td>COMPS5048 Information Visualisation</td>
</tr>
<tr>
<td>COMPS5318 Knowledge Discovery and Data Mining</td>
</tr>
<tr>
<td>COMPS5338 Advanced Data Models</td>
</tr>
<tr>
<td>COMPS5347 e-Commerce Technology</td>
</tr>
<tr>
<td>Unit of study</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
</tr>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
</tr>
<tr>
<td>COMP5415 Multimedia Authoring and Production</td>
</tr>
<tr>
<td>COMP5416 Advanced Network Technologies</td>
</tr>
<tr>
<td>COMP5424 Information Technology in Biomedicine</td>
</tr>
<tr>
<td>COMP5425 Multimedia Storage, Retrieval &amp; Delivery</td>
</tr>
<tr>
<td>COMP5426 Parallel and Distributed Computing</td>
</tr>
<tr>
<td>COMP5456 Computational Methods for Life Sciences</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
</tr>
<tr>
<td>COMP5705 Information Technology Short Project</td>
</tr>
<tr>
<td>COMP5706 IT Industry Placement Project</td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
</tr>
<tr>
<td>ELEC5402 Digital Integrated Circuit Design</td>
</tr>
<tr>
<td>ELEC5507 Error Control Coding</td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
</tr>
<tr>
<td>ELEC5511 Optical Communication Systems</td>
</tr>
<tr>
<td>ELEC5512 Optical Networks</td>
</tr>
<tr>
<td>ELEC5613 Image Processing and Computer Vision</td>
</tr>
<tr>
<td>ELEC5614 Real Time Computing</td>
</tr>
<tr>
<td>ELEC5615 Advanced Computer Architecture</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
</tr>
<tr>
<td>ELEC5619 Object Oriented Application Frameworks</td>
</tr>
<tr>
<td>HIMT5058 Health Informatics Applications</td>
</tr>
<tr>
<td>HIMT5060 Integration for Health Informatics</td>
</tr>
<tr>
<td>HIMT5069 Health Care Systems</td>
</tr>
<tr>
<td>INFO5010 IT Advanced Topic A</td>
</tr>
<tr>
<td>INFO5011 IT Advanced Topic B</td>
</tr>
<tr>
<td>Unit of study</td>
</tr>
<tr>
<td>---------------------------------------------</td>
</tr>
<tr>
<td>INFO5301 Information Security Management</td>
</tr>
<tr>
<td>INFO5990 Professional Practice in IT</td>
</tr>
<tr>
<td>INFO5991 Services Science Management and Eng</td>
</tr>
<tr>
<td>INFO6007 Project Management in IT</td>
</tr>
<tr>
<td>INFS6012 Business Process Integration</td>
</tr>
<tr>
<td>INFS6017 Strategic Information &amp; Knowledge Mgmt</td>
</tr>
<tr>
<td>PMGT6867 Quantitative Methods: Project Management</td>
</tr>
</tbody>
</table>

**Research path units**

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5702 IT Research Project A</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5704 IT Research Project B</td>
<td>6</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO5993 IT Research Methods</td>
<td>6</td>
<td>A Elementary statistics</td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

**Majors for the Master of Information Technology**

**Computer Networks major**

To achieve a major in Computer Networks, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5047 Pervasive Computing</td>
<td>6</td>
<td>A Networking concepts, operating system concepts, programming expertise. N NETS4047</td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5116 Internet Protocols</td>
<td>6</td>
<td>N ELEC5740</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5416 Advanced Network Technologies</td>
<td>6</td>
<td>A ELEC3506 or equivalent</td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5426 Parallel and Distributed Computing</td>
<td>6</td>
<td>A Equivalent of COMP5116</td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. N ELEC5501</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Multimedia Technology major**

To achieve a major in Multimedia Technology, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5114 Digital Media Fundamentals</td>
<td>6</td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5415 Multimedia Authoring and Production</td>
<td>6</td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5425 Multimedia Storage, Retrieval &amp; Delivery</td>
<td>6</td>
<td>A Algorithms (equivalent to COMP5211).</td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>Mobile Networks</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) or ELEC2602 Digital System Design (or ELEC3601 Digital Systems Design or ELEC3608 Digital Systems Design) or ELEC3603 Introduction to Computing Systems. Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Database Management Systems major**

To achieve a major in Database Management Systems, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5048 Statistical Natural Language Processing</td>
<td>6</td>
<td>A Concepts of Linguistics, elementary statistics, AI techniques. N COMP4046</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
</tr>
<tr>
<td>--------------------------------------------------</td>
<td>---------------</td>
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<td>------------------</td>
</tr>
<tr>
<td>COMP5138 Relational Database Management Systems</td>
<td>6</td>
<td>A Intermediate level of object oriented programming such as Java.</td>
<td></td>
</tr>
<tr>
<td>COMP5318 Knowledge Discovery and Data Mining</td>
<td>6</td>
<td>A COMP5138 and familiarity with basic statistics</td>
<td></td>
</tr>
<tr>
<td>COMP5338 Advanced Data Models</td>
<td>6</td>
<td>A COMP5138 or equivalent</td>
<td></td>
</tr>
<tr>
<td>COMP5425 Multimedia Storage, Retrieval &amp; Delivery</td>
<td>6</td>
<td>A Algorithms (equivalent to COMP5211).</td>
<td></td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
</tr>
<tr>
<td>Research Path units of study COMP5702, COMP5704</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Software Engineering major

To achieve a major in Software Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. Students may count either COMP5028 or COMP5214 or INFO5110 towards this major, but not more than one of these foundational units.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5028 Object-Oriented Design</td>
<td>6</td>
<td>A Intermediate level of object oriented programming such as Java</td>
<td>INFO3220</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5214 Software Development in Java</td>
<td>6</td>
<td>Note: Department permission required for enrolment in the following sessions: Semester 1, Semester 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>COMP5347 e-Commerce Technology</td>
<td>6</td>
<td>A COMP5028 Object Oriented Analysis and Design</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
<td>6</td>
<td>A INFO3220 or COMP5028 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>Research path units of study COMP5702, COMP5704</td>
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</tr>
</tbody>
</table>

### Computer Science major

To achieve a major in Computer Science, a student must complete INFO5990 and 18 credit points of study units from this list.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5045 Computational Geometry</td>
<td>6</td>
<td>A Data structures, analysis of algorithms</td>
<td>COMP4045</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5046 Statistical Natural Language Processing</td>
<td>6</td>
<td>A Concepts of Linguistics, elementary statistics, AI techniques.</td>
<td>COMP4046</td>
<td></td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5047 Pervasive Computing</td>
<td>6</td>
<td>A Networking concepts, operating system concepts, programming expertise.</td>
<td>NETS4047</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5048 Information Visualisation</td>
<td>6</td>
<td>A Discrete mathematics, algorithms and complexity.</td>
<td>COMP4048</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5211 Algorithms</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>COMP5456 Computational Methods for Life Sciences</td>
<td>6</td>
<td>N COMP3456</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>Research path units of study COMP5702, COMP5704</td>
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</tr>
</tbody>
</table>

### Telecommunications Engineering major

To achieve a major in Telecommunications Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. A maximum of 18 credit points of ELEC units of study can be completed in this major.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5116 Internet Protocols</td>
<td>6</td>
<td>N ELEC5740</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>COMP5416 Advanced Network Technologies</td>
<td>6</td>
<td>A ELEC3506 or equivalent</td>
<td></td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1, Semester 2</td>
</tr>
<tr>
<td>Research path units of study COMP5702, COMP5704</td>
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<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition</td>
<td>Session</td>
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<tr>
<td>ELEC5507 Error Control Coding</td>
<td>6</td>
<td>A Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. N ELEC4503</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5508 Wireless Engineering</td>
<td>6</td>
<td>A Basic knowledge in probability and statistics, analog and digital communications, error probability calculation in communications channels, and telecommunications network. N ELEC2504, ELEC4504</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5509 Mobile Networks</td>
<td>6</td>
<td>A Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one of the following units of study: ELEC3505 Communications, ELEC3506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. N ELEC5501</td>
<td>Semester 1</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>ELEC5510 Satellite Communication Systems</td>
<td>6</td>
<td>A Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC3505 Communications and ELEC4505 Digital Communication Systems, is assumed. N ELEC4502</td>
<td>Semester 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5511 Optical Communication Systems</td>
<td>6</td>
<td>A (ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics) or equivalent</td>
<td>Semester 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ELEC5512 Optical Networks</td>
<td>6</td>
<td>A ELEC3503 Introduction to Digital Communications N ELEC4506</td>
<td>Semester 2</td>
<td></td>
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</tr>
</tbody>
</table>

**Computer Engineering major**

To achieve a major in Computer Engineering, a student must complete INFO5990 and 18 credit points of study units from this list. A maximum of 18 credit points of ELEC units of study can be completed.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5116 Internet Protocols</td>
<td>6</td>
<td>N ELEC5740</td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Research Path units of study COMP5702, COMP5704</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>ELEC5303 Computer Control System Design</td>
<td>6</td>
<td>A This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. N ELEC4301</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5402 Digital Integrated Circuit Design</td>
<td>6</td>
<td>A Electronic circuit design and physics of electronic devices. N ELEC4402 Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5614 Real Time Computing</td>
<td>6</td>
<td>A SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language. N ELEC4602</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5615 Advanced Computer Architecture</td>
<td>6</td>
<td>A Equivalent to ELEC4605 Computer Engineering or ELEC4601 Computer Design. Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>ELEC5616 Computer and Network Security</td>
<td>6</td>
<td>A A programming language, basic maths. N ELEC5611, NETS3016, NETS3916</td>
<td>Semester 1</td>
</tr>
</tbody>
</table>

**Business Information Systems major**

To achieve a major in Business Information Systems a student must complete INFO5990 and 18 credit points of study units from this list, including COMP5206. Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5206 Introduction to Information Systems</td>
<td>6</td>
<td>N INFO5210</td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Research Path units of study COMP5702, COMP5704</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO5301 Information Security Management</td>
<td>6</td>
<td>A Basic IT knowledge of databases and networks.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>INFO5991 Services Science Management and Eng</td>
<td>6</td>
<td>A INFO5990</td>
<td>Semester 2</td>
</tr>
<tr>
<td>INF56012 Business Process Integration</td>
<td>6</td>
<td></td>
<td>Semester 1</td>
</tr>
<tr>
<td>INF56017 Strategic Information &amp; Knowledge Mgmt</td>
<td>6</td>
<td></td>
<td>Semester 2</td>
</tr>
</tbody>
</table>

**Project Management major**

To achieve a major in Project Management, a student must complete INFO5990 and 18 credit points of study units from this list, including INFO6007. Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge P: Prerequisites C: Corequisites N: Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5348 Enterprise Scale Software Architecture</td>
<td>6</td>
<td>A INFO3220 or COMP5028 or equivalent.</td>
<td>Semester 1</td>
</tr>
<tr>
<td>COMP5703 Information Technology Project</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td>Semester 1</td>
</tr>
<tr>
<td>Research Path units of study COMP5702, COMP5704</td>
<td></td>
<td></td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO5501 System Analysis and Modelling</td>
<td>6</td>
<td>A Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138 N INFO2110, ELEC3610 and ELEC5743</td>
<td>Semester 2</td>
</tr>
<tr>
<td>INFO5991 Services Science Management and Eng</td>
<td>6</td>
<td>A INFO5990</td>
<td>Semester 2</td>
</tr>
</tbody>
</table>
### Unit of study

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>Assumed Knowledge</th>
<th>Prerequisites</th>
<th>Corequisites</th>
<th>Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO6007</td>
<td>Project Management in IT</td>
<td>6</td>
<td>A INFO6000 or COMP5206 or INFO5990</td>
<td>N INFO6014, PMGT5871</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>PMGT6657</td>
<td>Quantitative Methods: Project Management</td>
<td>6</td>
<td></td>
<td></td>
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<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Health Informatics major

To achieve a major in Health Informatics, a student must complete INFO5990 and 18 credit points of study units from this list, including HIMT5057 or COMP5424. A maximum of 12 credit points of HIMT-coded units of study can be completed in this major.

Students in the Research Path must complete INFO5993 instead of INFO5990.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>Assumed Knowledge</th>
<th>Prerequisites</th>
<th>Corequisites</th>
<th>Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5046</td>
<td>Statistical Natural Language Processing</td>
<td>6</td>
<td>A Concepts of Linguistics, elementary statistics, AI techniques.</td>
<td>N COMP4046</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5206</td>
<td>Introduction to Information Systems</td>
<td>6</td>
<td></td>
<td>N INFO210</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5424</td>
<td>Information Technology in Biomedicine</td>
<td>6</td>
<td>A Basic programming skills</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5456</td>
<td>Computational Methods for Life Sciences</td>
<td>6</td>
<td></td>
<td>N COMP3456</td>
<td></td>
<td></td>
<td>Semester 2 Semester 2</td>
</tr>
<tr>
<td>COMP5703</td>
<td>Information Technology Project</td>
<td>12</td>
<td></td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>HIMT5056</td>
<td>Health Informatics Applications</td>
<td>6</td>
<td></td>
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<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>HIMT5060</td>
<td>Integration for Health Informatics</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 2 Semester 2</td>
</tr>
<tr>
<td>HIMT5069</td>
<td>Health Care Systems</td>
<td>6</td>
<td></td>
<td>Note: Department permission required for enrolment in the following sessions: Semester 1</td>
<td>Semester 1</td>
<td>Semester 1 Semester 2</td>
<td></td>
</tr>
<tr>
<td>INFO6007</td>
<td>Project Management in IT</td>
<td>6</td>
<td>A INFO6000 or COMP5206 or INFO5990</td>
<td>N INFO6014, PMGT5871</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
</tbody>
</table>

### Master of Information Technology Management

Core and elective units of study for the Master of Information Technology Management, Diploma in Information Technology Management and the Graduate Certificate in Information Technology Management are shown in the following Tables.

Candidates for the degree of Master of Information Technology Management are required to complete 48 credit points from the units of study set out below. Enrolment is subject to the following constraints:

1. A total of 48 credit points must be completed;
2. At least 30 credit points must come from core units of study;
3. INFO5990 Professional Practice in IT must be completed as a core unit of study;
4. INFO5991 Services Science Management and Eng must be completed as a core unit of study;
5. INFO5992 Understanding IT Innovations must be completed as a core unit of study;
6. A maximum of 18 credit points of elective units of study can be taken, of which no more than 12 credit points can be chosen from units offered outside the Faculty of Engineering and IT;
7. After completing 24 credit points of coursework, students who achieve Credit average results or above in their coursework may select 12 credit points of Information Technology Project units of study among their core units;
8. After completing 24 credit points of coursework, students who have Distinction average results or above may be eligible for the Research Path subject to the approval of the Head of the School of Information Technologies and the Dean. Students in the Research Path are not required to take INFO5991 or INFO5992.

#### Core units (mandatory)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>Assumed Knowledge</th>
<th>Prerequisites</th>
<th>Corequisites</th>
<th>Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>INFO5990</td>
<td>Professional Practice in IT</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO5991</td>
<td>Services Science Management and Eng</td>
<td>6</td>
<td>A INFO5990</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO5992</td>
<td>Understanding IT Innovations</td>
<td>6</td>
<td>A INFO5990</td>
<td>N PMGT5875</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
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</tbody>
</table>

#### Core units (additional)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credit Points</th>
<th>Assumed Knowledge</th>
<th>Prerequisites</th>
<th>Corequisites</th>
<th>Prohibition</th>
<th>Session</th>
</tr>
</thead>
<tbody>
<tr>
<td>COMP5206</td>
<td>Introduction to Information Systems</td>
<td>6</td>
<td>N INFO210</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>COMP5703</td>
<td>Information Technology Project</td>
<td>12</td>
<td></td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO5301</td>
<td>Information Security Management</td>
<td>6</td>
<td>A Basic IT knowledge of databases and networks.</td>
<td></td>
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<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>INFO6007</td>
<td>Project Management in IT</td>
<td>6</td>
<td>A INFO6000 or COMP5206 or INFO5990</td>
<td>N INFO6014, PMGT5871</td>
<td></td>
<td></td>
<td>Semester 1 Semester 2</td>
</tr>
<tr>
<td>ISYS5030</td>
<td>Knowledge Management Systems</td>
<td>6</td>
<td>A Information systems concepts, database concepts</td>
<td>N ISYS4050</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unit of study</td>
<td>Credit points</td>
<td>A: Assumed knowledge</td>
<td>P: Prerequisites</td>
<td>C: Corequisites</td>
<td>N: Prohibition</td>
<td>Session</td>
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</tr>
<tr>
<td><strong>Core units (research path)</strong></td>
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<td></td>
</tr>
<tr>
<td>COMP5702 IT Research Project A</td>
<td>12</td>
<td>Note: Department permission required for enrolment</td>
<td></td>
<td></td>
<td></td>
<td>Semester 1</td>
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<td>COMP5704 IT Research Project B</td>
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<tr>
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<td>A Elementary statistics</td>
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<td><strong>Elective units</strong></td>
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<td>COMP5029 Object-Oriented Design</td>
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<td>A Intermediate level of object oriented programming such as Java</td>
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<td>COMP5114 Digital Media Fundamentals</td>
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<td>COMP5116 Internet Protocols</td>
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<tr>
<td>COMP5158 Relational Database Management Systems</td>
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<tr>
<td>COMP5213 Computer and Network Organisation</td>
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<td>COMP5706 IT Industry Placement Project</td>
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<td>Semester 1 Semester 2 Winter</td>
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<td>INF56012 Business Process Integration</td>
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<td>INF56013 Information Risk, Governance &amp; Assurance</td>
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<td>INF56016 Technology Enabled Business Innovation</td>
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<td>INF56017 Strategic Information &amp; Knowledge Mgmt</td>
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<td>INF56018 Managing Business Intelligence</td>
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<td>PMGT5871 Project Process Planning and Control</td>
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<td>PMGT5876 Strategic Delivery of Change</td>
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<td>PMGT6887 Quantitative Methods: Project Management</td>
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<td><strong>Graduate Diploma in Computing</strong></td>
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Candidates for the degree of Graduate Diploma in Computing are required to complete 48 credit points of the units of study set out below.

Enrolment is subject to the following constraints:
1. 18 credit points must be completed before COMP5114 Digital Media Fundamentals can be taken;
2. 18 credit points must be completed before COMP5028 Object Oriented Design can be taken;
3. 18 credit points must be completed before COMP5116 Internet Protocols can be taken;

<table>
<thead>
<tr>
<th>Unit of study</th>
<th>Credit points</th>
<th>A: Assumed knowledge</th>
<th>P: Prerequisites</th>
<th>C: Corequisites</th>
<th>N: Prohibition</th>
<th>Session</th>
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<td>COMP5206 Introduction to Information Systems</td>
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<td>COMP5211 Algorithms</td>
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<td>COMP5212 Software Construction</td>
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<tr>
<td>COMP5214 Software Development in Java</td>
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Units of study

Engineering and Information Technologies
Postgraduate Units of Study
Complete unit of study descriptions giving details of assessment, learning outcomes, graduate attribute mappings and semester schedule are published on the Faculty of Engineering and Information Technologies course information web site:
cusp.sydney.edu.au/engineering

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School of Aerospace, Mechanical and Mechatronic Engineering

AERO5010
Optimisation Methods in Engineering
Note: Department permission required for enrolment.

The unit is intended primarily to graduate students and senior undergraduate students with some background in linear algebra, and with basic knowledge of FORTRAN, C++ or Matlab. After completion of this unit, students will have a much deeper understanding of methods used in modern design optimisation for linear and non-linear problems. Such problems are becoming increasingly common and important in engineering and scientific work. The unit will explore the limitations, advantages and caveats associated with optimisation in engineering applications. Students will develop their own optimisation methods for linear, non-linear, and multi-objective computational and experimental applications.

AERO5210
Foundations of Aerodynamics
Credit points: 6 Session: Semester 2 Classes: Lectures, 3hr per week. Assumed knowledge: BE in area of Aerospace Engineering or related Engineering field. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.


AERO5211
Foundations of Propulsion Systems
Credit points: 6 Session: Semester 2 Classes: Three 1hr lectures and one 2hr tutorial per week. Assumed knowledge: Calculus, Linear Algebra, Fluid Mechanics and Thermodynamics. Department permission required for enrolment.

This unit aims to develop an understanding of the modern techniques used for aircraft propulsion. Students will gain skills in problem solving for aircraft propulsion systems ranging from propellers, gas-turbine engines to rockets. This unit of study teaches the students the techniques used to propel aircraft and rockets. The students will learn to analyse various propulsion systems in use: propellers, gas turbines, rocket motors. Course content will include: Propulsion unit requirements subsonic and supersonic flight; thrust components, efficiencies, additive drag of intakes; Piston engine components and operation; Propeller theory; Operation, components and cycle analysis of gas turbine engines, turbojets, turbofans, turboprops, ramjets; Components: compressor; fan; burner; turbine; nozzle, efficiency of components; off-design considerations; Operation, components and thermodynamics of rocket motors; Dynamics of rocket flight, orbital velocity; staging; Future directions; minimisation of noise and pollution; sub-orbital propulsion systems; scram-jets; hybrid engines.

AERO5301
Advanced Aerodynamics
Credit points: 6 Session: Semester 1 Classes: 2 hours of tutorials per week. Assumed knowledge: BE in the area of Aerospace Engineering or related Engineering field. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.


AERO5310 Foundations of Aerospace Structures
Credit points: 6 Session: Semester 1 Classes: 3hrs of lectures per week and 2hrs tutorial per week. Assumed knowledge: Mathematics and Physics to a level of Bachelor of Science or equivalent. Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop a student's understanding of the theoretical basis of advanced aerospace structural analysis; and introduce students to the solution of real-world aircraft structural problems. This UoS will develop the following attributes: An understanding of the derivation of the fundamental equations of elasticity and their application in certain analytical problems; An understanding of plate theory and the ability to use this to obtain analytical solutions for plate bending and buckling problems; An understanding of energy-method solution techniques for structural problems; An understanding of the basic principals behind stressed-skin aircraft construction and the practical analysis of typical aircraft components, including the limitations of such techniques.

At the end of this unit students will have an understanding of: 2-D and 3-D elasticity: general equations and solution techniques; Energy methods in structural analysis, including the principles of virtual work and total potential and complimentary energies; Fundamental theory of plates, including in-plane and bending loads as well as buckling and shear instabilities; Solution techniques for plate problems including: Navier solutions for rectangular plates; Combined bending and in-plane loading problems; Energy methods for plate-bending; and Plate buckling for compression and shear loadings; Bending of beams with unsymmetrical cross-sections; Basic principals and theory of stressed-skin structural analysis; Determination of direct stresses and shear flows in arbitrary thin-walled beams under arbitrary loading conditions including: Unsymmetrical sections. Open and closed sections, Single and multi-cell closed sections, Tapered sections, Continuous and idealized sections; The analysis of common aircraft components including fuselages, wings, skin-panels, stringers, ribs, frames and cut-outs; The effects of end constraints and shear-lag on the solutions developed as well as an overall appreciation of the limitations of the solution methods presented.

AERO5400 Advanced Aircraft Design Analysis
Credit points: 6 Session: Semester 2 Classes: 4 hours of lectures per week. Assumed knowledge: BE in area of Aerospace Engineering or related Engineering field. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This Unit aims to provide familiarity and understanding with practical aircraft design processes expected in industry, including the evaluation and case studies of existing aircraft designs. Students will gain a better understanding of relevant issues particularly related to the design of aircraft with a level of confidence to lead them to develop new designs or modifications, having a good balance between theory and real-world applications. Good familiarity with unique and stringent international aviation regulations and certification processes will be expected with respect to the design of aircraft. Topics covered by the lectures will include aircraft specifications; aircraft selection and evaluation; aircraft configuration design; design considerations for aerodynamics, structures, systems, manufacture, testing, certification, life-cycle-cost, operations; the use of computational aircraft design tools, in particular DARcorp's Advanced Aircraft Analysis (AAA); and introduction to multidisciplinary design optimisation methods. Projects will be based on case study analyses and evaluation of aircraft types to operational specifications and requirements.

AERO5410 Foundations of Aerospace Design
Credit points: 6 Session: Semester 1 Classes: Two 1hr lectures and one 3hr practical session per week. Assumed knowledge: Mathematics, Physics and Solid Mechanics assumed knowledge at the level of Bachelor of Science or equivalent. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the theory and practice of aircraft structural component design. In doing so it will emphasize all the considerations, trade-offs and decisions inherent in this process and thus enable students to gain an understanding of why aircraft structures are designed in the way they are with respect to structural, manufacturing and cost considerations.

At the end of this unit students will be able to understand the design process, especially as it applies to aircraft structural component design: Have a familiarity with some of the practice of aircraft component structural design; An increasing familiarity with typical aircraft structural paradigms and how they work and can be analysed along with the primary failure modes that need to be considered; An understanding of the importance of different failure modes for different components and how these relate to load-conditions and understanding of some of the legal and ethical requirements of aircraft design engineers; A basic understanding of the regulatory framework in which aircraft design is conducted.

AERO5500 Flight Mechanics Test and Evaluation Adv
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. 2hrs of laboratory per semester. Prerequisites: AERO5510 Assumed knowledge: BE in area of Aerospace Engineering or related Engineering Field. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft flight test, validation and verification, and the development of modern flight control, guidance, and navigation systems. Students will gain skills in analysis, problem solving and systems design in the areas of aircraft dynamic system identification and control. At the end of this unit students will be able to understand elements of the following: the principles of stability augmentation systems and autopilot control systems in aircraft operation, their functions and purposes; the characteristics of closed loop system responses; advanced feedback control systems and state-space design techniques; the concepts of parameter and state estimation; the design of observers in the state space and the implementation of a Kalman Filter; multi-loop control and guidance systems and the reasons for their structures; flight test principles and procedures and the implementation a flight test programme.

AERO5510 Foundations of Flight Mechanics
Credit points: 6 Session: Semester 1 Classes: Laboratory(2.00 hours per week), Lecture(3.00 hours per week), Tutorial(2.00 hours per week). Assumed knowledge: Mathematics, Physics and Dynamics assumed knowledge at the level of Bachelor of Science or equivalent. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of aircraft longitudinal equilibrium, static stability, dynamic stability and response. Students will develop an understanding of the importance and significance of flight stability, will gain skills in dynamic system analysis and will learn mathematical tools used for prediction of aircraft flight behaviour. Students will gain skills in problem solving in the area of flight vehicle motion, and learn the fundamentals of flight simulation.

At the end of this unit students will be able to understand: aircraft flight conditions and equilibrium; the effects of aerodynamic and propulsive controls on equilibrium conditions; the significance of flight stability and its impact of aircraft operations and pilot workload; the meaning of aerodynamic stability derivatives and their sources; the effects of aerodynamic derivatives on flight stability; the impact of flight stability and trim on all atmospheric flight vehicles. Students will also be able to model aircraft flight characteristics using computational techniques.
and analyse the aircraft equations of rigid-body motion and to extract stability characteristics.

Course content will include static longitudinal aircraft stability: origin of symmetric forces and moments; static and manoeuvring longitudinal stability, equilibrium and control of rigid aircraft; aerodynamic load effects of wings, stabilisers, fuselages and power plants; trailing edge aerodynamic controls; trimmed equilibrium condition; static margin; effect on static stability of free and reversible controls.

**AERO5660 Safety Systems Management**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 3 hours of lectures and 2 hours of tutorials per week  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Objective: To develop an understanding of the current state of aerospace manufacturing, operations and maintenance for the Australian aviation industry. Students will gain skills in aerospace engineering risk management.


**AERO5760 Spacecraft and Satellite Design**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 3 hours of project work in class per week  
**Assumed knowledge:** BE in Aerospace Engineering or Equivalent  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This course aims to introduce the students to the engineering aspects of spacecraft and mission design, covering the space environment and spacecraft sub-systems, including thermal control, power systems, attitude determination and control system, tracking, telemetry & telecommand, and on-board data handling.

**AMME5020 Capstone Project A**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** Independent project work  
**Prerequisites:** 48 credits from MPE degree program  
**Prohibitions:** ENGS5222, ENGS5223, ENGS5218, ENGS5219  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision

Note: Department permission required for enrolment in the following sessions: Semester 2.

The capstone project aims to provide students with the opportunity to carry out a defined piece of independent research in a setting and in a manner that fosters the development of engineering research skills. These skills include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Capstone project is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Capstone Project A covers first steps of thesis research starting with development of research proposal. Project B covers the second of stage writing up and presenting the research results.

Students are asked to write a thesis based on a research project, which is very often related to some aspect of a staff member's research interests. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors as part of a seminar program.

It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the thesis is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.

**AMME5021 Capstone Project B**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** Independent project work  
**Corequisites:** AMME5020  
**Prohibitions:** ENGS5222, ENGS5223, ENGS5218, ENGS5219  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision

Note: Department permission required for enrolment in the following sessions: Semester 1.

The capstone project aims to provide students with the opportunity to carry out a defined piece of independent research in a setting and in a manner that fosters the development of engineering research skills. These skills include the capacity to define a research question, showing how it relates to existing knowledge, identifying the tools needed to investigate the question, carrying out the research in a systematic way, analysing the results obtained and presenting the outcomes in a report that is clear, coherent and logically structured. Capstone project is undertaken across two semesters of enrolment, in two successive Units of Study of 6 credits points each. Capstone Project A covers first steps of thesis research starting with development of research proposal. Project B covers the second of stage writing up and presenting the research results.

Note: Department permission required for enrolment in the following sessions: Semester 2.

Students are asked to write a thesis based on a research project, which is very often related to some aspect of a staff member's research interests. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility studies or the design, construction and testing of equipment. Direction of thesis work may be determined by the supervisor or be of an original nature, but in either case the student is responsible for the execution of the practical work and the general layout and content of the thesis itself. The final thesis must be the student's individual work, although research is sometimes conducted in the framework of a group project shared with others. Students undertaking research on this basis will need to take care in ensuring the individual quality of their own research work and the final thesis submission. The thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors as part of a seminar program.

It is not expected that a thesis at this level will represent a significant contribution to new knowledge; nor is it expected that theses will resolve great intellectual problems. The timeframe available for the thesis is simply too short to permit students to tackle complex or difficult problems. Indeed, a key aim of the thesis is to specify a research topic that arouses sufficient intellectual curiosity, and presents an appropriate range and diversity of technical and conceptual challenges, while remaining manageable and allowing achievable outcomes within the time and resources available. It is important that the topic be of sufficient scope and complexity to allow a student to learn their craft and demonstrate their research skills. Equally imperative is that the task not be so demanding as to elude completion.
AMME5101
Power Plant Engineering
Credit points: 6  Session: Semester 1  Classes: 2 hrs lectures and 2 hrs tutorials per week.  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit is suitable for any engineering discipline student who is interested in developing an understanding of analysis and design in energy, power generation, environment and relevant economic issues. The aim is to acquaint students with the methods engineers use to design and evaluate the thermal processes used for the production of electricity. It also assesses and deals with the environmental consequences of power generation. At the end of this unit students will be able to carry out preliminary design and economic impact analyses for electrical power generation systems. A series of topics will be covered in relation to energy and electricity and relevant issues.

The course contents will include:
1. Economic analysis of energy systems;
2. Environmental impact of power generation;
3. Principles of thermodynamics;
4. First law analysis of power cycles;
5. Design and simulation of power generation cycles;
6. Second law efficiency and availability;
7. Energy efficiency;
8. CO2 capture and sequestration;
9. Design of various components of thermal power plants.

AMME5200
Foundations of Thermodynamics and Fluids
Credit points: 6  Session: Semester 2  Classes: Lectures: 3hr per week;  Tutorials: 2 hrs per week  Assumed knowledge: Students are expected to be familiar with basic, first year, integral calculus, differential calculus and linear algebra.  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to teach the basic laws of thermodynamics and the fundamentals of fluid statics and dynamics. At the end of this unit students will have: an understanding of the basic laws of thermodynamics and basic equations governing the statics and dynamics of fluids; the ability to analyze and determine the forces governing static fluid; the ability to evaluate the relevant flow parameters for fluid flow in internal engineering systems such as pipes and pumps (velocities, losses, etc.) and external systems such as flow over wings and airfoils (lift and drag). Course content will include concepts of heat and work, properties of substances, first law of thermodynamics, control mass and control volume analysis, thermal efficiency, entropy, second law of thermodynamics, reversible and irreversible processes, isentropic efficiency, power and refrigeration cycles; basic concepts of pressure, force, acceleration, continuity, streamline and stream function, viscosity, non-dimensional parameters; Fluid statics: governing hydrostatic equations, buoyancy; Fluid dynamics: governing conservation equations; Potential flow, vorticity and circulation; Bernoulli and Euler equations; A brief introduction to flow measuring devices, pipe flow, flow over surfaces, lift and drag.

AMME5218
Research Dissertation
Credit points: 24  Session: Semester 1, Semester 2  Classes: Project work carried out in own time  Prerequisites: The completion of 48 CP from the MPE degree program  Campus: Camperdown/Darlington  Mode of delivery: Supervision
Note: Department permission required for enrolment.

The aim of this unit of study is to obtain an understanding of how to define, plan, undertake and report on an open-ended piece of supervised research or design work. Students will discuss the thesis topic with the supervisor and generate a suitable thesis plan with proposed outcomes. They will then conduct a literature survey and background research. Students are asked to write a detailed report on a major research or design project. Some projects will be experimental in nature, others may involve computer-based simulation, feasibility testing of equipment or construction and testing of equipment. In the normal course of events some or all of the theoretical, developmental and experimental aspects of design or research work will be covered in this unit of study. These aspects may be either directed by the supervisor or be of an original nature, but in any event the student is responsible for the execution of his or her practical work and the general layout and content of the Thesis document. During the course of this unit of study, students will learn how to examine published and experimental data, set objectives, organize a program of work and analyse results. They will also be expected to evaluate these results in relation to existing knowledge. The Thesis will be judged on the extent and quality of the student's original work and particularly how critical, perceptive and constructive he or she has been in assessing his/her work and that of others. Students will also be required to present the results of their findings to their peers and supervisors in seminar.

AMME5271
Computational Nanotechnology
Credit points: 6  Session: Semester 1  Classes: Lectures: 2 hrs per week;  Tutorials: 3 hrs per week  Assumed knowledge: Students are required to have an understanding of basic principles of Newtonian mechanics, physics and chemistry, fluid mechanics and solid mechanics. General knowledge of how to operate a computer and work with different software is also required.  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

This course introduces atomistic computational techniques used in modern engineering to understand phenomena and predict material properties, behaviour, structure and interactions at nano-scale. The advancement of nanotechnology and manipulation of matter at the molecular level have provided ways for developing new materials with desired properties. The miniaturization at the nanometre scale requires an understanding of material behaviour which could be much different from that of the bulk. Computational nanotechnology plays a growingly important role in understanding mechanical properties at such a small scale. The aim is to demonstrate how atomistic level simulations can be used to predict the properties of matter under various conditions of load, deformation and flow. The course covers areas mainly related to fluid as well as solid properties, whereas, the methodologies learned can be applied to diverse areas in nanotechnology such as, liquid-solid interfaces, surface engineering, nanorheology, nanobiology and biological systems. This is a course with a modern perspective for

AMME5202
Advanced Computational Fluid Dynamics
Credit points: 6  Session: Semester 1  Classes: Lectures: 2 hour per week;  Tutorials: 1 hour per week;  Laboratory Sessions: 2 hours per week  Assumed knowledge: Partial differential equations; Finite difference methods; Taylor series; Basic fluid mechanics including pressure, velocity, boundary layers, separated and recirculating flows. Basic computer programming skills.  Campus: Camperdown/Darlington  Mode of delivery: Normal (lecture/lab/tutorial) Day

Objectives: To provide students with the necessary skills to use commercial Computational Fluid Dynamics packages and to carry out research in the area of Computational Fluid Dynamics. Expected outcomes: Students will have a good understanding of the basic theory of Computational Fluid Dynamics, including discretisation, accuracy and stability. They will be capable of writing a simple solver and using a sophisticated commercial CFD package. Syllabus summary: A course of lectures, tutorials and laboratories designed to provide the student with the necessary tools for using a sophisticated commercial CFD package. A set of laboratory tasks will take the student through a series of increasingly complex flow simulations, requiring an understanding of the basic theory of computational fluid dynamics (CFD). The laboratory tasks will be complemented by a series of lectures in which the basic theory is covered, including: governing equations; finite difference methods accuracy and stability for the advection equation, diffusion equation; direct and iterative solution techniques; solution of the full Navier-Stokes equations; turbulent flow; Cartesian tensors; turbulence models.
AMME5301 Foundations of Mechanics of Solids 1
Credit points: 6 Session: Semester 1 Classes: Lectures: 3 hours per week; Tutorials: 2 hours per week. Assumed knowledge: Physics, Calculus, Linear Algebra, Integral Calculus and Modelling. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to teach the fundamentals of analysing stress and deformation in elementary structures/components in aerospace, mechanical and biomedical engineering (bars, beams, frames, cell box beams and tubes) under simple and combined loading of tension, compression, bending and torsion. The vibration will also be addressed. At the end of this unit students will have gained knowledge of: equilibrium of deformable structures; basic concept of deformation compatibility; stress and strain in bars, beams and their structures subjected to tension, compression, bending, torsion and combined loading; statically determinate and indeterminate structures; energy methods for bar and beam structures; simple buckling; simple vibration; deformation of simple frames and cell box beams; simple two-dimensional stress and Mohr’s circle; problem-based applications in aerospace, mechanical and biomedical engineering.

AMME5302 Foundations of Materials 1

This unit aims to cover four key focus areas: Atomic structure of the solid state; atomic bonding, crystal structures, crystal imperfections, and diffusion; Mechanical properties and microstructure: the relationship between properties and microstructure, and the effects of heat treatment on properties and microstructure; Electrical, magnetic, thermal, and optical properties of materials; Manufacture and applications of materials: metals, ceramics, polymers. At the end of this unit students will have gained an understanding of: the ways in which atoms are arranged in the solid state; the ways in which their arrangement and the imperfections of their arrangement affect the macroscopic properties of a material; gain an understanding of the various types of properties of materials, how to measure and calculate them, and how to use these skills in engineering design and failure analysis; gain an understanding of the means by which the properties of materials can be manipulated via heat treatment, alloying, and other means. Course content will include: Atomic Structure/Crystallography; Microstructure - Composites/Monolithics; Dislocation Theory; Diffusion; Phase Equilibrium and Heat Treatment; Suspension Rheology; Physical Properties.

AMME5500 Foundations of Engineering Dynamics
Credit points: 6 Session: Semester 1 Classes: Lectures: 3 hours per week; Tutorials: 2 hours per week. Assumed knowledge: Physics, statics, Particle dynamics, Calculus, Linear Algebra, Integral Calculus and Modelling. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study aims to teach: Dynamics of Rigid Bodies: Analysis of Planar mechanisms; Kinematics of rigid bodies; Kinetics of rigid bodies. Students will also develop their skills in: how to model and analyse dynamic systems and the application of theory to real systems through practical/laboratory sessions. At the end of this unit students will have developed skills in modelling and analysing planar mechanisms and rigid body dynamic systems. Course content will include planar mechanisms, linkages, mobility; instant centres of rotation, Kennedy’s theorem; velocity and acceleration polygons; kinematics of rigid bodies, frames of reference, velocity and acceleration, rotating frame of reference, relative velocity and acceleration, gyroscopic acceleration; kinetics of rigid bodies, linear momentum and Euler’s first law; angular momentum and Euler’s second law; centre of mass; moments of inertia, parallel axis and parallel plane theorems, principal axes and principal moments of inertia, rotation about an axis; impulse and momentum; work and energy, kinetic and potential energies; applications to orbital and gyroscopic motion; introduction to Lagrangian methods.

AMME5501 Foundations: System Dynamics and Control

This unit of study aims to allow students to develop an understanding of methods for modeling and controlling linear, time-invariant systems. Techniques examined will include the use of differential equations and frequency domain approaches to modeling of systems. This will allow students to examine the response of a system to changing inputs and to examine the influence of external stimuli such as disturbances on system behaviour. Students will also gain an understanding of how the responses of these mechanical systems can be altered to meet desired specifications and why this is important in many engineering problem domains. The study of control systems engineering is of fundamental importance to most engineering disciplines, including Electrical, Mechanical, Mechatronic and Aerospace Engineering. Control systems are found in a broad range of applications in these disciplines, from aircraft and spacecraft to robots, automobiles, computers and process control systems. The concepts taught in this course introduce students to the mathematical foundations behind the modelling and control of linear, time-invariant dynamic systems. In particular, topics addressed in this course will include: 1. Techniques for modelling mechanical systems and understanding their response to control inputs and disturbances. This will include the use of differential equations and frequency domain methods as well as tools such as Root Locus and Bode plots. 2. Representation of systems in a feedback control system as well as techniques for determining which desired system performance specifications are achievable, practical and important when the system is under control. 3. Theoretical and practical techniques that help engineers in designing control systems, and an examination of which technique is best in solving a given problem.

AMME5601 Professional Engineering
Credit points: 6 Session: Semester 1 Classes: Lectures 2 hrs per week and tutorial 2 hrs per week. Assumed knowledge: Manufacturing, management experience or equivalent. Equivalent to AMME4100 Practical Experience, ENGG1803 Professional Engineering 1, MECCH3661 Engineering Management. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study aims to create an awareness of the issues surrounding management of projects and in general management in engineering plants; impart knowledge resulting in a more global approach to the practice of engineering and engineering management; provide a vehicle for improving communication skills. The course also aims, when taken together with other courses offered by the School, to substantially meet the requirement of the Institution of Engineers, Australia, for undergraduate training in management theory. On completion of this unit students should be able to: plan small projects, and contribute effectively to planning of larger projects; understand what is required of you in your role in the conduct and management of an engineering project; perform well in that role from the outset, with your performance limited only by your experience; prepare an interesting presentation on aspects of your work for your peers or senior managers; recognise the range of expertise you may need to call on in your role as an engineer working on a project (e.g. in the safety and environmental fields); Have an awareness of ethical and other issues which can arise in the workplace; be aware of the impact of Global Warming, Climate Change and related issues threatening sustainability and have some appreciation of the role for engineers in proposing solutions; be familiar with ergonomic design principals;
understand what the experts are saying, and to be able to contribute effectively to that discussion, so making effective use of that expertise.

**AMME5602**
Product Life Cycle Design

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Project Work in Class : 5 hours per week  
**Assumed knowledge:** Some knowledge of product and process design is assumed and a basic understanding of business activity will also be helpful.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit covers the following topics: Interfaces of product’s functional requirements and product’s design attributes; Mapping of product’s design attributes into the manufacturing requirements; The business constraints of bringing new products into the market place; Product life cycle management.

**AMME5900**
Project 1 in Manufacturing & Automation

**This unit of study is not available in 2012**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** Project Work done in own time.  
**Prerequisites:** BE or equivalent  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.

A core unit of study for the degree of Master of Engineering Studies (Automation and Manufacturing Systems).

**Expected outcomes:** Students will understand the major issues in project investigation on manufacturing and automation with improved ability and skill of systematic organisation of projects and technical communications.

**Syllabus summary:** Each student enrolled needs to consult with the prospective supervisor(s) to apply for a project topic in manufacturing and automation. The student can also propose his/her own topic in the field when the supervisor(s) permit(s) him/her to do so and agree(s) to offer consistent supervision. Under the guidance of the supervisor(s), the student will learn how to develop a proposal, how to do the project investigation and how to prepare and carry out the technical communications (writing and oral). In any of these scenarios, the student is directly responsible for the progress and quality of the results. At the end of the semester, the student is required to submit a written project report and to give a seminar presenting the aims and achievements of the project. 

**AMME5901**
Anatomy and Physiology for Engineers

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lectures : 2.5 hours per week; Laboratory : 12 hours per semester.  
**Assumed knowledge:** Biology  
**Campus:** Cumberland  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims for students to gain familiarity with anatomical and physiological terms and understanding their meaning. Students should gain an understanding of the gross anatomy of the major systems in the human body and their importance in the design of biomedical devices. Students should gain an understanding of the major physiological principles which govern the operation of the human body. At the end of this unit students will be able to: identify the gross anatomical features of the human body; describe the normal function of the major body systems (nervous, circulatory, respiratory, musculoskeletal, digestive and renal); determine how these functions relate to cellular function; determine how a biomedical engineering device affects the normal anatomy and function of the body. 

Course content will include: Bone tissue; Skeletal system; Joints; Muscle Tissue; Bones & joints anatomy (prac); Muscle Mechanics; Muscle anatomy (prac); Nerve Tissue; Muscles & nerves prac; CVS Heart; Blood vessels; Respiratory System 1; Respiratory System 2; Homeostasis; CVS and Respiratory anatomy (prac); Physiology; Respiratory Physiology; Cardio-respiratory physiology (prac); Renal Anatomy; Renal Physiology; Abdominal Renal Digestive Anatomy; Digestive Physiology; Oral Presentation.

**AMME5902**
Advanced Computer Aided Manufacturing

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lectures: 2 hours per week; Tutorials: 2 hours per week; Laboratory: 3 hours per semester.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The aim of this course is to enhance the student’s manufacturing engineering skills in the CAD/CAM area. The course focuses on CNC milling as a manufacturing automation process applied to a project. The management, planning and marketing of a typical engineering project are also discussed.

**Objectives:**
- Through integrated project-based learning and hands-on-machine training, you will learn how to successfully complete a CAD/CAM and CNC mill based project.
- Manufacturing management and system skills, such as product planning, manufacturing sequence, time and cost;
- The science in designing and selecting a manufacturing method.
- How to effectively present your ideas and outcomes using oral and report based methods.

**AMME5912**
Crash Analysis using LS-DYNA

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** Lectures: 2 hours per week, Tutorials: 2 hours per week, Project Work - own time.  
**Assumed knowledge:** Computer Aided Drafting, Basic FEA principles and Solid Mechanics  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.

The objective of the course is to give students skills in the area of highly non-linear finite element analysis. Major topics covered include CAD, Implicit / explicit codes, Wire frame geometry, Elementar Theory, Materials, Pre-processing using ETA-VPG, Contact, LS-Dyna, using NCAC FEM models, Modeling fasteners. Material covered in lectures is reinforced through independent research, assignments, quizzes and a major project. The project involves the development of an approved crash scenario.

**AMME5921**
Biomedical Engineering Tech 2

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lectures: 4 hours per week  
**Assumed knowledge:** A bachelor degree, ideally in the engineering or science field, is advisory, but not essential.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study provides an introduction to the field of biomedical engineering, from the point of view of the engineering and the global biomedical industry itself. After completion of this unit, students will have a clear understanding of what biomedical engineering is, both from the engineering perspective and the commercial/industry perspective.

**AMME5961**
Biomaterials Engineering

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lectures: 3 hours per week  
**Assumed knowledge:** Chemistry, biology, materials engineering, and engineering design at least at the Junior level.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

To gain a basic understanding of the major areas of interest in the biomaterials field, learn to apply basic engineering principles to biomedical systems, and understand the challenges and difficulties of biomedical systems. To participate in a project-based-learning approach to the topic of design with Biomaterials.

**AMME5971**
Applied Tissue Engineering

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lectures: 2 hours per week  
**Assumed knowledge:** Biology, chemistry at a junior level and intermediate physiology or equivalent  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

With the severe worldwide shortage of donor organs and the ubiquitous problem of donor organ rejection, there is a strong need for developing technologies for engineering replacement organs and other body
parts. Recent developments in biochemistry and cell biology have begun to make this possible, and as a consequence, the very new field of tissue engineering has been making dramatic progress in the last few years.

This UoS will provide an introduction to the principles of tissue engineering, as well as an up to date overview of recent progress in the field of tissue engineering and where it is going. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of tissue engineering. The objectives are:

Objectives:
1. To gain a basic understanding of the major areas of interest in tissue engineering
2. To learn to apply basic engineering principles to tissue engineering systems
3. To understand the challenges and difficulties of tissue engineering.
4. Understand the ethical issues of stem cell applications.
5. Practical classes in the preparation and evaluation of scaffolds for tissue regeneration.
6. Enable student to access web-based resources in tissue engineering (for example: Harvard-MIT Principles and Practice of Tissue Engineering).
7. Research basic skills in Tissue Engineering Learning outcomes:

1. To develop a theoretical understanding of the basic concepts of tissue engineering and be exposed to the various specific disciplines of this field. The students will develop specific expertise through the lectures given by invited speakers at the forefront of their research.
2. To achieve effective communications the class will be divided into small groups where each group will present their findings on their assigned project/paper for discussion with the whole class on their results, ideas and critically evaluate their scientific findings.
3. The students will each complete an individual assignment on the applications of tissue engineering to ophthalmology, dental, skeletal tissue, skin, neural, vascular and cardiology. In their assignment they will discuss the advances and future direction and identify key areas of shortcoming in the specific fields and discuss the general problem and possible solutions.
4. Students will gain expertise by conducting a scientific literature review of the current progress in the field of tissue engineering in general. Specifically, they will undertake a thorough scientific search on the latest development in the research conducted in their chosen assignment topic.
5. Team work skills will be developed by participating in group tutorial projects. Each group will then discuss the assigned paper/project in detail, decide on key points and then report back to the entire class.

AMME5981
Computational Biomedical Engineering

Credit points: 6 Session: Semester 1 Classes: Lectures: 2 hours per week; Tutorials: 2 hours per week Assumed knowledge: AMME5301, AMME5302, AMME5500, MECH5361 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This UoS will give students a comprehensive understanding of finite element method, material constitutive modelling, CT/MRI based solid modelling, design analysis and optimisation, and their applications in biomedical engineering. The students are expected to expand their research and development skills in relevant topics, and gain experience and skills in finite element software for the solution to sophisticated problems associated with biomedical engineering. The objectives are:

1. Understanding of the nature of biomedical engineering problems;
2. Exploring CT/MRI image processing, solid modelling etc;
3. Understanding of finite element methods and developing FE models for biomedical engineering analysis;
4. Understanding biomaterials constitutive modelling;
5. Understanding bone remodelling simulation, fracture mechanics;
6. Developing prosthetic design optimisation;

AMME5990
Biomedical Engineering Tech 1

Credit points: 6 Session: Semester 1 Classes: Lectures: 2 hours per week; Tutorials: 2 hours per week Assumed knowledge: Junior level chemistry, intermediate level biology, and specific knowledge of cell biology at least at the junior level, and preferably at the intermediate level. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Elective Unit of Study: Product development in the biomedical area presents unique challenges that need to be addressed to efficiently satisfy strict regulatory requirements and to successfully advance products to approval for marketing. Biomedical engineers need a broad understanding of these challenges as the main components of product development are complex and interdependent. Development of good manufacturing and quality control processes, preclinical and clinical validation of product safety and efficacy, and regulatory filings, are each progressive and interdependent processes. This UoS will provide a broad understanding of regulatory requirements for biomedical product development, with particular emphasis on the dependence of each component on the development of processes and control systems that conform to Good Manufacturing Practice. This UoS assumes prior knowledge of cell biology and chemistry and builds on that foundation to elaborate on the important aspects of biomedical product development. The objectives are:

1. To gain a broad understanding of biomedical product development within the regulatory framework.
2. To understand the challenges and difficulties of Good Manufacturing Practice.
3. Understand the purpose and conduct of preclinical and clinical testing.
4. To understand how each of these components fit together to support regulatory filings.

MECH5255
Air Conditioning and Refrigeration (Adv)

Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1 hour of tutorials per week. Prohibitions: MECH4255 Assumed knowledge: Students are expected to be familiar with the basic laws of thermodynamics, fluid mechanics and heat transfer. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study develops an advanced knowledge of air conditioning systems and refrigeration applications. At the completion of this unit students will be able to determine thermal loads on structures and design an air conditioning or refrigeration system with attention to comfort, control, air distribution and energy consumption. Course content will include: applied psychrometrics, air conditioning systems, design principles, comfort in the built environment, cooling load calculations, heating load calculations, introduction and use of computer-based load estimation packages software, air distribution, fans, ducts, air conditioning controls, advanced refrigeration cycles, evaporators, condensers, cooling towers, compressors, pumps, throttling devices, piping, refrigerants, control, refrigeration equipment, simulation of refrigeration systems, food refrigeration and industrial applications; Use of CFD packages as tools to simulate flows in building and to optimise air conditioning design, energy estimation methods and software, energy evaluation and management in the built environment. Use of experimental air conditioning systems to test for thermal balances and compare with simulations.

Textbooks
References:
MECH5261
Foundations of Fluid Mechanics

This unit aims to provide students with a detailed understanding of the theory and practice of fluid mechanics in the context of mechanical engineering. At the end of this unit students will have the ability to critically assess and solve problems commonly found in fluid mechanics practice, such as sizing pumps and piping systems, designing channels, and determining the lift and drag characteristics of submerged bodies. Additionally, they will develop a structured and systematic approach to problem solving. Course content will include: Navier-Stokes equations: derivation, significance and fundamental importance. Pipe flow: Bernoulli, shear losses, minor losses, networks. Pumps: pump types, characteristics, applications. Flow around submerged bodies: lift and drag Boundary layers: derivation of equations, laminar and turbulent, transition, momentum integral method, law of the wall, velocity profiles. Turbulence: concept, properties of turbulent flow, eddy viscosity models, more advanced approaches. Channel flow: flow in a channel, weir, hydraulic jump. Gas dynamics: steady one-dimensional flow including friction and heat transfer, sound waves, normal shock, nozzle flow, shock tube.

MECH5262
Foundations of Thermal Engineering
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prerequisites: AMME5200 Assumed knowledge: Fundamentals of thermodynamics are needed to begin this more advanced course. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop an understanding of: the principles of thermodynamic cycles, gas mixtures, combustion and thermochromy applied to engineering processes, power and refrigeration systems; heat transfer equipment design. To classify heat transfer situations as conduction, convection, radiation, forced or natural convection. To determine the appropriate approach to problems, the type of solution needed, analytical or numerical. To be able to arrive at a solution and predict heat transfer rates and be able to design and size heat transfer equipment.

At the end of this unit students will be able to: apply the principles of thermodynamics and heat transfer to real engineering situations; have the Ability to tackle and solve a range of complex thermodynamics cycles, air conditioning, combustion, chemical equilibrium, problems involving gas mixtures; have the ability to tackle and solve a range of heat transfer problems including finned heat exchangers, cooling by fluids, quenching, insulation and solar radiation. Course content will include: Thermodynamics: Exergy and entropy. Power: spark ignition, Power: diesel, Power: gas turbine, Power: stirling, Power: steam, Gas mixtures, Clausius-Clapeyron, Humidity, psychrometry, Air-conditioning, Combustion: stoichiometry, gas analysis. Combustion, Thermochromy, adiabatic flame, temperature Combustion, 2nd Law of Thermo., equilibrium, exergy. Heat Transfer: Conduction, thermal circuits, General conduction equation, cylindrical fins, Heat Exchangers, Numerical solutions, Unsteady conduction, Convection, analytical, Forced convection correlations, Natural convection, boiling, Radiation spectrum, blackbody, Radiation properties and laws, Radiation environmental, solar.

MECH5265
Advanced Combustion
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 3 hours of tutorials per week. Prerequisites: MECH5262 Prohibitions: MECH4265 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to give students a sound understanding of combustion and some of its applications such as internal combustion engines, gas turbines and fires. At the completion of this unit students will be able to perform an analysis of simple reacting systems, calculate the structure of simple premixed and diffusion flames, and analyse thermal and flow processes in fires and combustion chambers of practical devices. Course content will include: equilibrium compositions, flammability limits, simple chemically reacting systems, detailed chemical kinetics, the basic theory underlying laminar and turbulent combustion for both premixed and non-premixed cases, an introduction to droplet combustion, the concept of mixture fraction for non-premixed flames, combustion in engines and gas turbines as well as the formation of pollutants. Some computational tools in combustion will be introduced. Fire ignition, growth and spread will also be covered with respect to safety in buildings including the hazards related to the formation of smoke and toxic products.

MECH5275
Advanced Renewable Energy
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 3 hours of tutorials per week. Assumed knowledge: The students will require an understanding of the basic principles of fluid mechanics, thermodynamics and heat transfer, and the application of these principles to energy conversion systems. In particular, students should be able to analyse fluid flow in turbomachinery; perform first and second law thermodynamic analysis of energy conversion systems; and perform calculations of radiative, conductive and convective heat transfer. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to develop understanding of the engineering design and analysis of different devices and technologies for generating power from renewable sources including: solar, wind, wave, tidal, ocean thermal, geothermal, hydro-electric, and biofuels; to understand the environmental, operational and economic issues associated with each of these technologies. At the end of this unit students will be able to perform in depth technical analysis of different types of renewable energy generation devices using the principles of fluid mechanics, thermodynamics and heat transfer. Students will be able to describe the environmental, economic and operational issues associated with these devices.
improve mechanical design with the knowledge of mechanics and properties of materials, and (c) how to conduct failure diagnosis of engineering materials.

MECH5361
Foundations of Mechanics of Solids 2
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 2 hours of tutorials per week Prerequisites: AMME5301 Prohibitions: MECH5361 Assumed knowledge: Linear Mathematics, Vector Calculus, Differential Equations and Fourier Series Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The UoS aims to: teach the fundamentals of analysing stress and deformation in a solid under complex loading associated with the elemental structures/components in aerospace, mechanical and biomedical engineering; develop the following attributes: understand the fundamental principles of solid mechanics and basic methods for stress and deformation analysis of a solid structure/element in the above mentioned engineering areas; gain the ability to analyse problems in terms of strength and deformation in relation to the design, manufacturing and maintenance of machines, structures, devices and elements in the above mentioned engineering areas.

At the end of this unit students will have a good understanding of the following: applicability of the theories and why so; how and why to do stress analysis; why we need equations of motion/equilibrium; how and why to do strain analysis; why we need compatibility equations; why Hooke’s law; why plasticity and how to do elastic and plastic analysis; how and why to do mechanics modelling; how to describe boundary conditions for complex engineering problems; why and how to solve a mechanics model based on a practical problem; why and how to use energy methods for stress and deformation analysis; why and how to do stress concentration analysis and its relation to fracture and service life of a component/structure; how and why to do fundamental plastic deformation analysis; how and why the finite element method is introduced and used for stress and deformation analysis.

The students are expected to develop the ability of solving engineering problems by comprehensively using the skills attained above. The students will get familiar with finite element analysis as a research and analysis tool for various real-life problems.

MECH5362
Foundations of Materials 2
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 2 hours of tutorials per week Prerequisites: AMME5302 Prohibitions: MECH5362 Assumed knowledge: Mechanics of solids: statics, stress, strain Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims for students to understand the relationship between properties of materials and their microstructures and to improve mechanical design based on knowledge of mechanics and properties of materials.

At the end of this unit students should have the capability to select proper materials for simple engineering design. Course content will include: short-term and long-term mechanical properties; introductory fracture and fatigue mechanics, dislocations; polymers and polymer composite materials; ceramics and glasses; structure-property relationships; selection of materials in mechanical design.

MECH5416
Advanced Design and Analysis
Credit points: 6 Session: Semester 1 Classes: 2 hrs of lectures, 2 hrs of tutorials per week Assumed knowledge: Eng Mechanics, balance of forces and moments Mechanics of Solids, 2 and 3 dimensional stress and strain Engineering Dynamics - dynamic forces and moments. Mechanical Design, approach to design problems and report writing, and preparation of engineering drawing Mechanical design intermediate, means of applying fatigue analysis to a wide range of machine components Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This UoS utilises assumed theoretical knowledge and skills to elucidate the stresses and strains that exit in the different categories of machine parts. It sets out to make the students familiar with the simplifications that are applied to arrive at the analytic expressions commonly used to analyse each individual categories parts. These simplifications usually begin by assuming that only particular types of loads are carried by teh parts in that category. The resulting analyses provide approximations to the actual stresses. It is possible to have different degrees of simplifications, requiring more or less work, giving better or poorer approximations. Should a part be used to carry loads that were not allowed for in the traditional method then some more appropriate method must be found or developed. An important aspect is to make the student practiced in a range of modern concepts, techniques and tools, and to be made aware of their strengths and limitations.

This UoS teaches the student how to recognise where and how their theoretical skills can be applied to the practical situations that they may encounter in this field of design. Options may be provided in the choice of design assignments. Biomedical engineering and vehicle design problems may be provided as options to more general machine design problems.

MECH5660
Foundations of Manufacturing Engineering
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week. Prohibitions: MECH5660 Assumed knowledge: AMME5200, AMME5301, AMME5302 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The unit aims to teach the fundamentals of manufacturing processes and systems in mechanical, mechatronic and biomedical engineering, including traditional and advanced manufacturing technologies.

This unit aims to develop the following attributes: to understand the fundamental principles of manufacturing technologies for the above mentioned engineering areas; to gain the ability to select existing manufacturing processes and systems for direct engineering applications; to develop ability to create innovative new manufacturing technologies for advanced industrial applications; to develop ability to invent new manufacturing systems.

At the end of this unit students will have a good understanding of the following; merits and advantages of individual manufacturing processes and systems; principles of developing new technologies; comprehensive applications and strategic selection of manufacturing processes and systems.

Course content will include:
Manufacturing Processes: Common processes and their science (machining, casting, powder metallurgy, metal working, welding); merits and limitations; CNC and CAM;
Manufacturing Systems: Economics in manufacturing; flexible manufacturing; group technology; materials selection and requirements planning; quality control; introduction to new technology; introduction to e-manufacturing; human factors; plant layout.

MECH5701
Computers in Real Time Control and Inst
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 3 hours of tutorials per week Prohibitions: MECH4730, MECH4710 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Units of study

Syllabus Summary: Review of sensing, analogue and digital electronics, and overview of the IBM PC architecture. Programming for interactive control using both assembly language and high level languages. Timers and asynchronous tasks; data communication. Data structures for real-time programming. Multitasking and real-time operating systems. Use of multi-tasking, message passing and multi-threading in environments such as NT and/or Unix. Object-oriented programming in C++. Design of interactive graphical displays; man-machine communication. Objectives: Microcomputer and microprocessor system, operating in real time have become very common components in today's computer systems. The objective of this unit of study is to teach the fundamentals of real time software and to build competence in the engineering use of such systems through lectures emphasising standard computer architectures, real-time operating systems and programming, and through intensive laboratory work with microcomputer systems interacting with experimental mechatronic processes. Expected outcomes: The student will have a basic knowledge of the hardware components available in a microcomputer system and a detailed knowledge of facilities and capabilities typically present in a professional real time operating system. The student will have the competence to design, implement and debug real-time multitasking systems with graphical user interfaces.

MECH5720

Sensors and Signals


Syllabus Summary: This course starts by providing a background to the signals and transforms required to understand modern sensors. It goes on to provide an overview of the workings of typical active sensors (Radar, Lidar and Sonar). It provides insight into basic sensing methods as well as aspects of interfacing and signal processing. It includes both background material and a number of case studies. The course covers the following topics:

a) SIGNALS: Convolution, The Fourier Transform, Modulation (FM, AM, FSK, PSK etc), Frequency shifting (mixing)
b) PASSIVE SENSORS: Infrared Radiometers, Imaging Infrared, Passive Microwave Imaging, Visible Imaging & Image Intensifiers
c) ACTIVE SENSORS THE BASICS: Operational Principles, Time of flight, user's view of sensor & Imaging of Radar, Lidar and Sonar, Radar Tags and Transponders, Range Tacking, Doppler Measurement, Phase Measurement
d) SENSORS AND THE ENVIRONMENT: Atmospheric Effects, Target Characteristics, Clutter Characteristics, Multipath

Objectives: The course aims to provide students with a good practical knowledge of a broad range of sensor technologies, operational principles and relevant signal processing techniques.

Expected Outcomes: A good understanding of active sensors, their outputs and applicable signal processing techniques. An appreciation of the basic sensors that are available to engineers and when they should be used.

MTRX5700

Experimental Robotics


This unit aims to present a broad overview of the technologies associated with industrial and mobile robots. Major topics covered are sensing, mapping, navigation and control of mobile robots and kinematics and control of industrial robots. The subject consists of a series of lectures on robot fundamentals and case studies on practical robot systems. Material covered in lectures is illustrated through experimental laboratory assignments. The objective of the course is to provide students with the essential skills necessary to be able to develop robotic systems for practical applications. At the end of this unit students will: be familiar with sensor technologies relevant to robotic systems; understand conventions used in robot kinematics and dynamics; understand the dynamics of mobile robotic systems and how they are modeled; have implemented navigation, sensing and control algorithms on a practical robotic system; apply a systematic approach to the design process for robotic systems; understand the practical application of robotic systems in applications such as manufacturing, automobile systems and assembly systems; develop the capacity to think creatively and independently about new design problems; undertake independent research and analysis and to think creatively about engineering problems. Course content will include: history and philosophy of robotics; hardware components and subsystems; robot kinematics and dynamics; sensors, measurements and perception; robotic architectures, multiple robot systems; localization, navigation and obstacle avoidance, robot planning; robot learning; robot vision and vision processing.

School of Chemical and Biomolecular Engineering

CHNG5001

Process Systems Engineering

Credit points: 8 Session: Semester 2 Classes: Lectures: 1 hour per week, Tutorials: 2 hours per week. Assumed knowledge: Mathematics, physics and modeling. Assumed knowledge at the bachelor of Science level. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: This unit of study is for Masters students and can be selected as an elective by 4th year students.

Whatever its purpose, any process requires some level of process monitoring and control to allow it to operate satisfactorily. Once a process is under control, the option exists to further improve performance via the implementation of some level of optimisation. This UoS will develop skills in integrating process modelling, simulation, design, optimisation and control concepts. The aims of this UoS are (i) to demonstrate that modelling, process control and optimisation are integral concepts in the overall consideration of industrial plants, (ii) to demonstrate that a unified approach allows a diversity of application fields to be readily handled, and (iii) to allow each student to achieve and demonstrate acceptable competency over the UoS material through a range of individual and group-based activities.

CHNG5003

Green Engineering

Credit points: 5 Session: Semester 2 Classes: 1 hour of lectures, 4 hours of tutorial/project work group per week. Assumed knowledge: Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day

Green engineering, eco-technology and sustainable technology are all interchangeable terms for the design of products and processes that maximise resource and energy efficiency, minimise (or preferably eliminate) waste and cause no harm to the environment. In modern society, engineers equipped with the skills to develop sustainable technologies are tremendously valuable. This unit of study will examine cutting edge examples of sustainable technologies across a broad range of applications relevant to chemical and biomolecular engineering. The delivery of teaching and learning material will be exclusively in project mode. Students will be expected to critically analyse modern engineering processes and improve them, from the ground up if necessary, so that they satisfy the criteria of eco-design. At the completion of this unit of study students should have developed an appreciation of the underlying principles of green engineering and be able to demonstrate they can apply these skills to new and novel situations. Students are expected to develop an integrated suite of
problem-solving skills needed to successfully handle novel (and previously unseen) engineering situations, coupled with an ability to independently research new areas and be critical of what is found, and an ability to cope with experimental data, change and uncertainty through critical thinking.

CHNG5004 Particles and Surfaces
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours of tutorials per week. 10 hours of lab work per semester. Assumed knowledge: Enrolment in this unit of study assumes that all (six) core chemical engineering UoS in third year or their equivalent have been successfully completed. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Particles and Surfaces: Mineral Processing. Aims and Objectives: Solid-solids and solid-liquid interactions are an important aspect in mineral processing. The aim of any mineral processing operation is the efficient extraction of the valuable metals or minerals (concentrate) from the waste materials in the ore (gangue). The goal of this course is to understand the various key steps and the corresponding principles required to achieve metal extraction from the ores.

Syllabus summary: This course will elucidate the principles in size reduction or comminution of the ore in liberating the valuable minerals, examine the microscopic details of solid-liquid, solid-gas and solid-solid interactions in metal processing and their roles in macroscopic phenomena such as adhesion, wetting, adsorption, and mineral reactions such as reduction roasting and leaching. The general understanding of these factors will allow manipulation and improvement of performance in metal beneficiation, dewatering of mineral slurries and extractive metallurgy.

By the end of this course students should develop a proficiency in characterisation of physical, surface and chemical properties of solids and metal aqueous streams; devising strategies to achieve extraction process objectives, within the constraints imposed by social, economic and physical environments, developing management strategies for treating liquid and solid effluents and becoming familiar with computer software packages in modelling aqueous and solid systems.

CHNG5005 Wastewater Eng - Systems and Practice
Credit points: 6 Session: Semester 2 Classes: 4 hours of lectures and tutorials per week. Prerequisites: CHNG5801 Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve 'real' chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use basic calculus and linear algebra, and carry out such computations using Matlab and MS Excel. Ability to read widely outside of the technical literature and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on information from diverse sources. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This course will give students insights into advanced concepts in Chemical and Biomolecular Engineering, which are essential for the design of efficient processes and green products for the sustainable development and minimise or preferably eliminate waste for a clean world. This unit of study will examine cutting edge examples of nano-technology, renewable energy, bio-technology, and other advanced technologies across a broad range of applications relevant to chemical and biomolecular engineering. At the completion of this unit of study students should have developed an appreciation of the underlying concepts and be able to demonstrate they can apply these skills to new and novel situations. Students are expected to develop an integrated suite of problem-solving skills needed to successfully handle novel (and previously unseen) engineering situations, coupled with an ability to independently research new areas and be critical of what is found, and an ability to cope with experimental data, change and uncertainty through critical thinking.

CHNG5008 Chemical & Biomolecular Engineering Adv
Credit points: 6 Session: Semester 2 Classes: Project Work - own time, Lectures 4hrs per week. Prerequisites: CHNG5801 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Note: Department permission required for enrolment.

This course will give students insights into advanced concepts in Chemical and Biomolecular Engineering, which are essential for the design of efficient processes and green products for the sustainable development and minimise or preferably eliminate waste for a clean world. This unit of study will examine cutting edge examples of nano-technology, renewable energy, bio-technology, and other advanced technologies across a broad range of applications relevant to chemical and biomolecular engineering. At the completion of this unit of study students should have developed an appreciation of the underlying concepts and be able to demonstrate they can apply these skills to new and novel situations. Students are expected to develop an integrated suite of problem-solving skills needed to successfully handle novel (and previously unseen) engineering situations, coupled with an ability to independently research new areas and be critical of what is found, and an ability to cope with experimental data, change and uncertainty through critical thinking.

CHNG5020 Capstone Project A
Credit points: 6 Session: Semester 1, Semester 2 Classes: Independent project work. Prerequisites: 48 credits from MPE degree program. Prohibitions: ENGG5222, ENGG5223 Campus: Camperdown/Darlington Mode of delivery: Supervision

Note: Department permission required for enrolment in the following sessions: Semester 2.

The ability to plan, systematically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s): 1, 2

CHNG5021 Capstone Project B
Credit points: 6 Session: Semester 1, Semester 2 Classes: Independent project work. Corequisites: CHNG5020 Prohibitions: ENGG5222, ENGG5223, ENGG5218, ENGG5219 Campus: Camperdown/Darlington Mode of delivery: Supervision

Note: Department permission required for enrolment in the following sessions: Semester 1.

In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s): 1, 2

CHNG5112 Found of Chemical Eng Design A
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of lectures and 2 hours of tutorials per week. Prerequisites: CHNG5801, CHNG5802,
In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This UoS builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity.

This design activity is spread over two UoS (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first UoS is to consider the technical issues - with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in the subsequent UoS is on evaluating how non-technical considerations affect the final process design and its operation.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to designing chemical processes and associated technological developments.

CHNG5116
Found of Chemical Eng Design B
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2 hours of lectures and 2 hours of tutorials per week. Prerequisites: CHNG5112 Chemical Engineering Design A Assumed knowledge: Enrolment in this unit of study assumes that all core chemical engineering UoS in second and third years, or their equivalent, have been successfully completed. Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Aims and Objectives
In the overall design process, chemical engineers must clearly understand the (often complex) interactions and trade-offs that occur between technical, economic, social and environmental considerations. This UoS builds on concepts in each of these areas introduced in previous years but with an emphasis on their successful integration within a comprehensive design activity.

This design activity is spread over two UoS (Chemical Engineering Design A and B) run in first and second semester. The primary aim in the first UoS is to consider the technical issues - with an emphasis on creating and evaluating a range of alternative options that exist at both the unit operation and complete flowsheet levels. The primary emphasis in the subsequent UoS is on evaluating how non-technical considerations affect the final process design and its operation.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to designing chemical processes and associated technological developments.

CHNG5205
Major Industrial Placement Project
Credit points: 24 Session: Semester 1 Classes: Practical Experience and Research with Industry partner. Prerequisites: Passed at least 48 credit points in Master of Professional Engineering. Prohibitions: CHNG5112, ENGG5219, ENGG5220, ENGG5221, CHNG5801 Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment. Note: Enrolment by permission only. The students enrolled in this subject should complete the first year of the Master of Professional Engineering with specialisation in Chemical and Biomolecular Engineering and a minimum credit average. The candidate will be selected by interview and at the discretion of the Head of School.

The purpose of this proposal is to introduce a new subject into the Master of Professional Engineering with specialisation in Chemical and Biomolecular Engineering. The new subject is designed to equip students with practical experience in the area of chemical and Biomolecular Engineering. Industrial project placement will clearly cover and widen the practical nature of curriculum base studies. This unit of study will give students a rich experience for undertaking a major project in an industrial environment and developing skills in the preparation and presentation of technical reports. The project is performed under joint university and industry supervision and extends over one semester. The students will be engaged full time on the project at the industrial site. Students will be placed with industries, such as mining, oil and gas processing, plastic and paint manufacturing, food production, wastewater and water treatment. The students will learn essential engineering skills, such as how to examine published and experimental data, set objectives, project management, and analysis of results and assess these with theory and existing knowledge.

CHNG5601
Membrane Science
Credit points: 6 Session: Semester 1 Classes: 4 hours of lectures and laboratory sessions per week. Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Students will be given a background in the physics of cell membranes. The students will understand the electrodiffusion of materials through membranes. Students will be provided with a good background in the electrical properties of cell membranes and gain an understanding of the process of excitation in nerve and muscle.

CHNG5602
Cellular Biophysics
Credit points: 6 Session: Semester 1 Classes: 4 hours of lectures/ project work classes per week. Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Students will be given a good background in the physics of biological processes. Students will understand the differences between thermodynamically closed and open systems and its relevance to cells and other biological systems. Students will be provided with an introduction to the thermodynamics of irreversible and evolutionary processes of relevance to biology. Students will be introduced to the statistical mechanics of self assembly and equilibrium structures and its relevance to biology at the molecular level.

CHNG5603
Analysis, Modelling, Control: BioPhy Sys
Credit points: 6 Session: Semester 1 Classes: Lectures 2hrs per week, Tutorials 1hr per week, Project Work - own time. Assumed knowledge: It is assumed that students have a general knowledge of: MATH 1001 Differential Calculus MATH 1003 Integral Calculus and Modeling Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This course will give students an insight into the use of (computer-based) statistical techniques in extracting information from experimental data obtained from real life bio-physical systems. The issues and techniques required for mathematical modeling as well as monitoring and/or control scheme for bio-physical systems will be discussed and implemented in diverse range of bioprocesses, including biomaterials and fermentation products.
We will review statistical distribution; tests based on z, t, F variables; calculation of confidence intervals; hypothesis testing; linear and nonlinear regression; analysis of variance; principal component analysis; and use of computer-based statistical tools. The issues associated with dynamic response of bio-physical processes; inferred or estimated variables; control system design and implementation; introduction to model-based control; use of computer-based control system design and analysis tools will be elaborated.
When this course is successfully completed you will acquire knowledge to choose the appropriate statistical techniques within a computer based environment, such as Excel or MATLAB, for a given situation. The students will also obtain potential for monitoring/control scheme based on the key dynamic features of the process. Such information would be beneficial for any future career in Bio-manufacturing companies. Students are encouraged to promote an interactive environment for exchange of information.

CHNG5604
Membrane Science Laboratory
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures or tutorials per week. Campus: Campden/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Students will explore experimentally the theoretical concepts learned in the other modules of the MES course in Biophysical Processes. They will gain practical insights into electrodiffusion and other mass transport processes through membranes. Students will understand the construction and functional properties of synthetic separation membranes. Students will explore experimentally the various factors affecting the performance of synthetic separation membranes.

**CHNG5605 Bio-Products: Laboratory to Marketplace**

**Credit points:** 6. **Session:** Semester 2. **Classes:** 2 hours of lectures per week. **Project Work - own time.** **Campus:** Camperdown/Darlington. **Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of the course are to provide students with an overview of biochemical and pharmaceutical industry. It will give students an insight into drug delivery systems and formulation; how therapeutic drugs work; and a general overview of biochemical and pharmaceutical marketing. The design and management of clinical trials, which are key factors for development of any new therapeutic agent will also be covered in the course. The challenges for commercialisation of innovative methods and/or biochemical and pharmaceutical products and aspects of intellectual property protection will be elaborated. Ultimately the aspects of Good Manufacturing Practice (GMP) and international legislation for marketing pharmaceutical products will be illuminated.

Lectures in this course will be delivered by both University of Sydney staff and by a number of visiting professional representatives from industry and government agencies. We will also arrange a site visit for a bio-manufacturing company as warranted.

When you successfully complete this course you acquire knowledge about drug formulation, pharmaceutical processing including physical processes, legislation governing the bio-manufacturing and commercialisation of biochemicals and pharmaceuticals. The information would be beneficial for your future career in pharmaceutical manufacturing companies.

Students are encouraged to engage in an interactive environment for exchange of information. This course will be assessed by quizzes, assignments, oral presentation and final report.

**CHNG5701 Found of Conservation & Transport Proc**

**Credit points:** 6. **Session:** Semester 1. **Classes:** Lectures 2hrs per week, Tutorial 2hrs per week, Project Work - own time. **Campus:** Camperdown/Laboratory 2hrs per week. **Prohibitions:** CHNG2801. **Assumed knowledge:** Calculus, computations (Matlab, Excel), Mass and Energy Balances. **Campus:** Camperdown/Darlington. **Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Aims and Objectives**

In the design and analysis of chemical processes, chemical engineers must understand integrated concepts in conservation of mass and energy, the flow properties of fluids, heat transfer and the mass transfer of chemical species through materials. This is true not only in traditional areas, such as petrochemicals, but also for emerging fields like microreactors and biotechnology. This course is an introduction to the basic concepts in transport phenomena necessary for subsequent courses ranging from unit operations to reactor design and reaction kinetics. The course builds on concepts from elementary physics and chemistry, as well as calculus and differential equations.

This module will provide students with working knowledge of conservation of mass and energy, momentum, mass and energy transfer, and non-reaction rate processes. These aspects are a first step to the understanding of transport phenomena. It considers the classification of fluids and their properties. The integral and differential forms of the fundamental equations - Continuity, Momentum and Energy equations are studied. The concepts of transfer rates of momentum, heat and mass as functions of appropriate driving forces divided by appropriate resistances will be introduced. The way in which such resistances and driving forces are defined will be reviewed. Also covered are dimensional analysis and the differences between molecular diffusion and convection (bulk flow) of mass, heat and momentum.

In addition, there will be considerable time spent during the semester on advanced topics related to the analysis of conservation and transport processes in engineering, and recent associated technological developments.

**CHNG5702 Found of Applied Maths for Chem Eng**

**Credit points:** 6. **Session:** Semester 1. **Classes:** 2 hours of lectures and 2 hours of tutorials per week. **Assumed knowledge:** Enrolment in this unit of study assumes that all core science and engineering UoS in first-year (or their equivalent) have been successfully completed. **Campus:** Camperdown/Darlington. **Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Note:** Department permission required for enrolment. **Aims and Objectives**

Virtually every aspect of a chemical engineer’s professional life will involve some use of mathematical techniques. Not only is the modern chemical engineer expected to be proficient in the use of these techniques, they are also expected to be able to utilise computer-based solutions when analytical solutions are unfeasible. This UoS aims to expose students to an appropriate suite of techniques and enable them to become proficient in the use of mathematics as a tool for the solution of a diversity of chemical engineering problems. Specifically, this unit consists of two core modules: (A) Statistical methods and (B) Numerical methods. These modules aim at furthering knowledge by extending skills in statistical analysis and Chemical Engineering computations. This unit will also enable the development of a systematic approach to solving mathematically oriented Chemical Engineering problems, which will help with making sound engineering decisions.

In addition, there will be considerable time spent during the semester on advanced topics related to mathematical analysis techniques in engineering and recent associated developments.

**CHNG5703 Found of Energy and Fluid Systems**

**Credit points:** 6. **Session:** Semester 1. **Classes:** 8 hours per week of in class project work. **Prohibitions:** CHNG2803. **Assumed knowledge:** Ability to understand basic principles of physical chemistry, physics and mechanics. Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative and quantitative information. **Campus:** Camperdown/Darlington. **Mode of delivery:** Normal (lecture/lab/tutorial) Day

To recognise that chemical engineers are involved in creation of products and processes, in manipulating complex systems, and in managing technical operations To develop an appreciation of the practical application of concepts and tools to real design problems in the process, product and service sectors in which chemical engineers are engaged. To consider this through three project-driven case studies covering a range of integrated analysis scenarios, from the domain of energy and fluid systems. In addition, there will be considerable time spent during the semester on advanced topics related to energy and fluid systems and associated technological developments.

**CHNG5704 Found: Chem & Biological Syst Behaviour**

**Credit points:** 6. **Session:** Semester 2. **Classes:** 1-2 hours of lectures and 2 hours of tutorials per week. **Prohibitions:** CHNG2804. **Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. **Campus:** Camperdown/Darlington. **Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Aims and Objectives**

Chemical Engineering requires an understanding of material and energy transformations and how these are driven by molecular interactions. The rate of such transformations is dependent on driving forces and resistances, and these need to be defined in terms of fundamental physical and chemical properties of systems.
This course seeks to provide students with a sound basis of the thermodynamics of chemical and biological systems, and how these, in turn, define limits of behaviour for such real systems. The thermodynamic basis for rate processes is explored, and the role of energy transfer processes in these highlighted, along with criteria for equilibrium and stability. Emphasis is placed on the prediction of physical properties of chemical and biological systems in terms of state variables. The course delivery mechanism is problem-based, and examples from thermal, chemical and biological processes will be considered, covering molecular to macro-systems scale.

In addition, there will be considerable time spent during the semester on advanced topics related to the analysis of the behaviour of chemical and biological systems, and recent associated technological developments.

**CHNG5705**

**Found: Industrial Syst & Sustainability**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prohibitions:** CHNG2805  
**Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative information.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

To develop an awareness of the various concepts which underpin Sustainable Development, including technical and economic efficiency, stewardship of the bio-physical environment, and social acceptability. To examine the material economy from the perspective of open and closed thermodynamic systems, and the implications of this for resource consumption and waste generation. To explore governing frameworks for Sustainability, and engagement of chemical engineers with these. To explore tools and approaches for quantifying industry’s environmental performance and how this can be examined within a Sustainability framework. To consider process design and operation, and product design, from a Sustainability perspective, how these can be informed by Green Engineering principles, and to suggest how this combination of perspectives could lead to a re-defined industry sector. To investigate advanced topics related to the areas of industrial systems and sustainability and recent associated technological developments.

**CHNG5801**

**Foundations of Process Design**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours of lectures and 2 hours of tutorials per week.  
**Prerequisites:** CHNG3570, CHNG5702, CHNG5704, CHNG5705  
**Prohibitions:** CHNG3801  
**Assumed knowledge:** Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative information.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

In the design and analysis of diverse processes, chemical engineers must understand fundamental principles, complex interactions, and the integration of these concepts to solve real chemical engineering problems. Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCEL. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature. Ability to write coherent reports and essays based on qualitative information.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The final component will focus on how unit operations are integrated into a process flowsheet. Software tools for flowsheet solution will be introduced. The impact of heat integration and recycle streams will be considered. Examples will cover a diversity of process industries. In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to process design and associated technological developments. The overall aims of this unit of study are (i) to demonstrate the ‘vertical integration’ that exists from engineering concepts through unit operations to complete flowsheets, (ii) to demonstrate that a unified approach allows a diversity of fields to be handled via a consistent, common approach, and (iii) to allow each student to achieve and demonstrate acceptable competency over the UoS material through a range of individual and group-based activities.
of discrete but connected entities. This course is an introduction to the basic concepts in discrete systems necessary for a chemical engineer to be able to formulate and design discrete products which have desired properties. In essence it is a course on product formulation and design.

This module will provide students with a working knowledge of the types of discrete systems available, the ways in which particulate systems can be characterized and their applications in industry. These aspects will form the foundation for an introduction of the modelling techniques used for discrete systems, such as population balances and batch scheduling.

In addition to the above fundamentals, there will be considerable time spent during the semester on advanced topics related to the formulation and design of a variety of products, as well as the associated recent technological developments.

CHNG5806

Found of Manag of Industrial Syst

Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 3 hours of tutorials per week. Prerequisites: CHNG5701, CHNG5702, CHNG5704 and CHNG5705. Prohibitions: CHNG3805. Assumed knowledge: Ability to conduct mass and energy balances, and the integration of these concepts to solve real chemical engineering problems Ability to understand basic principles of physical chemistry, physics and mechanics Ability to use mathematics of calculus (including vector calculus) and linear algebra, and carry out computations with MATLAB and MS EXCE. Ability to read widely outside of the technical literature, and to synthesise arguments based on such literature Ability to write coherent reports and essays based on qualitative and quantitative information

Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Aims and Objectives

To develop an appreciation of management practice in process-led and product-driven industries; considering project management, economic evaluation of processes, risk assessment and decision making with multiple objectives and uncertainty; to develop the requisite tools to support above; to consider approaches to innovation and entrepreneurship; to consider all this in the context of different scales of operation - from single process, to business unit, to enterprise, and across supply and value chains; to support this analysis through real-problem case studies and projects.

By the end of this unit of study a student should be competent in: developing project work plans in conjunction with project management schedules; performing economic evaluations of projects, plans and processes; performing qualitative risk assessments of projects, plans and processes; exploring optimisation of complex processes under risk and uncertainty, covering unit operations, business units, enterprises and value chains.

CHNG5901

Project Part A

Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes.

Campus: Camperdown/Darlington Mode of delivery: Supervision

Note: Department permission required for enrolment.

In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with your supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator. Only one Project per semester can be taken, however, it can be supplemented with a 2 credit point Seminar in which supplementary work, and an oral presentation related to the Project can be carried out.

CHNG5902

Project Part B

Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes.

Campus: Camperdown/Darlington Mode of delivery: Supervision

Note: Department permission required for enrolment.

In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with your supervisor.
The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their consent to supervise to the Postgraduate Administrator. Only one Project per semester can be taken, however, it can be supplemented with a 2 credit point Seminar in which supplementary work, and an oral presentation related to the Project can be carried out.

CHNG5906

Extended Project
Credit points: 12 Session: Semester 1, Semester 2 Classes: no formal classes. Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment. Note: In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

For the student to complete an extended research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued report.

CHNG5907

Extended and Enhanced Project
Credit points: 24 Session: Semester 1, Semester 2 Classes: no formal classes. Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment. Note: In order to enrol in a project, students must first of all secure an academic supervisor in an area that they are interested in. The topic of your project must be determined in discussion with the supervisor. The supervisor can come from any department, however, if outside the School of Chemical and Biomolecular Engineering, they need to send confirmation of their supervision approval to the Postgraduate Administrator.

To complete an extended and enhanced research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis.

School of Civil Engineering

CIVL5257

Concrete Structures: Prestressed
Credit points: 6 Session: Semester 1 Classes: Lectures 2hrs per week, Project Work - in class 1hr per week). Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Objectives: To develop an advanced understanding of the behaviour, analysis and design of prestressed concrete structures.

Outcomes: Students will develop skills in the analysis and design of prestressed concrete beams, columns and slabs, to satisfy the serviceability and strength provisions of the Australian Concrete Structures Standard.

Syllabus Summary: The behaviour and design of prestressed concrete structures and structural elements including beams, columns and slabs. Topics covered will include steel and concrete materials, prestress loss causes, flexural and shear behaviour at service loads and ultimate loads, short and long term deflections, load balancing, anchorage zones (including strut and tie modelling of anchors), dynamic response of post-tensioned floors, and sustainability considerations for prestressed concrete structures.

Textbooks
Reference books:
Warner et al. Concrete structures (Longman) Australian Standard AS 3600 Concrete Structures

CIVL5264

Composite Steel-Concrete Structures
Credit points: 6 Session: Semester 2 Classes: Lectures 2hrs per week. Tutorial 1hr per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Students will understand the basic principles for the design of steel-concrete composite structures. In particular, they will develop an understanding of the procedures required for the design of composite beams, slabs and columns; they will also be introduced to the concepts of composite connection design. Design guidelines will reflect requirements of the Australian Standards, Eurocodes, British Standards and American Standards.

Textbooks
References:

CIVL5266

Steel Structures - Stability
Credit points: 6 Session: Semester 1 Classes: 2hrs of lecture and 2hrs of tutorial/lab per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Objectives:
This Unit aims to:
- provide fundamental understanding at advanced level of the behaviour and design steel structural members, notably members undergoing cross-sectional and/or global buckling,
- provide fundamental understanding of the methods available for determining buckling loads of structural members and elements, and explain how classical solutions to buckling problems are incorporated in national design standards for steel structures, including AS4100 and AS/NZS4600.

Outcomes:
It is anticipated that at the end of this unit of study students will be familiar with the buckling behaviour of steel structures and will understand the methods available for determining buckling loads of structural members and cross-section. Students will have a good understanding of the stability design provisions for steel structures specified in the standards AS4100 and AS/NZS4600, and will be proficient in using software for calculating buckling loads.

Syllabus Summary:
Stability theory, Plate theory, Stability of plates and plate assemblies, Theory for thin-walled members in torsion and biaxial bending, Stability of thin-walled members, Stability design to AS4100 and AS/NZS4600, Direct Strength Method.

Textbooks
Lecture notes:
- Lecture notes compiled by Kim Rasmussen and Greg Hancock
Reference Books:
- GJ Hancock, Design of Cold-Formed Steel Structures to AS/NZ 4600, AISC, 1998.
- GJ Hancock, TM Murray and DS Ellifritt, Cold-formed steel structures to the AISI Specification, Marcel Dekker, New York, 2001.
- Relevant Australian Standards
- AS 4100-1998 Steel Structures
- AS 4100-1999 Commentary to AS 4100
- AS/NZS 4600:2005 Cold-formed Steel Structures

Recommended alternative:
- HB 2.2: Australian Standards for Civil Engineering Students, Part 2 - Structural Engineering

CIVL5267

Steel Structures - Advanced Design
Credit points: 6 Session: Semester 1 Classes: 3-hr combined lecture and tutorial per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives:
This Unit covers the advanced principles of the design of hot-rolled and cold-formed steel structural members and connections. Reference is made to the Australian Standards AS4100 and AS/NZS4600, explaining the underlying theory for the provisions of these standards. The objectives are to provide students with advanced knowledge of steel structural design and confidence to apply the underlying principles to solve a wide range of structural steel problems.

Outcomes:
This Unit will provide students with the following knowledge and skills:
- An understanding of the basic principles of reliability based design on steel structures.
- An understanding of the relationship between structural analysis and design provisions.
- An understanding of the background to the design provisions for hot-rolled and cold-formed steel structures, including the main differences between them.
- Proficiency in applying the provisions of AS4100 and AS/NZS4600 for columns, beams, beam-columns and connections.

Syllabus Summary:
Limit states design philosophy and approaches, Loading standards, Methods of analysis, Flexural members section and member capacity, Compression members section and member capacity, Beam-column member and section capacity, Interrelationship between analysis and design, pinned (shear) and rigid (moment) connections.

Textbooks
Lecture notes:
- Advanced Structural Steel Design, compiled by Greg Hancock & Kim Rasmussen
Reference Books:
- GJ Hancock, Design of Cold-Formed Steel Structures to AS/NZS 4600, AISC, 1998.
- GJ Hancock, TM Murray and DS Ellifritt, Cold-Formed steel structures to the AISI Specification, Marcel Dekker, New York, 2001
- Australian Steel Institute (ASI), Design of Structural Steel Connections, suite of various design manuals and handbooks.

Library Classifications
624.17, 624.18, 691.7.

CIVIL5288
Structural Dynamics
Credit points: 6 Session: Semester 2 Classes: 3-hr combined lecture and tutorial per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/tut/tutorial) Day

Objectives: This Unit introduces the fundamental concepts and theory of dynamic analysis. In a first step, free vibrations are studied and the problem of determining the natural frequency of a system is addressed. This is followed by the study of harmonically excited vibrations. While methods of analysis related to the time-dependent effects of creep and shrinkage (at service loads), this Unit also examines the non-linear (strain-softening) behaviour of reinforced concrete and the related effects concerning the strength of statically-indeterminate reinforced concrete structures. In particular, this Unit examines the concepts of ductility, moment-redistribution and plastic design (for beams and slabs).

Outcomes: This Unit will provide students with the following knowledge and skills:
- understanding of the fundamental concepts and theoretical models concerning the time-dependent structural effects of concrete creep and shrinkage
- ability to carry out calculations to estimate 'elastic' load-effects (stresses/strains/deformations) for reinforced concrete structures (at service loads), accounting for the time-dependent effects of concrete creep and shrinkage
- understanding of the fundamental concepts and theoretical models of the strain-softening behaviour of reinforced concrete (in flexure)
- understanding of the fundamental concepts and numerical models of ductility and moment redistribution for reinforced concrete beams
- ability to quantitatively assess the ductility and moment-redistribution capacity of reinforced concrete beams
- understanding of the fundamental concepts and numerical models of plastic behaviour and design for reinforced concrete beams and slabs (including yield-line analysis)
- ability to determine the ultimate plastic load-carrying capacity of statically-indeterminate reinforced-concrete beams and slabs

Textbooks
- Advanced Structural Steel Design, compiled by Greg Hancock & Kim Rasmussen
- AS3600 Concrete Structures Code
- AS HB2.2 Structural Engineering Standards

Understanding of the fundamental concepts of earthquake engineering
Textbooks
- Notes shall also be handed out during class or available for download from WebCT.

Reference books:
- Simiu, E. and Scanlan, R.H., Wind effects on structures, John Wiley and sons, 1996.
- Anil K. Chopra, Dynamics of Structures, Prentice Hall, 2001

CIVIL5269
Concrete Structures - Strength & Service
Credit points: 6 Session: Semester 2 Classes: 4-hr combined lecture and tutorial per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/tab/tutorial) Day

Objectives: This Unit reviews the fundamental concepts of 'elastic' behaviour of reinforced concrete structures and introduces models of behaviour and methods of analysis related to the time-dependent effects of creep and shrinkage (at service loads). This Unit also examines the non-linear (strain-softening) behaviour of reinforced concrete and the related effects concerning the strength of statically-indeterminate reinforced concrete structures. In particular, this Unit examines the concepts of ductility, moment-redistribution and plastic design (for beams and slabs).

Outcomes: This Unit will provide students with the following knowledge and skills:
- understanding of the fundamental concepts and theoretical models concerning the time-dependent structural effects of concrete creep and shrinkage
- ability to carry out calculations to estimate 'elastic' load-effects (stresses/strains/deformations) for reinforced concrete structures (at service loads), accounting for the time-dependent effects of concrete creep and shrinkage
- understanding of the fundamental concepts and theoretical models of the strain-softening behaviour of reinforced concrete (in flexure)
- understanding of the fundamental concepts and theoretical models of the strain-softening behaviour of reinforced concrete (in flexure)
- ability to quantify assess the ductility and moment-redistribution capacity of reinforced concrete beams
- understanding of the fundamental concepts and numerical models of plastic behaviour and design for reinforced concrete beams and slabs (including yield-line analysis)
- ability to determine the ultimate plastic load-carrying capacity of statically-indeterminate reinforced-concrete beams and slabs

Textbooks
- Australian Standards - current editions
- AS3600 Concrete Structures Code
- AS HB2.2 Structural Engineering Standards

CIVL5351 Geoenvironmental Engineering
Credit points: 6 Session: Semester 1 Classes: 4 hours of lectures/project work per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives: To develop an understanding of the geotechnical aspects of the design and management of industrial and domestic waste disposal systems. Outcomes: Students should gain an advanced understanding of: the role of geotechnics in the design of waste management systems; current design methods and technologies. In particular, they should be able to predict: likely interactions between waste and soil; of pollutant movement in the ground, and be able to evaluate strategies for the containment of industrial and domestic wastes and mine tailings. Syllabus summary: Landfill design, including clay mineralogy, effects of chemicals on soil permeability, flow rates through membranes, effect of punctures, composite liners, mechanisms of mass transport, diffusion, dispersion, advective transport, sorption, predicting transport time, solutions to advection-dispersion equation, design of liners, stability of clay liners on slopes, design of covers, infiltration rates. Tailings disposal, including types of tailings dams, design of dams, water balances, rehabilitation, use of slope stability and seepage software.

CIVL5450 Analysis and Design of Pile Foundations
Credit points: 6 Session: Semester 1 Classes: 3 hours of lecture/project work in class per week. 3 hours of laboratory work per semester. Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives: To develop an understanding of the modern principles of design of pile foundations and the application of those principles to practice.
Expected outcomes: Students should gain an advanced understanding of the types of pile foundations used in practice, and the procedures for analysis of pile foundations under various types of loading, and gain experience in carrying out pile design for real geotechnical profiles.
Syllabus summary: Types of piles and their uses, effects of pile installation, axial capacity of piles and pile groups, settlement of pile foundations, ultimate lateral capacity, lateral deformations, analysis of pile groups subjected to general loading conditions, piled raft foundations, piles subjected to ground movements, pile load testing, code provisions for pile design.

CIVL5451 Computer Methods in Geotechnical Eng
Credit points: 6 Session: Semester 1 Classes: 3-hr combined lecture and tutorial per week Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives and Outcomes
1. To introduce students to major computer modelling techniques used to solve boundary-value and initial-value problems in geotechnical engineering.
2. To develop students' skills at using computer modelling software to solve stress and flow problems in geomechanics.
3. To developed students ability at critically assessing assumptions behind computer models and critically evaluating the quality of numerical results.

Textbooks
Reference Books:

CIVL5452 Foundation Engineering
Credit points: 6 Session: Semester 2 Classes: Lectures 3 hrs per week, presented in 2 sessions per week for 11 weeks of semester. Tutorials 1hr per week. Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The objectives of this unit are to gain an understanding of the design process in foundation engineering, to understand the importance of site investigation and field testing, and to learn how to deal with uncertainty. To achieve these objectives students are asked to design foundations using real data. Students will develop the ability to interpret the results of a site investigation; to use laboratory and field data to design simple foundations; develop an appreciation of the interaction between the soil, foundation system and the supported structure. The syllabus is comprised of field testing, site characterisation, interpretation of field data, design of pile raft and surface footings, support of excavations, soil improvement, and geotechnical report writing.

Textbooks

CIVL5454 Rock Engineering
Credit points: 6 Session: Semester 2 Classes: 3 hours of project work in class per week. Assumed knowledge: Undergraduate geology and soil mechanics. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives: to develop an understanding of the behaviour and design of engineering structures in rock masses.
Expected outcomes: Students will have learnt how to classify and characterise rocks and rock masses for engineering purposes and developed an understanding of basic rock mechanics etc.

Textbooks

CIVL5455 Engineering Behaviour of Soils
Credit points: 6 Session: Semester 2 Classes: Independent Study 4 hrs per week. Lectures 2hrs per week 12 weeks of semester. Tutorials 1hr per week. Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
The objective of the course is to provide an introduction to the critical state framework. This framework is used for the basis for developing an understanding of the stress, strain, strength behaviour of all soils, and is used to present a rational approach to the selection of parameters for use in geotechnical design.

Textbooks
CIVL5458 Numerical Methods in Civil Engineering
Credit points: 6 Session: Semester 1 Classes: 4 hrs lecture, tutorial and laboratory per week. Assumed knowledge: FE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The primary objective of this unit is to understand internal actions (forces and moments) in structures (deformable objects) under loads in three key areas: how structures resist external loads by internal actions; the distribution of internal actions within structures; and the deformations, stresses and strains associated with the internal actions. The syllabus comprises derivation; equilibrium; internal actions: BMDs, SFDs, AFDs, and TMDs; elasticity, stress and strain, and basic material properties; axial forces; tension and compression; elastic bending of beams; shear force and shear stresses in beams; torsion; deflection of beams; pipes and pressure vessels; trusses; material properties, combined stresses and yield criteria; advanced bending; introduction to buckling and instability.

Textbooks
Reference: J. Meriam and LG Kraige, Engineering Mechanics - Volume 1

CIVL5504 Foundations of Soil Mechanics
Credit points: 6 Session: Semester 2 Classes: 3 hrs of lectures and 1 hour of tutorial per week. Prohibitions: CIVL2510 Assumed knowledge: CIVL5502 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

This course provides an elementary introduction to Geotechnical Engineering, and provides the basic mechanics necessary for the detailed study of Geotechnical Engineering. This course aims to provide an understanding of: the nature of soils as engineering materials; common soil classification schemes; the importance of water in the soil and the effects of water movement; methods of predicting soil settlements, the stress-strain-strength response of soils, and earth pressures.

CIVL5505 Foundations of Intro. Fluid Mechanics
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 2 hours of tutorials per week. Assumed knowledge: Students are expected to have a strong understanding of fundamental physics, statics, equilibrium, forces, and dimensional analysis. Familiarity with simple calculus, partial differential equations, and the analytical and numerical solutions. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The objective of this unit of study is to develop an understanding of basic fluid concepts for inviscid and incompressible fluids. Topics to be covered will include: basic fluid properties, hydrostatics, buoyancy, stability, pressure distribution in a fluid with rigid body motion, fluid dynamics, conservation of mass and momentum, dimensional analysis, open channel flow, and pipe flow. This core unit of study forms the basis for further studies in the applied areas of ocean, coastal and wind engineering and other elective fluid mechanics units which may be offered.

CIVL5506 Foundations-Eng Construction & Surveying
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 2 hours of tutorials per week. Prohibitions: CIVL2510 Assumed knowledge: Students should be competent in the following areas. 1. The concept of force and momentum equilibrium in two and three dimensions. 2. Drawing free body diagrams. 3. Establishing and solving the equations of equilibrium from the FBD. 4. Setting out solutions logically, clearly and neatly. Students should be competent in certain mathematical skills. 1. Solving algebraic equations. 2. Differentiation and integration (including double integrals). 3. Drawing graphs of polynomials (especially) and other mathematical function. 4. Trigonometry. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The objectives of this unit are to gain an understanding of the fundamentals of engineering construction including - design, control, management, measurement and construction methods for excavation,

Units of study

251
embankments and other earthworks, hauling and associated operations. - building construction fundamentals, including reinforced concrete, masonry, steel and timber. - drilling and blasting Engineering Survey topics aim (a) to provide basic analogue methods of distance, angle and height measurement and (b) to provide an understanding of three dimensional mapping using basic total station electronic field equipment with associated data capture ability and (c) to give an insight into future trends in the use of GPS and GIS systems.

At the end of this unit, students should develop basic competency in earthwork engineering and economic optimisation of related construction, including proposing and analysing systems and methods, estimation of probable output, unit cost and productivity evaluation.

Students should have a basic knowledge of vertical construction in reinforced concrete, masonry, steel and timber. Students should also develop proficiency in the design and implementation of mapping systems in Civil Engineering, using analogue and electronic field equipment and associated software packages. The syllabus comprises introduction to the framework under which construction projects are formulated and analysed; construction engineering fundamentals; construction systems related to excavation, hauling and embankment construction, including selection and evaluation of plant and methods as well as the expected output and cost; introduction to construction operations for foundations. Introduction to engineering surveying, distance measurement, angle measurement, levelling, traversing, topographic surveys, electronic surveying equipment, future surveying technologies.

CIVL5507
Foundations of Concrete Structures 1
Credit points: 6 Session: Semester 1 Classes: 3 hours of lectures and 3 hours of project work in class per week, 2 hours of laboratory demonstration per semester. Assumed knowledge: CIVL5501, CIVL5502, CIVL5509. Stress-strain relationships for steel and concrete; concepts of force equilibrium, compatibility of strains, and elastic beam theory. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background

The objectives of this unit are to provide a basic understanding of the behaviour of reinforced concrete members and structures; to provide a basic understanding of standard methods of analysis and design of reinforced concrete behaviour (including an understanding of capacities and limitations); and to provide basic design training in a simulated professional engineering environment.

The syllabus comprises the behaviour of reinforced concrete members and structures, including: material properties, 'elastic' analysis (stresses/deformations/time-dependence), ultimate strengths of beams (flexure), ultimate strength of columns (short and slender), behaviour or reinforced concrete slabs. The reinforced concrete truss analogy (shear/torsion/detalling implications). Design of typical elements of a reinforced concrete building, structural modelling, analysis of load-effects (incl. earthquakes), design criteria (for durability, fire-resistance, serviceability and strength), design calculation procedures, reinforcement detailing, structural drawings.

At the end of this unit students will gain proficiency in basic methods of reinforced concrete analysis and design.

CIVL5508
Foundations of Steel Structures 1
Credit points: 6 Session: Semester 2 Classes: 3 hours of lectures and 3 hours of tutorials per week. 2 hours of laboratory work per semester. Assumed knowledge: There are no prerequisites for this unit of study but it is assumed that students are competent in the content covered in CIVL2201 Structural Mechanics, CIVL2230 Introduction to Structural Concepts and Design as well as knowledge of the content in CIVL3235 Structural Analysis. It is assumed that students are competent in the following areas: the methods of load transfer in structures tension, compression, bending, shear, torsion, and bearing; an appreciation management. Introduction to engineering surveying, distance measurement, angle measurement, levelling, traversing, topographic surveys, electronic surveying equipment, future surveying technologies.

CIVL5509
Foundations of Strut Concepts & Design
Credit points: 6 Session: Semester 2 Classes: 4 hours of lectures and 2 hours of tutorials per week. Assumed knowledge: CIVL5501, CIVL5502, ENG31802. Structural mechanics, first year mathematics. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background

The objectives of this unit are to understand the mechanical properties of the materials used in civil engineering and to show the relation between the methods of manufacture, the resulting microstructures and the mechanical responses.

CIVL5510
Foundations of Civil Engineering Design
Credit points: 6 Session: Semester 2 Classes: 1 hour of lectures and 3 hours of tutorials per week. Assumed knowledge: CIVL3205 and CIVL3206 or equivalent Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This UoS is only available to students in the MPE degree who do not have a Civil Engineering background.

The UoS aims to develop students' ability to apply engineering fundamentals and the underlying science and mathematics to engineering problem solving. Students are encouraged to exercise critical decision making in developing solutions to challenges and to develop their own philosophical understanding of the design process. The concept covered in this UoS are: the design cycle from problem definition, through concept development, generation of ideas, analysis of proposals, feasibility evaluation, preferred solution selection to the detailed development and documentation of a final design.

Textbooks
n/a

CIVL5511
Foundations of Fluid Mechanics
Credit points: 6 Session: Semester 1 Classes: Lecture 2hrs per week, Tutorial 2hrs per week. Laboratory 2hrs per week. Assumed knowledge: This unit of study assumes previous study of the fundamental principles of fluid dynamics obtained from CIVL5505 Foundations of Fluid Mechanics and Inviscid Flow or equivalent introductory fluid mechanics subject. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit of study builds on previous study of the principles of fluids dynamics and introduces applied fluid mechanics. The unit provides the theory and tools to solve practical problems related to: differential relations for fluid flow, pipe flow, flow around immersed body, flow around immersed bodies, open channel flow, compressible flow, and turbo-machinery.

**CIVL5512 Foundation of Eng Design & Construction**

**Credit points:** 6  **Session:** Semester 1  **Classes:** Workshop 3 hours per week.  
**Assumed knowledge:** Basic knowledge of construction operations including excavation, embankments and other earthworks, hauling and associated procedures - drilling and blasting, survey, reinforced concrete construction (including formwork and formwork substitutes), interpretation of engineering drawings.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to develop an understanding of construction methods, strategies, equipment and machinery in a range of construction activities and an understanding of the principles involved in the design for those construction activities. At the end of this unit, students will have developed a familiarity with a variety of construction methods, strategies, equipment and machinery in a range of construction activities such that they will be able, if and when the opportunity arises to participate as site engineers (or similar role) in the planning and execution of those construction activities, albeit with supervision and guidance from experienced professionals. Students will also have developed an understanding of the design principles and techniques involved in the planning for those construction activities such that they are able, if and when the opportunity arises, to participate as design engineers, in the planning and design for those construction activities, with supervision and guidance from experienced professionals. The range of topics covered in this course is such that the learning outcomes form a basis for later development of more detailed knowledge, dependent on the future career experiences of the student. The course does not prepare a student for immediate, unsupervised participation in construction and design work associated with the topics covered. The construction topics covered in this course have not been previously addressed in CIVL5506 (Foundations of Engineering Construction and Survey) or equivalent introductory study of construction and surveying techniques. The topics may vary dependent on current and planned projects in Sydney, NSW and Australia. At this stage the topics are hard rock tunnelling and general hard rock underground excavation; soft ground tunnelling; underground construction; micro tunnelling; cut and cover (cut and cover) tunnelling; earth retaining systems; piling; formwork and falsework (incl Tilt up, Ultrafloor, Sacrificial form); dewatering; pavement design and construction - rigid and flexible (incl and pavement construction materials); stormwater drainage design and construction; marine construction; civil construction in environmentally sensitive areas; contract administration for construction engineers; general engineering in remote localities (project based); construction methods in bridge engineering; QA documentation on a typical project; insurance in the construction industry occupational health and safety issues in the construction industry.

**CIVL5513 Foundations of Structural Analysis**

**Credit points:** 6  **Session:** Semester 2  **Classes:** Lecture 4 hours per week, Tutorial 2 hours per week.  
**Assumed knowledge:** This unit of study assumes previous study of the fundamental principles of structural mechanics obtained from CIVL5502 Foundations of Structural Mechanics or equivalent introductory structural mechanics subject.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the principles of structural analysis by introducing the strain-displacement, stress-strain and equilibrium relationships for beam members; applying the relationships to the matrix displacement analysis of frame structures; and using computer software to conduct the linear-elastic and buckling analyses of frame structures. At the end of this unit, students will be able to deduce appropriate structural models for frame structures; and use computer methods and simple hand methods to obtain internal forces and displacements as well as buckling loads for frame structures. The syllabus comprises theoretical background (strain-displacement, stress-strain and equilibrium relationships), structural analysis software, matrix displacement method, beam theory, introduction to nonlinear analysis, buckling analysis.

**CIVL5514 Foundations of Geotechnical Engineering**

**Credit points:** 6  **Session:** Semester 2  **Classes:** Lecture 2 hours per week, Tutorial 2 hours per week.  
**Assumed knowledge:** Fundamentals of soil mechanics including effective stress, pore pressure, consolidation and seepage.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objectives of this unit are to provide an understanding of the factors influencing soil strength, and to give practice in the application of this understanding by exploring the stability of slopes, retaining walls and foundations. At the end of this unit students will be able to: determine the strength parameters appropriate to a range of stability problems, and understand the difference between total and effective stress approaches; evaluate strength parameters from laboratory data; critically analyse foundation stability and slope stability problems; use spreadsheets to perform parametric studies and produce design charts for simple geotechnical design problems; and communicate the results of experiments and analyses using written methods appropriate for professional geotechnical engineers. The syllabus comprises; methods of analysis for gravity and sheet pile retaining walls; reinforced soil; slope stability, including modes of failure, analysis and computer methods; bearing capacity of shallow foundations under general loading, and axial and lateral capacities of deep pile foundations; the mechanical behaviour of sands and clays; the Cam Clay model and the breakage model.

**CIVL5515 Foundations of Ocean and Coastal Engg**

This unit of study is not available in 2012

**Credit points:** 6  **Session:** Semester 2  **Classes:** Lecture 4 hrs per week, Tutorial 2 hrs per week, E-Learning.  
**Assumed knowledge:** Fundamentals of fluid mechanics.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

**Note:** Department permission required for enrolment.

The objectives of this unit of study are to develop an understanding of the physics of ocean waves at any water depth and its application to the analysis and design of marine structures. This unit of study introduces the governing equations for free surface flows, including linear and nonlinear wave theories, wave transformation physics and nearshore hydrodynamics modelling. Furthermore, this unit of study includes the calculation of wave forces based on deterministic and probabilistic wave theories, wave-induced coastal currents and sediments, wind-wave-structure interactions, tides, ocean engineering operational sea state, storm surges (due to cyclones and tsunamis) and various other environmental effects. Many marine structure design applications are introduced, including jetties, harbours, breakwaters, bridge piers, dams, offshore platforms, turbines and other wind/wave energy devices. The major outcomes of this unit of study are (i) an understanding of wave physics at any water depth and the criteria for choosing the appropriate wave theory, and (ii) the ability to apply this understanding to the analysis and design of engineering marine structures.

Although the unit has an analytical focus, the use of model scale, computational techniques and code of practice based design are also discussed.

**CIVL5665 Advanced Water Resources Management**

**Credit points:** 6  **Session:** Semester 2  **Classes:** 2 hours of lectures and 1 hour of tutorials per week.  
**Assumed knowledge:** Basic calculation skills and a knowledge of the application of spreadsheets to perform data manipulation and presentation.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

The objective of this unit of study is to introduce students and professionals to water resources engineering. The aim of this unit is to provide an understanding of: hydrologic cycle from the broadest perspective, physical, chemical and biological characterization of water, how to change the water quality parameters, water quality
control and management, water quality in the environment, nutrient and contaminant cycling and removal, water treatment methods for drinking, wastewater and groundwater, conservation/reuse/treatment techniques, soil salinization, stormwater, bioremediation and phytoremediation techniques. The topics mentioned above will be covered in both a qualitative and quantitative aspects.

CIVL5666
Open Channel Flow & Hydraulic Structures
Credit points: 6 Session: Semester 1 Classes: 3 hr combined lecture and tutorial per week Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives:
This unit of study will review the principles of uniform flow in open channels. These will be extended into a study of the principles of slowly varying and rapidly varying flow, the calculation of backwater curves and hydraulic jumps. These principles will then be applied to the design of gutters, inlets, culverts and piers, using existing commercially available software packages commonly used in engineering practice.
Outcomes:
This Unit will provide students with a strong background in open channel flow hydraulics, and the basis for the calculation of stream and hydraulic structure performance. Students will gain experience in the use of currently available commercial software for the design of culverts and other structures.
Textbooks:
Reference Books:

CIVL5668
Wind Engineering for Design-Fundamentals
Credit points: 6 Session: Semester 1 Classes: 3 hr combined lecture and tutorial per week Assumed knowledge: BE or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives:
This unit of study will introduce the fundamentals of meteorology governing wind flow, details of extreme wind events, wind structure, statistical distribution of the wind, the effect of topography and terrain changes on wind profile, investigate the fluid flow around bluff bodies, and detail the design of civil engineering structures for wind loading.
Outcomes:
This Unit will provide students with the following knowledge and skills:
On completion of this course students will have an understanding of the governing principles of wind engineering, how to predict the extreme wind speed and analyse anemographs, predict the effect of terrain and topography on velocity and turbulence, understand flow patterns around bodies, how to predict the pressure distribution and wind loading on bodies and structures, and how all the above relates to AS 1170.2.

Textbooks:
Textbooks:
- Standards Australia
- Engineering Science Data Units series Wind Engineering (on-line)
Reference Books:
- Wind Engineering Course Notes, Ed. Melbourne, W.H., Department of Mechanical Engineering, Monash University, 1997
- Holmes, J.D., Wind Loading of Structures, Spon Press, 2001

CIVL5669
Applied Fluid Engineering Computing
Credit points: 6 Session: Semester 2 Classes: Lecture 1 hr per week, Tutorial 1hr per week, Laboratory 2hrs per week Assumed knowledge: Understanding of fluid mechanics at the undergraduate level; Appreciation of fluid flow problems relevant to Civil and Environmental Engineering applications; Basic computer skills and some understanding of numerical methods. CIVL5511. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Objectives:
The objective of this unit is to provide students with advanced knowledge of Computational Fluid Dynamics (CFD) techniques and skills in solving fluid and thermal flow problems relevant to Civil and Environmental Engineering applications. Students will also gain experience in using a state-of-the-art commercial CFD package and advanced understanding of a range of engineering problems through working on projects.

Textbooks:
Reference Books:

CIVL5670
Reservoir Stream & Coastal Eng
Credit points: 6 Session: Semester 1 Classes: Lectures 2 hours per week, Tutorials 2 hours per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.
The objectives of this Unit of Study are to develop an understanding of the processes occurring in lakes, reservoirs, streams and coastal seas, and an introduction to transport and mixing in inland waters, and to the design the design of marine structures. The unit will cover the mass and heat budget in stored water bodies, mixing, and the implications for water quality. In streams, simple transport models will be introduced, and simple models for dissolved oxygen transport discussed. The basic equations for linear and non linear wave theories in coastal seas will be introduced, and wave forces on structures and an introduction to design of offshore structures will be discussed.

CIVL5901
Civil Engineering Project 1
Credit points: 5 Session: Semester 1, Semester 2 Classes: project work - own time. Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.
Involves carrying out some original research work on a topic. The results of the research are reported in a project thesis. This can be combined with CIVL5902, to form a 12 credit point research project.

**CIVL5902**

**Civil Engineering Project 2**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** Project work - own time  
**Corequisites:** CIVL5901  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision  
**Note:** Department permission required for enrolment.

This UoS is a 6 credit point UoS and involves carrying out some original research work on a topic. The results of the research are reported in a project thesis. This can be combined with CIVL5901, to form a 12cr point research project.

**CIVL5903**

**Major Project A**

**Credit points:** 12  
**Session:** Semester 1, Semester 2  
**Classes:** Project work - own time  
**Corequisites:** CIVL5903  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision  
**Note:** Department permission required for enrolment.

This UoS is a 12 cr point UoS and involves carrying out original research work on a chosen topic at a more advanced level than is required for the 6 credit point project (CIVL5901 and CIVL5902). The work can be combined with CIVL5904 to form a 24 credit point project.

**CIVL5904**

**Major Project B**

**Credit points:** 12  
**Session:** Semester 1, Semester 2  
**Classes:** Project work - own time  
**Corequisites:** CIVL5903  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision  
**Note:** Department permission required for enrolment.

This UoS is a 12 cr point UoS and involves carrying out original research work on a chosen topic at a more advanced level than is required for the 6 credit point project (CIVL5901 and CIVL5902). The work can be combined with CIVL5903 to form a 24 credit point Project

**PMGT5871**

**Project Process Planning and Control**

**Credit points:** 6  
**Session:** Semester 1, Semester 2, Summer Late, Winter  
**Main Classes:** Session 1: Evening, Online, Session 2: Evening, Online, Winter and Summer: Day  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Evening or On-line  

Project Management processes are what moves the project from initiation through all its phases to a successful conclusion. This course takes the project manager from a detailed understanding of process modelling through to the development and implementation of management processes applicable to various project types and industries and covers approaches to reviewing, monitoring and improving these processes.

**Textbooks**

Information Technology Project Management by Kathy Schwalbe

**PMGT5872**

**People and Leadership**

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** Session 1: Block mode & on-line; Session 2: Block mode & on-line  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Block Mode or On-line  

This is a core program unit with a focus on enhancing leadership and people management capability. It covers diverse traditional and innovative theories, models and tools. It complements traditional views based as PMBoK, applying diverse approaches to contemporary project environments. Many of the unit tasks are framed in uncertain and potentially ambiguous terms as is common in many project environments. Topic areas covered: Project context, Personal Competence, Interpersonal Competence, Team Competence The unit references a range of Australian and global Project Management, Management and Consulting Standards. It integrates theory and practice to optimise results. Recommended reading: A Guide to the Project Management Body of Knowledge (PMBoK Guide)"
2. a group presentation which demonstrates understanding of organisational culture and how change management impacts cultural changes. This assignment is worth 25% of the overall grade.

3. individual assignment describing an insight learnt in the class and how this insight can be applied theoretically and practically. This assignment is worth 50% of the overall grade.

PMGT5877
Management of Project Organisations
Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: on-line; Session 2: 3 hours per week (evening) Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Evening

This course examines the challenges and approaches of managing project-oriented organisations. These could be independent business units or divisions within a larger corporation. Examples are construction contractors, ICT services, R&D units and many internal business units that are project-oriented.

Today, more organisations are adopting project management as a management strategy to provide effective and timely solutions to clients. They are managing organisational architecture to support both "business as usual" and projects that are increasingly important to the organisation.

Focus is on the relationship between project management and the following: organisational culture, structure, processes, cross-functional teams, project governance, performance management, organisational learning, change and knowledge management. The assessment comprises a series of case study based assignments, quizzes and exams.

PMGT5879
Strategic Portfolio & Program Management
Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: on-line; Session 2: Block Mode Campus: Camperdown/Darlington Mode of delivery: Block Mode

This unit specifically addresses the selection and prioritisation of multiple programmes and projects which have been grouped to support an organisation’s strategic portfolio.

The allocation of programmes of work within a multi-project environment, governing, controlling and supporting the organisation’s strategy, are considered. The aim is to formulate and manage the delivery of the portfolio of strategies using programme management. Students will learn and practice the issues to be considered in selecting an effective organisation portfolio and how to implement a Portfolio Management Framework. Also they will encounter the many conflicting issues facing Program Managers as they seek to implement organisation strategy through programs and learn how to balance these to obtain desired outcomes.

Textbooks

PMGT5886
System Dynamics Modelling for PM
Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: Online; Session 2: Block Mode Campus: Camperdown/Darlington Mode of delivery: On-line

Students should achieve an understanding of the roles of statistical methods, coordinate transformations, and mathematical analysis in mapping complex, unpredictable dynamical systems. Systems Thinking is a more natural and better way to think, learn, act, and achieve desired results. Effectively implemented, it can dramatically improve a manager’s effectiveness in today’s complex and interconnected business world. This course provides managers with many practical new Systems Thinking tools and the main concepts of Systems Thinking to enhance individual, team, and organizational learning, change, and performance.

PMGT5887
Computer Applications in PM
Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: 3hrs evening class; and on-line Session 2: Block-mode Campus: Camperdown/Darlington Mode of delivery: Block Mode

Computer-Aided Project Management builds a bridge from the genesis of project management principles through today’s software, developing a postmodern project management system paradigm for the twenty-first century. Adopting a unique systems perspective that emphasises project coding—an essential skill in project database management—this course demonstrates what fundamental project management principles are, what they do, and how they work in the software environment. Addressing all phases of a project it illustrates and expands theories through the use of realistic case studies which are based on actual project experience and extensive exercises running on PCs. An important feature of systems project management, the use of "scope" and "quality," is also discussed.

By the end of this unit of study, students should be able to:
- Understand application-based introduction to effective systems and methods for project planning and control
- Understand essential knowledge to manage successfully and to create, use, and communicate PC-, Server-, Web-, and Internet-based project management information.
- Understand the use of structures such as PDS (Project Definition Structure), WBS (Work Breakdown Structure), OBS (Organizational Breakdown Structure), and Masterformat project coding for areas, functions, elements, phases, stages, packages, purchase orders, contracts, and human resources planning and scheduling by CPM (Critical Path Method) and PERT (Program Evaluation and Review Technique) communicating with Gantt and bar charts and graphics such as S curves relating estimating and cost control from order-of-magnitude numbers to appropriation grade budgets.

PMGT5888
Global Project Management
Credit points: 6 Session: Semester 1, Semester 2, Summer Early Classes: Session 1: Block Mode Session 2: Online, available in Summer School Campus: Camperdown/Darlington Mode of delivery: Block Mode

This course has been designed to suggest the development of best practices in communication, collaboration and management across international borders. The objectives are to: Understand the challenges faced by a global program and project teams; and, Improve the overall skills and practices of global project managers that will lead international companies to achieve maturity in global project management. Topics include: Introduction to traditional, distributed, and virtual project work; Global projects and requirements; Organisational change and organisational theory; Cross-cultural collaboration; Global project leadership; Trust building and conflict resolution; Coaching over distance; Global communication and channels; Leading a global organisation; Implementing collaborative tools; and, Implementing a Global Project Management Framework.

Textbooks

PMGT5889
Integrated Cost and Scheduling Control
Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: On-line Session 2: Block Mode Campus: Camperdown/Darlington Mode of delivery: On-line

Aims:
The unit of study focuses on the integrated management of project scope, time and cost for effective control and delivery of projects. The scope of the subject matter includes delivering comprehensive theoretical knowledge and application skills in integrated management and control of cost and schedule in complex projects. By successful completion of this unit of study, students should achieve a clear
understanding of the time and cost management and appropriate control measures in project development environments.

Objectives:
Students should be able to:
- Discuss the project management trade-offs on balancing the triple-constraint;
- Explain the integrated cost and schedule control processes;
- Construct work breakdown structure (WBS) given project information;
- Discuss scope monitoring and change control system;
- Produce networks diagrams for project scheduling;
- Apply critical path analysis (CPA) in network scheduling;
- Apply critical chain method in project scheduling;
- Estimate the project cost and duration;
- Apply resource scheduling techniques;
- Construct a time-phased budget plan;
- Discuss cost monitoring and control processes;
- Undertake earned value analysis (EVA); and
- Undertake integrated cost and schedule control processes using project management software (Microsoft Project or Primavera)

By the end of this unit of study, students should be able to:
- Undertake WBS exercises, CPA, EVA and trade-off analysis using the given project information;
- Explain how the components of time and cost management interrelate;
- Explain in depth why integrated cost and schedule management are important to project management; and
- Analyze a project situation that involves time and cost management issues and apply a solution(s)

Textbooks
Integrated Cost & Scheduling control in Project Management - Ursula Kuehn
(Recommended reading, not compulsory)

PMGT5891
Project Risk Management

Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: Block mode & on-line; Session 2: Block mode & on-line Campus: Camperdown/Darlington Mode of delivery: Block Mode or On-line

The aims of this course are to develop students' understanding and ability in applying project risk management skills in project environments. The course enables the students to apply best practice techniques and methods commonly used by industry in project risk management.

The competencies developed through this unit cover and go beyond the competencies in Risk areas as outlined in the competency standards by the Australian Institute of Project Management and Project Management Institute in the USA, respectively. The UoS aims to develop students' ability to understand and conceptualise risk management issues, and analyse and apply risk management techniques using concepts and frameworks from the underpinning literature.

- Ability to establish risk management plans, policies & integrate them with other project plans, organisation & align them to the business case
- Ability to understand the sources of potential risks (including but not limited to political, organisational, psychological and technical risks) and to use risk management tools & techniques to identify, assess, evaluate, & prioritise risks
- Ability to simulate the potential effects of risks on schedule, cost and other performance dimensions using sensitivity analysis, decision tree analysis and simulation techniques.
- Ability to track, monitor & control risks & actions to achieve project objectives & the business case
- Ability to close risks for an optimal outcome

PMGT5892
Project Management Industrial Project

Credit points: 12 Session: Semester 1, Semester 2 Classes: Weekly 3hr meeting. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Evening
Note: Department permission required for enrolment. Note: Students must have a credit average for admission into this unit.

In this intensive PM capstone project, students are required to apply all of the skills necessary to successfully initiate, plan, execute, control and close a project. Working as part of a team on a simulated four-month, mid-sized, high-priority project, student will be responsible for developing the key project management deliverables, including the project charter, project plan, change control process, status reports and post-project reviews. Students will facilitate meetings, update the project plan with actuals and changes, present status to management, justify your decisions to key stakeholders and determine the impacts of your actions on multiple projects. Under the guidance of a senior project manager and their academic supervisor, students will be given direct feedback and techniques to increase efficiency and effectiveness.

Alternatively students with a 75D average may have the opportunity with permission to do an Honours level thesis working on a full-time project. The Hons level thesis will be a minimum of 70 pages and max of 100 pages. Please contact the Coordinator to discuss.

PMGT5893
Statistical Methods in PM

Credit points: 6 Session: Semester 2 Classes: 3hrs Weekly (evening) Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Evening

Aims: Students should achieve an understanding of the applications of statistical methods in project environments.

Objectives:
- Conduct hypothesis test and draw conclusions;
- Apply regression analysis to examine relationships between variables;
- Explain the relationships between variables;
- Describe the distributions of variables;
- Draw conclusions based on results observed in a sample;
- Discuss the application of statistical model for project selection;
- Apply statistical method for forecasting project time and cost at completion;
- Discuss the application of statistical model for cost estimating; and
- Apply SPSS in analyzing and evaluating a project situation.

By the end of this unit of study, students should be able to:
- Discuss the applications of statistical methods in project management;
- Evaluate a project situation based on statistical results; and
- Apply simple statistical methods to problem-solving in project management.

PMGT5895
Contracts Management

Credit points: 6 Session: Semester 1, Semester 2 Classes: Session 1: evening ; Session 2: on-line Campus: Camperdown/Darlington Mode of delivery: On-line
Note: Department permission required for enrolment.

The aim of this unit is the understanding of fundamental contracts as it relates to project management. The aim is that students are able to understand various contracts that are available and have the ability to select the right contract for a project. The unit aims to give an understanding of contract terms and conditions that may give rise to potential issues and methods to mitigate this. Given contracts are pivotal in a project manager's role the overall aim is for students to understand contracts better and have the confidence to use contracts in their day to day activities to avoid potential risks and conflicts. In addition it will assist students to have the ability to solve complex issues by being able to think critically and analyze issues.
### Units of Study

#### Sustainability & Intelligence in P. M.
- **PMGT5896**
  - Credit points: 6
  - **Session:** Semester 1, Semester 2
  - **Classes:** 3hr per week evenings
  - **Campus:** Camperdown/Darlington
  - **Mode of delivery:** Block Mode
  
  Note: Department permission required for enrolment.

In order to run projects successfully, project managers need to master more than the requisite technical knowledge. The more complex the project, the more significant interpersonal skills become to achieving a successful outcome. Without the people skills necessary to lead effectively, even the most carefully orchestrated project can quickly fall apart. This unit aims to introduce project managers to the basic concepts of emotional intelligence and shows how to apply them to their project goals. Students will learn how to: Set the tone & direction for the project, communicate more effectively, improve listening skills, create a positive work environment, motivate, coach and mentor team members and productively handle stress, criticism and blame.

#### Disaster Project Management
- **PMGT5897**
  - Credit points: 6
  - **Session:** Semester 1, Semester 2
  - **Classes:** Session 1: block mode; Session 2: block mode
  - **Campus:** Camperdown/Darlington
  - **Mode of delivery:** Block Mode

This unit identifies the causes of some well-known project failures and reveals what can be learned by being able to think critically and analyse the issues. The aim of this unit is to outline traditional and contemporary theories in emergency response planning; to provide an overall scope of comprehensive emergency planning and the major elements that must be addressed in an Emergency Response Plan. Student outcomes from this unit include: Developing & implementing an Emergency Response Plan; Specific recommendations for the health & safety of emergency response personnel and provides concise information on learning objectives and a review of important concepts.

#### Complex Project Leadership
- **PMGT5898**
  - Credit points: 6
  - **Session:** Semester 1, Semester 2
  - **Classes:** Session 1: block mode; Session 2: block mode
  - **Campus:** Camperdown/Darlington
  - **Mode of delivery:** Block Mode

Note: Department permission required for enrolment.

This unit will offer students an innovative way of looking at projects and treating them as complex adaptive systems. Applying the principles of complexity thinking will enable project managers and leadership teams to manage large-scale initiatives successfully. The expected outcomes of this unit include: Exploring how complexity thinking can be used to find new, creative ways to think about and manage projects; Diagnose complexity on a wide range of projects; Understand and manage the complexity of the business problem and use the Project Complexity Model to determine the most effective approach to managing all aspects of a project based on the level of complexity involved.

#### Project Management Thesis
- **PMGT5900**
  - Credit points: 12
  - **Session:** Semester 1, Semester 2
  - **Classes:** Session 1 & 2
  - **Thesis project**
    - **Campus:** Camperdown/Darlington
    - **Mode of delivery:** Supervision
  
  Note: Department permission required for enrolment.

This UoS aims to give students a rich experience in carrying out a major project within an industrial environment, which will have significant ties to their chosen specialisation. Supervision of the project will be joint between the University and Industry. Students will work in industry for 12 weeks and engage fulltime on the project at the industrial site. Students will prepare and present a detailed technical report on their work.

This UoS will give students essential experience working on real-life projects, where their knowledge gained in their MPM will be put into practice. Students will also obtain invaluable knowledge and experience of the way engineering skills are employed in an industrial context.

Students will have the ability to write a thorough technical report and present it in a professional manner.

#### Advanced Knowledge in Project Management
- **PMGT6869**
  - Credit points: 6
  - **Session:** Semester 1, Semester 2
  - **Classes:** Session 1: On-line; Session 2: 3 hours per week (evening) & on-line
  - **Campus:** Camperdown/Darlington
  - **Mode of delivery:** Normal (lecture/lab/tutorial) Evening

The objectives of this Unit are: Develop capability in creating environments for the success of multiple, large and complex projects

Examples of Unit outcomes include an ability to lead stakeholders in situations of changing needs and requirements in a ‘managed’ way, understanding that typical solutions to current problems may be the foundations for future failures & being able to deal with the unique challenges of large and complex projects.

Topics include:
- Business Case Development
- Project Failure
- Large and Multiple Projects
- International Project Teams
- Organisational Learning
- Corporate Law
- Systems Practice
- Organisational Design
- Performance and Benefit Measurement
- Project Management Methodology (PRINCE2)
- Systems and Data Integration
- Project Managing Events

School of Electrical and Information Engineering

ELEC5020
Capstone Project A
Credit points: 6 Session: Semester 1, Semester 2 Classes: Independent project work. Prerequisites: 48 credits from MPE degree program. Assumed knowledge: ENGS5222, ENGS5223, ENGS5218, ENGS5219. Campus: Camperdown/Darlington. Mode of delivery: Supervision. Note: Department permission required for enrolment in the following sessions: Semester 2.

The ability to plan, systemically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s): 1, 2.

ELEC5021
Capstone Project B

In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project.

ELEC5101
Antennas and Propagation

The basics of antenna radiation are introduced with emphasis on the important performance characteristics of the radiation field pattern (in 3 dimensions) and feed impedance. The omnidirectional and Hertzian dipole antennas (both hypothetical in practise but robust theoretically) provide the starting point to analyse real antenna operation. Mutual coupling between close antennas and important "ground" imaging effects lead to the design of antenna arrays to increase gain and directivity. Aperture antennas and frequency broadening techniques are introduced. Ionospheric propagation is discussed and also the the reception efficiency of receiving antennas which allows consideration of a Transmitter - Receiver "Link budget". The important "Pocklington" equation for a wire dipole is developed from Maxwell's equations and leads to the numerical analysis of wire antennas using "Moment" methods. Real world applications are emphasised throughout and are reinforced by the hands on laboratory program which includes design projects.

ELEC5203
Topics in Power Engineering

This unit of study aims to give students an in depth understanding of modern power electronic equipment supporting the intelligent grid of the future and the associated electronic control. Electronic power systems rely on a complex system of methods and equipment for controlling the voltage levels and for maintaining the stability and security of the supply. It covers recent findings in the fundamental theory and the massive change of modern power electronic equipment and methods supporting the electricity grids. It also looks at the huge influence of computer-aided analysis of electric power systems and the effects of the deregulation of the industry. The specific topics covered are as follows: Introduction to power electronic systems and applications in the electrical grid, power semiconductors, reactive power control in power systems, flexible AC transmission systems (FACTS), high-voltage direct-current transmission (HVDC), static reactive power compensator, dynamic voltage restorer, unified-power flow controller, line-commutated converters, thyristor-controlled equipment, phase-angle regulators, voltage-source converter based power electronic equipment, harmonics, power quality, passive and active filters, distributed generation, grid-interconnection of renewable energy sources, intelligent grid technologies.

ELEC5204
Power Systems Analysis and Protection
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 1 hour tutorial per week, 2 hours laboratory per week. Assumed knowledge: ELEC4201. Assumed knowledge: The unit assumes basic knowledge of circuits, familiarity with basic mathematics, competence with basic circuit theory and an understanding of three phase systems, transformers, transmission lines and associated modeling and operation of such equipment. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day.

This unit provides the basis for the analysis of electricity grids using symmetrical components theory. Such analysis theory is the basis for the understanding of electrical faults and the design of protection strategies to safeguard the electrical equipment, and maintain safety of the plant at the highest possible level. The following specific topics are covered: The types and causes of power system faults; balanced faults and short circuit levels; an introduction to fault current transients in machines; symmetric components, sequence impedances and networks; the analysis of unsymmetrical faults. Review of the impact of faults on power system behaviour; issues affecting protection scheme characteristics and clearance times; the security and reliability of protection schemes; the need for protection redundancy and its implementation as local or remote backup; zones of protection and the need for zones to overlap; the analysis and application of over-current and distance relay protection schemes with particular reference to the protection of transmission lines.

ELEC5205
High Voltage Engineering
Credit points: 6 Session: Semester 2 Classes: 2 hours lecture and 2 hours tutorial/lab per week. Assumed knowledge: The following previous knowledge is assumed for this unit. Circuit analysis techniques, electricity networks, power system fundamentals equivalent to ELEC3105. Campus: Camperdown/Darlington. Mode of delivery: Normal (lecture/lab/tutorial) Day. Note: Recommended: ELEC3204 Power Systems.

The unit provides advanced knowledge associated with high voltage engineering methods, techniques and equipment. It is divided into two sections. The first section presents fundamentals of the failure mechanisms of solid, liquid and gaseous insulation at high voltages. It also discusses consequent design principles for high-voltage
equipment; of the generation of high direct, alternating and impulse voltages for testing high-voltage equipment; and of methods for monitoring and assessing the condition of high-voltage equipment such as dissolved gas analysis for oil-filled transformers and partial discharge in cables. The second section presents in detail all the high-voltage equipment and in particular underground cables, overhead transmission lines, transformers, bushings and switchgear. It finally offers asset management solutions for modern transmission and distribution electricity networks.

**ELEC5206**

**Sustainable Energy Systems**

Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures per week and 2 hours of labs and 2 hours of tutorials per fortnight. Assumed knowledge: Following concepts are assumed knowledge for this unit of study: familiarity with transformers, ac power, capacitors and inductors, electric circuits such as three-phase circuits and circuits with switches, and basic electronic circuit theory. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The unit builds upon the knowledge of engineering mathematics, electronic devices and circuit theory and simulation techniques. It deals with both technical and business aspects of sustainable electrical energy systems. In technical aspect, it focuses on energy conversion and electrical characteristics of different renewable energy sources and integration of multiple energy sources into distributed electricity generation. In business aspect, it focuses on economical, marketing and political aspects of installing and managing sustainable electrical energy systems in present and future society. It lays a solid foundation of practical and managerial skills on electronics and electrical (power) engineering and later studies such as ELEC5203 and advanced energy conversion and power systems. The following topics are covered: modern power systems; distributed generation; co-generation; tri-generation; microturbine; renewable energy sources: solar, wind, hydro, biomass, geothermal, fuel cells; wind turbine; photovoltaic; grid-connected power systems; stand-alone power systems; power conditioner; maximum power point tracking; single-axis and two-axis tracker.

**ELEC5303**

**Computer Control System Design**

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours lab/tutorial per week. Prohibitions: ELEC4301 Assumed knowledge: This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to teach the basic issues involved in the analysis and design of computer-controlled systems. The emphasis is on theory rather than technological application or industrial practice. However, students are expected to test some of these ideas on a few benchmark control problems in the laboratory. Completion of the unit will facilitate progression to advanced study in the area and to work in industrial control. This unit assumes a basic knowledge of calculus, functions of real variables, Laplace transform, matrix theory and control theory.


**ELEC5402**

**Digital Integrated Circuit Design**

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 2 hours project work in class per week. Prohibitions: ELEC4402 Assumed knowledge: Electronic circuit design and physics of electronic devices. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

This unit of study explores CMOS technology and integrated circuit design and fabrication. The fundamental theory and techniques behind digital integrated circuit design are introduced. A primary focus of this unit is providing the student with practical laboratory design experience using a professional VLSI CAD tool to design digital integrated circuits. This unit provides a foundation for more advanced digital integrated circuit design techniques and also analogue integrated circuit design. Topics covered in this unit are: IC manufacturing process and CMOS technology, CMOS static logic design, CMOS dynamic logic design, arithmetic building block design, sequential logic design, VLSI interconnection and wiring issues, timing issues, digital memory design, digital system design methodologies.

**ELEC5403**

**Radio Frequency Engineering**

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 2 hours lab/tutorial per week. Prohibitions: ELEC5521 Assumed knowledge: Students will be expected to be familiar with ELEC3404 - Electronic Circuit Design. ELEC3104 - Engineering Electromagnetics and the third year course in Circuit Design: ELEC3106 - Circuit Theory and Design. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study builds upon earlier work and provides an introduction to radio frequency components and systems used in wireless and satellite communications as well as in other high frequency applications. It assumes some knowledge of: basic circuit analysis; semiconductor device models and behaviour; transistor operation as switches and amplifiers; transistor operation as current sources and current mirrors; differential amplifiers. The following topics are covered: RF circuit element models, high-frequency effects and biasing in active devices, transmission lines and the Smith Chart, RF system characteristics, RF amplifiers, oscillators, mixers, power amplifiers, microwave measurements.

**ELEC5507**

**Error Control Coding**

Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 1 hour tutorial per week. Prohibitions: ELEC4503 Assumed knowledge: Basic knowledge on digital communications. Fundamental mathematics including probability theory and linear algebra. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit deals with the principles of error control coding techniques and their applications in various communication and data storage systems. Its aim is to present the fundamentals of error control coding techniques and develop theoretical and practical skills in the design of error control encoders/decoders. Successful completion of this unit will facilitate progression to advanced study or to work in the fields of telecommunications and computer engineering. It is assumed that the students have some background in communications principles and probability theory.

The following topics are covered. Introduction to error control coding, linear algebra. Linear block codes, cyclic codes, BCH codes, Reed-Solomon codes, burst-error correcting codes, design of codes for block codes, applications of block codes in communications and digital recording. Convolutional codes, Viterbi algorithm, design of codes for convolutional codes, applications of convolutional codes in communications, soft decision decoding of block and convolutional codes, trellis coded modulation, block coded modulation, design of codes for trellis codes, applications of trellis codes in data transmission. Turbo codes and applications to space and mobile communications.
ELEC5508
Wireless Engineering

This unit will introduce the key ideas in modern wireless telecommunications networks. It will address both physical layer issues such as propagation and modulation, plus network layer issues such as capacity, radio resource management and mobility management issues.

The following topics are covered. Mobile radio channel: Multipath fading, diversity, log-normal fading, mean propagation loss, propagation models. Cellular technologies: Cell types, coverage, frequency reuse, spectral efficiency, link budget, power budget, traffic capacity. Omnidirectional and sectorised antennas. Handover, interaction with the fixed network. Microcells and macrocells, Medium access control: Near-far effect and the hidden terminal problem. Multiple access schemes: FDM, TDMA, CDMA. Aloha and s-Aloha, carrier sense multiple access, reservation-based MAC schemes, polling, sensing-a-loha multiple access. GSM: System architecture, radio resource management, mobility management, connection management.


ELEC5509
Mobile Networks
Credit points: 6 Session: Semester 1 Classes: 2 hours of lecture and a 2 hours tutorial/project meeting per week. Prohibitions: ELEC5501 Assumed knowledge: Basically, students need to know the concepts of data communications and mobile communications, which could be gained in one of the following units of study: ELEC5505 Communications, ELEC5506 Data Communications and the Internet, or similar units. If you are not sure, please contact the instructor. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study serves as an introduction to communications network research. The unit relies on a solid understanding of data communications and mobile networks. It introduces some of the currently most debated research topics in mobile networking and presents an overview of different technical solutions. Students are expected to critically evaluate these solutions in their context and produce an objective analysis of the advantages/disadvantages of the different research proposals. The general areas covered are wireless Internet, mobility management, quality of service in mobile and IP networks, ad hoc networks, and cellular network architectures. The following topics are covered. Introduction to wireless and mobile Internet. Wireless cellular data networks. Cellular mobile networks. Mobile networks of the future. Quality of service in a mobile environment. Traffic modelling for wireless Internet. Traffic management for wireless Internet. Mobility management in mobile networks. Transport protocols for mobile networks. Internet protocols for mobile networks.

ELEC5510
Satellite Communication Systems
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures, 1 hour tutorial per week. 3 hour site visit during semester. Prohibitions: ELEC5502 Assumed knowledge: Knowledge of error probabilities, analog and digital modulation techniques and error performance evaluation studied in ELEC5505 Communications and ELEC4505 Digital Communication Systems, is assumed. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Satellite communication systems provide fixed and mobile communication services over very large areas of land, sea and air. This unit presents the fundamental knowledge and skills in the analysis and design of such systems. It introduces students to the broad spectrum of satellite communications and its position in the entire telecommunications network; helps students to develop awareness of the key factors affecting a good satellite communications system and theoretical and practical skills in the design of a satellite communications link.

Topic areas include: satellite communication link design; propagation effects and their impact on satellite performance; satellite constellations; digital modem design; speech codec design; error control for digital satellite links.

ELEC5511
Optical Communication Systems
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and 1 hour laboratory/tutorial per week. Prohibitions: ELEC5506 Assumed knowledge: ELEC3503 Introduction to Digital Communications or ELEC3505 Communications) and (ELEC3402 Communications Electronics or ELEC3405 Communications Electronics and Photonics) or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This course will provide an understanding of the fundamental principles of optical fibre communication systems. It commences with a description of optical fibre propagation characteristics and transmission properties. We will then consider light sources and the fundamental principles of laser action in semiconductor and other lasers, and also the characteristics of optical transmitters based on semiconductor and electro-optic modulation techniques. The characteristics of optical amplifiers will also be discussed. On the receiver side, the principles of photodetection and optical receiver sensitivity will be discussed. Other aspects such as fibre devices and multiple wavelength division multiplexing techniques will also be discussed. Finally, the complete optical fibre communication system will be studied to enable the design of data transmission optical systems, local area networks and multi-channel optical systems.

ELEC5512
Optical Networks
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 1 hour laboratory/tutorial per week. Prohibitions: ELEC5506 Assumed knowledge: ELEC3503 Introduction to Digital Communications Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit builds upon the fundamentals of optical communication introduced in ELEC3405 (Communications Electronics and Photonics). It focuses on photonics network architectures and protocols, network design, enabling technologies and the drivers for intelligent optical network.

Students will learn how to analyze and design optical networks and optical components.

Introduction, photonic network architectures: point to point, star, ring, mesh; system principles: modulation formats, link budgets, optical signal-to-noise ratio, dispersion, error rates, optical gain and regeneration; wavelength division multiplexed networks: WDM components: optical filters, gratings, multiplexers, demultiplexers, wavelength routers, optical crossconnects, wavelength converters, WDM transmitters and receivers; Wavelength switched/routed networks, ultra high speed TDM, dispersion managed links, soliton systems; broadcast and distribution networks, multiple access, subcarrier multiplexed lightweight video networks, optical local area and metropolitan area networks; protocols for photonic networks: IP, Gbit Ethernet, SDH/SONET, FDDI, ATM, Fibre Channel.

ELEC5514
Networked Embedded Systems
Credit points: 6 Session: Semester 2 Classes: 2 hours lecture and 2 hours lab per week. Assumed knowledge: ELEC3607, ELEC3305, ELEC3506 and ELEC5508 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit aims to teach the fundamentals concepts associated with:
*Networked Embedded Systems, wireless sensor networks
*Wireless channel propagation and radio power consumption
*Wireless networks, ZigBee, Bluetooth, etc.
*Sensor principle, data fusion, source detection and identification
The prime aim of this unit of study is to develop a sound understanding of images. The emphasis is on fundamental theory with discussion of topics such as:

- Image perception and representation.
- Enhancements - histogram & pixelwise transforms.
- Filtering; Compression and image coding.
- Texture analysis - Modelling, classification, segmentation.
- Geometry - Transforms, matching.
- Mathematical Morphology - non-linear filtering.
- Distances, residues, HMT.
- Segmentation - Thresholding, split & merge.
- Snakes, watershed, SRG.
- Recent PDE methods.

Completion of the unit will facilitate progression to advanced study in the area and to work in the image processing field.

Some background in programming, object-oriented design, and system architecture is assumed. A prime aim of this unit of study is to develop a capacity for research and inquiry. Completion of this unit will facilitate progression to advanced study in the area and to work in the image processing field.

**ELEC5614 RealTime Computing**

- **Credit points:** 6
- **Session:** Semester 1
- **Classes:** 2 hours of lectures, 1 hour tutorial per week, 2 hours labs per week.
- **Prohibitions:** ELEC4602
- **Assumed knowledge:** SOFT2130 Software Construction (or SOFT2004 Software Development Methods 1) and ELEC3607 Embedded Computing (or ELEC2601 Microprocessor Systems). Ability to program in a high level language.
- **Campus:** Camperdown/Darlington
- **Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is concerned with the theory and practice of real-time computer systems as applied to the design of embedded systems and computer control systems in engineering, manufacturing and automation.

**ELEC5615 Advanced Computer Architecture**

- **Credit points:** 6
- **Session:** Semester 1
- **Classes:** 2 hours of lectures and 2 hours laboratory/tutorial per week.
- **Assumed knowledge:** Equivalent to ELEC4605 Computer Engineering or ELEC4601 Computer Design.
- **Campus:** Camperdown/Darlington
- **Mode of delivery:** Normal (lecture/lab/tutorial) Day
- **Note:** Department permission required for enrolment.

This unit of study is comprised of a selection of topics covering advanced computer architecture, advanced digital engineering and embedded systems. They may be chosen from the following:

- Advanced Computer Architecture: Processor organisation, parallelism, scalability, language and application driven architectures, design tools and methodologies.
- Advanced Digital Engineering: Advanced hardware description language skills for ASIC and FPGA design; CAD methodologies; designing for low power, high speed, small area, low cost and testability; advanced printed circuit board design, system design exercises.
- Advanced Embedded systems: System on chip design and associated hardware description languages and CAD tools; embedded system interworking; real time design constraints; case studies and laboratory exercises in communications and industrial control applications.

**ELEC5616 Computer and Network Security**

- **Credit points:** 6
- **Session:** Semester 1
- **Classes:** 2 hours of lectures, 1 hour tutorial and 2 hours labs per week.
- **Prohibitions:** ELEC5611, NETS3016, NETS3916
- **Assumed knowledge:** A programming language, basic maths.
This unit examines the basic cryptographic building blocks of security, working through to their applications in authentication, key exchange, secret and public key encryption, digital signatures, protocols and systems. It then considers these applications in the real world, including models for integrity, authentication, electronic cash, viruses, firewalls, electronic voting, risk assessment, secure web browsers and electronic warfare. Practical cryptosystems are analysed with regard to the assumptions with which they were designed, their limitations, failure modes and ultimately why most end up broken.

**ELEC5618 Software Quality Engineering**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 2 hours lecture and 2 hours tutorials per week. **Prohibitions:** SOFT3002  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit will cover software quality planning, validation and verification methods and techniques, risk analysis, software review techniques, software standards and software process improvement and software reliability. The unit covers testing and quality assurance from a unit testing/developer-based focus up to an overall quality process overview of the software development life cycle. Students who successfully complete this unit will: understand the fundamental concepts of software quality, be able to assess the quality of a software design, be acquainted with methods of building for quality and be able to verify and test a unit of code through familiarity with unit testing strategies and understanding software quality assurance as a rigorous and structured formal process.

**ELEC5619 Object-Oriented Application Frameworks**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 3 hours project work in class per week. **Assumed knowledge:** Java programming, and some web development experience are essential. Databases strongly recommended  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit aims to introduce students to the main issues involved in producing large Internet systems by using and building application frameworks. Frameworks allow great reuse so developers do not have to design and implement applications from scratch, as students have done in ELEC3610 The unit lays down the basic concepts and hands on experience on the design and development of enterprise systems, emphasizing the development of systems using design patterns and application frameworks. A project-based approach will introduce the problems often found when building such systems, and will require students to take control of their learning. A project-based approach will introduce the problems often found when building such systems, and will require students to take control of their learning. Several development Java frameworks will be used, including Spring, Hibernate, and others. Principles of design patterns will also be studied.

**ELEC5620 Model-Based Software Engineering**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours lectures, 1 hour of tutorial and 2 hours of lab/project work in class per week. **Assumed knowledge:** A programming language, basic maths  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.

Model-Based Software Engineering focuses on modern software engineering methods, technologies, and processes used in professional development projects. It covers both the pragmatic engineering elements and the underlying theory of the model-based approach to the analysis, design, implementation, and maintenance of complex software-intensive systems. Students will participate in a group project, which will entail developing and/or evolving a software system, following a full development cycle from requirements specification through to implementation and testing using up-to-date industrial development tools and processes. At the end of the course they will provide a presentation and demonstration of their project work to the class. There is no formal teaching of a programming language in this unit, although students will be expected to demonstrate through their project work their general software engineering and architectural skills as well as their mastery of model-based methods and technologies. Students successfully completing this unit will have a strong practical and theoretical understanding of the modern software development cycle as applied in industrial settings. In particular, they will be familiar with the latest model-based software engineering approaches necessary for successfully dealing with today's highly complex and challenging software systems. The pedagogic grounds for this course and its focus on model-based approaches are to arm new software engineers with skills and perspectives that extend beyond the level of basic programming. Such skills are essential to success in software development nowadays, and are in great demand but very low supply. The dearth of such expertise is one of the key reasons behind the alarmingly high failure rate of industrial software projects (currently estimated at being greater than 40%). Therefore, this unit complements SQE and strengthens a key area in the program.

**ELEC5621 Digital Systems Design**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours lectures per week, Laboratory 3 hours per week. **Assumed knowledge:** Basic knowledge of digital logic, computer architecture and microprocessor systems is required. Equivalent to ELEC2602 and ELEC3608  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.

This unit of study explores the design of digital computing systems using hardware description languages. Topics covered include field programmable gate array (FPGA) architectures, computer arithmetic, high-speed digital logic, interfacing, computer architectures and case studies. Emphasis will be on how to design high-performance digital systems in the algorithmic, system and logic level. Students are required to implement, test and report on a digital design of moderate complexity.

**ELEC5701 Technology Venture Creation**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** 2 hours of lectures and 1 hour visiting professional or team-based interaction exercise per week. **Prohibitions:** ENGG3403  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit of study prepares graduating students with insight and skills in how to turn a concept into a high technology startup company. The class will provide students with knowledge, practical experience and frameworks to assist in evaluating the market for a technology product or service, the design & viability of business models around it, the formulation of a funding-reading business plan & financials, capital raising options & process, venture capital, building distribution channels, intellectual property protection, putting together an A-grade management team, term sheets & funding documentation, technology sales models and going global. We will look at real world case studies of successful technology companies (and flame outs). Does Twitter have a viable business model? Will Facebook eat its lunch? Is YouTube just burning cash? Will Google rule the world? During the period of the course, students will form teams and write a business plan around a concept they propose. Each student will assume a role in the team (CEO, CTO, CFO, VP Sales & Marketing). The plan will be judged by a panel of real world venture capitalists, entrepreneurs and angel investors to determine the final grade for the course. The course is limited to 40 students (10 teams of 4) in addition to a waiting list of 8. Be warned that a serious commitment will be required in developing the concept into a viable business plan. The outcome, however, will be very rewarding to those students interested in starting the next Google. Prospective students should send an email in 400 words or less on why they want to enroll prior to acceptance, to the course email address. The course is taught by instructors experienced in technology startups & venture capital. The course will include a number of guest lectures by industry.
ELEC5720 Foundations Electronic Devs and Circuits
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures per week, and a 2 hours tutorial and 2 hours lab per fortnight. Prohibitions: ELEC2104, ELEC2401 Assumed knowledge: Ohm's Law and Kirchhoff's Laws; action of Current and Voltage sources; network analysis and the superposition theorem; Thevenin and Norton equivalent circuits; inductors and capacitors, transient response of RL, RC and RLC circuits; the ability to use power supplies, oscilloscopes, function generators, meters, etc. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students who do not have an Engineering degree.

Modern Electronics has come to be known as microelectronics which refers to the Integrated Circuits (ICs) containing millions of discrete devices. This course introduces some of the basic electronic devices like diodes and different types of transistors. It also aims to introduce students the analysis and design techniques of circuits involving these discrete devices as well as the integrated circuits. Completion of this course is essential to specialize in Electrical, Telecommunication or Computer Engineering stream. The knowledge of ELEC1103 is assumed.

ELEC5721 Foundations of Signals and Systems
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures, 2 hours lab/tutorial per week and 1 hour of eLearning session per week. Prohibitions: ELEC2301, ELEC2302, MATH3019, MATH3919 Assumed knowledge: MATH11001 Differential Calculus and MATH11002 Linear Algebra and MATH11003 Integral Calculus and Modelling. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering students who do not have an Engineering degree.

This unit aims to teach some of the basic properties of many engineering signals and systems and the necessary mathematical tools that aid in this process. The particular emphasis is on the time and frequency domain modeling of linear time invariant systems. The concepts learnt in this unit will be heavily used in many units of study (in later years) in the areas of communication, control, power systems and signal processing. A basic knowledge of differentiation and integration, differential equations, and linear algebra is assumed.

ELEC5722 Found: Simulations & Numerical Solutions
Credit points: 6 Session: Semester 2 Classes: Lecture 1 hours per week, Laboratory 3 hours per week. Prohibitions: ELEC2103 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Objectives: How to apply the software package Matlab to achieve engineering solutions Critical assessment of various computer numerical techniques Professional project management, teamwork, ethics This unit assumes an understanding of the fundamental concepts and building blocks of electrical and electronics circuits. As well as covering the specific topics described in the following paragraphs, it aims to develop skills in professional project management and teamwork and promote an understanding of ethics. Basic features of Matlab. The Matlab desktop. Interactive use with the command window. Performing arithmetic, using complex numbers and mathematical functions. Writing script and function m-files. Matrix manipulations. Control flow. Two dimensional graphics. Application of Matlab to simple problems from circuit theory, electronics, signals and systems and control. Investigation of the steady state and transient behaviour of LCR circuits. Matlab based numerical solutions applicable to numerical optimization, ordinary differential equations, and data fitting. Introduction to symbolic mathematics in Matlab. Applications, including the derivation of network functions for simple problems in circuit analysis. Introduction to the use of Simulink for system modelling and simulation.

ELEC5730 Foundations of Eng Electromagnetics
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 2 hours tutorial per week. Prohibitions: ELEC3102, ELEC3104 Assumed knowledge: Differential calculus, integral calculus, vector integral calculus; electrical circuit theory and analysis using lumped elements; fundamental electromagnetic laws and their use in the calculation of static fields. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering students with a Non-Electrical Engineering degree.

This unit introduces students to the broad spectrum of engineering electromagnetics and helps students to develop theoretical and analytical skills in the area of electrical and telecommunications engineering and develop understanding of the basic electromagnetic theory underpinning optical communications, wireless communications and electrical engineering.

ELEC5731 Foundations of Circuit Theory and Design
This unit of study is not available in 2012
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and a 2 hours laboratory/tutorial per week. Prohibitions: ELEC3101 Assumed knowledge: (ELEC2101 Circuit Analysis or ELEC2104 Electronic Devices and Basic Circuits or ELEC2401 Introductory Electronics) and (ELEC2901 Signals and Systems or ELEC2302 Signals and Systems). Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment. Note: This Unit of Study is only available to Master of Professional Engineering students with a Non-Electrical Engineering degree.

This unit of study is to build on the platform provided by the basic theory and technical units such as ELEC2104 Electronic Devices and Basic Circuits and ELEC2103 Simulation and Numerical Solutions in Engineering. Based on deep understanding of aspects in active analog filter design students are equipped with the knowledge and skills to design, and to be in a good position to undertake further self study as required. This unit of study is conducted with theoretical study and design project practice. It covers the theory and design of active and passive analog filters including the followings: Fundamental concepts in circuit theory: network functions, characteristic frequencies; Types of filter: lowpass, bandpass, etc; Review of operational amplifiers; Design of first and second order filters using operational amplifiers; Cascade design; Typical filters: Butterworth, Chebyshev, etc; Frequency transformations in design; Sensitivity, etc.

ELEC5732 Foundations of Electricity Networks
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 3 hours lab/tutorial per week. Prohibitions: ELEC3201, ELEC3203 Assumed knowledge: This unit of study assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in basic electromagnetics. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor's degree.

This unit of study provides an introduction to electrical power engineering and lays the groundwork for more specialised units. It assumes a competence in first year mathematics (in particular, the ability to work with complex numbers), in elementary circuit theory and in elements of introductory physics. A revision will be carried out of the use of phasors in steady state ac circuit analysis and of power factor and complex power. The unit comprises an overview of modern electric power system with particular emphasis on generation and transmission. Detailed study will be carried out of the following. The use of three phase systems and their analysis under balanced conditions. Transmission lines: calculation of parameters, modelling, analysis. Transformers: construction, equivalent circuits. Generators: construction, modelling for steady state operation. The use of per unit systems. The analysis of systems with a number of voltage levels. The control of active and reactive power. The load flow problem: bus and impedance matrices, solution methods.

ELEC5733 Foundations of Power Electronics & Apps
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures, 3 hours lab/tutorial per week. Prohibitions: ELEC3202, ELEC3204 Assumed knowledge: Differential equations, linear algebra, complex variables, analysis of linear circuits. Fourier theory applied to periodic and non-periodic signals.
This unit of study aims to teach the fundamentals of advanced energy conversion systems based on power electronics. It provides description of the operation principles and control of these blocks. Through analysis and design methodologies, it delivers an in depth understanding of modern enabling technologies associated with energy conversion. Through laboratory hands-on experience on actual industrial systems, such electrical motor drives, robotic arms, and power supplies, it enhances the link between the theory and the "real" engineering world. The unit clarifies unambiguously the role these imperative technologies play in every human activity; from mobile telephone chargers to energy electricity grids; from electric vehicles and industrial automation to wind energy conversion to name just few. The following topics are covered: Introduction to power electronic converters and systems; applications of power electronic converters; power semiconductor devices; uncontrolled rectifiers: single- and three-phase; non-isolated dc-dc converters: buck, boost and buck-boost: isolated dc-dc converters; inverters: single- and three-phase; uninterruptible power supplies; battery chargers and renewable energy systems; electric and hybrid electric vehicles technologies, design of converters and systems.

ELEC5734

Foundations Elec Energy & Conversion Sys

Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures per week and 3 hours of labs and one hour of tutorial per fortnight. Assumed knowledge: Following concepts are assumed knowledge for this unit of study: familiarity with circuit theory, electronic devices, ac power, capacitors and inductors, and electric circuits such as three-phase circuits and circuits with switches, the use of basic laboratory equipment such as oscilloscope and power supply. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor’s degree.

This unit of study aims to give students a good understanding of electrical energy conversion techniques and equipment. Students who successfully complete this unit will 1) have a broad view of electrical energy conversion systems including transformers, DC machines, induction machines and synchronous machines; 2) be able to analyze and solve problems in transformers and electric machines; 3) have gained confidence in their ability to undertake more advanced study in the power area. The following specific topics are covered: magnetic circuits, inductance, sinusoidal excitation, hysteresis and eddy current loss, permanent magnets, electromechanical energy conversion, singly-excited and doubly-excited systems, transformers, single-phase, equivalent circuit parameters, three-phase transformers, autotransformers, DC machines, separate excitation, shunt excitation, series excitation, and compound excitation, efficiency, armature reaction, induction machines, revolving field, equivalent circuit, squirrel cage machines, measurements of the parameters, DC resistance test, no-load test, blocked-rotor test, synchronous machines, field relationships, power-angle relationships, salient pole machines.

ELEC5735

Foundations of Control

Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and a 3 hours lab/tutorial per week. Prohibitions: ELEC3302, ELEC3304, AMME3500 Assumed knowledge: Specifically the following concepts are assumed knowledge for this unit: familiarity with basic Algebra, Differential and Integral Calculus, Physics; solution of linear differential equations, Matrix Theory, eigenvalues and eigenvectors; linear electrical circuits, ideal op-amps; continuous linear time-invariant systems and their time and frequency domain representations, Laplace transform, Fourier transform. ELEC2302 and MATH2601 or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor’s degree.

This unit is mainly concerned with the application of feedback control to continuous-time, linear time-invariant systems. It aims to give the students an appreciation of the possibilities in the design of control and automation in a range of application areas. The concepts learnt in this unit will be made use of heavily in many units of study in the areas of communication, control, electronics, and signal processing. The following specific topics are covered: Modelling of physical systems using state space, differential equations, and transfer functions, dynamic response of linear time invariant systems and the role of system poles and zeros on it, simplification of complex systems, stability of feedback systems and their steady state performance, Routh-Hurwitz stability criterion, sketching of root locus and controller design using the root locus, Proportional, integral and derivative control, lead and lag compensators, frequency response techniques, Nyquist stability criterion, gain and phase margins, compensator design in the frequency domain, state space design for single input single-output systems, pole placement state variable feedback control and observer design.
squares and current mirrors. Differential amplifiers. Output stages and power amplifiers: class A, class B and class AB.

ELEC5738 Foundations Comm Electronics & Photonics
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures and 3 hours lab/tutorial per week. Prohibitions: ELEC3402, ELEC3405 Assumed knowledge: ELEC2401 Introductory Electronics or ELEC2104 Electronic Devices and Basic Circuits. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor’s degree.

This unit of study provides an introduction to the fundamental operation and design of transmitter and receiver subsystems for two broad classes of communications systems: those based on electronic transmission and those based on optical transmission. In the area of electronic communication subsystems, the course presents transmitter and receiver design. Topics relating to the transmitter comprise electronic oscillator sources, tuned electronic amplifiers, and modulators. Topics relating to receiver design comprise RF and IF frequency selective amplifiers, mixers, demodulators, phase-lock loops, feedback amplifiers, and high frequency RF and microwave communication amplifiers. In the area of optical communication subsystems, the course presents photonic transmitters and receivers.

On the transmitter side this focuses on the principles of light generation in optical sources such as semiconductor lasers and light emitting diodes, electro-optic modulation of light, and optical amplifiers. On the receiver side, photodetectors, optical receivers, and front-end circuits are discussed. The principles and design of these subsystems are considered with reference to a basic optoelectronic communication link.

ELEC5739 Foundations of Communications
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 3 hours lab and tutorial per week. Prohibitions: ELEC3503 Assumed knowledge: Confidence in mathematical operation usually needed to handle telecommunications problems such as Fourier transform, fundamental in signals and systems theory, convolution, and similar techniques. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor’s degree.

This is an intermediate unit of study in telecommunications following on the general concepts studied in earlier units such as Signal and Systems and leading on to more advanced units such as Digital Communication Systems. Students will learn how to critically design and evaluate digital communication systems including the elements of a digital transmission system, understand the limitations of communications channels, different analog and digital modulation schemes and reasons to use digital techniques instead of analog, and the effect of noise and interference in performance of the digital communication systems. On completion of this unit, students will have sufficient knowledge of the physical channel of a telecommunications network to approach the study of higher layers of the network stack.

The following topics are covered. Introduction to communications systems, random signals and stochastic process, components, signals and channels, sampling, quantization, pulse amplitude modulation (PAM), pulse code modulation (PCM), quantization noise, time division multiplexing, delta modulation. Digital communications: baseband signals, digital PAM, eye diagram, equalization, correlative coding, error probabilities in baseband digital transmission, bandpass transmission, digital amplitude shift keying (ASK), frequency shift keying (FSK), phase shift keying (PSK) and quadrature shift keying (QPSK), error probabilities in bandpass digital transmission, a case study of digital communication systems. Introduction to information theory: fundamental limits in communications, channel capacity and channel coding, signal compression.

ELEC5740 Foundations of Data Comm & the Internet
Credit points: 6 Session: Semester 2 Classes: 2 hours of lectures, 2 hours tutorial per week. Prohibitions: ELEC2504, ELEC4501 Assumed knowledge: ELEC2504 AND ELEC2602 or equivalent. Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor’s degree.

Students undertaking this unit should be familiar with fundamental digital technologies and representations such as bit complement and internal word representation. Students should also have a basic understanding of the physical properties of communication channels, techniques and limitations. Furthermore, students should be able to apply fundamental mathematical skills.

The unit will cover the following specific material: Communication reference models (TCP/IP, ATM and OSI). Circuit switched and packet switched communication. Network node functions and building blocks. LAN, MAN and WAN technologies. ATM systems. Protocols fundamental mechanisms. The TCP/IP core protocols (IP, ICMP, DHCP, ARP, TCP, UDP etc.). Applications and protocols (FTP, Telnet, SMTP, HTTP etc.).

ELEC5741 Foundations of Embedded Systems
Credit points: 6 Session: Semester 1 Classes: 1 hour of lectures per week and 10 three hour labs. Prohibitions: ELEC2601 Assumed knowledge: ELEC1601 AND ELEC2602 or equivalent. Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor’s degree.

The aim of this unit of study is to teach students about microprocessors and their use. This includes architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and communications.

ELEC5742 Foundations of Internet Software Platforms
Credit points: 6 Session: Semester 2 Classes: 2 hours lecture and 2 hours tutorials per week. Prohibitions: EBUS4001 Assumed knowledge: INFO1103, INFO2110 and INFO2120 or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non-Electrical Engineering Bachelor’s degree.

This course will focus on the design, the architecture and the development of web applications using technologies currently popular in the marketplace including Java and .NET environments. There are three key themes examined in the course: Presentation layer, Persistence layer, and Interoperability. The course will examine practical technologies such as JSP and Servlets, the model-view-controller (MVC) architecture, database programming with ADO.NET and JDBC, advanced persistence using ORM, XML for interoperability, and XML-based SOAP services and Ajax, in support of the theoretical themes identified.

On completion the students should be able to Compare Java/J2EE web application development with Microsoft .NET web application development, Exposure to relevant developer tools (e.g. Eclipse and VS.NET), Be able to develop a real application on one of those environments, Use XML to implement simple web services and AJAX applications.

ELEC5743 Foundations of E-Business Anal & Design
Credit points: 6 Session: Semester 2 Classes: 2 hours project work in class and 1 hour tutorial per week. Prohibitions: EBUS3003, EBUS3001 Assumed knowledge: INFO2120 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit examines the essential pre-production stages of designing successful internet websites and services. It focuses on the aspects of analysis, project specification, design, and prototype that lead up to the actual build of a website or application. Topics include, B2C, B2B and B2E systems, business models, methodologies, modeling with use cases / UML and WebML, the Project Proposal and Project Specification Document, Information Architecture and User-Centred Design, legal issues, and standards-based web development. Students build a simple use-case based e-business prototype with web standards. A final presentation of the analysis, design and prototype are presented in a role play environment where students try to win funding from a venture capitalist. An understanding of these pre-production fundamentals is critical for future IT and Software Engineering Consultants, Project Managers, Analysts and CTOs.

ELEC5744 Foundations of Digital Comm Systems
Credit points: 6 Session: Semester 1 Classes: 2 hours of lectures and a 2 hours lab/tutorial per week. Prohibitions: ELEC4502 Assumed knowledge: ELEC3550 Computer studies or equivalent. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.


ELEC5745 Foundations of Computer Architecture
This unit of study is not available in 2012
Credit points: 6 Session: Semester 1 Classes: 1 hour of lecture and 3 hours lab/tutorial per week. Prohibitions: ELEC4601 Computer Design Assumed knowledge: Logic operations, theorems and Boolean algebra, data representation, number operations (binary, hex, integers and floating point), combinational logic analysis and synthesis, sequential logic, registers, counters, bus systems, state machines, simple CAD tools for logic design, basic computer organisation, the CPU, peripheral devices, software organisation, machine language, assembly language, operating systems, data communications and computer networks, microprocessors and their use, the architecture, programming and interfacing of microcomputers, peripheral devices and chips, data acquisition, device monitoring and control and other communications. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: This Unit of Study is only available to Master of Professional Engineering degree students with a Non- Electrical Engineering Bachelor's degree.


ELEC8900 Project
Credit points: 12 Session: Semester 1, Semester 2 Classes: Project work - own time. Campus: Camperdown/Darlington Mode of delivery: Supervision Note: Department permission required for enrolment.

Students will work individually or in groups on an assigned project for the semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

ELEC8901 Project Part A
This unit of study is not available in 2012
Credit points: 6 Session: Semester 1, Semester 2 Classes: Project work - own time Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

Students will work individually or in groups on an assigned project for the semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

ELEC8902 Project Part B
This unit of study is not available in 2012
Credit points: 6 Session: Semester 1, Semester 2 Classes: Project work - own time Prerequisites: ELEC8901 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day Note: Department permission required for enrolment.

Students will work individually or in groups on an assigned project for the semester. The concepts covered depend on the nature of the project, but broadly cover research and inquiry, and information literacy.

School of Information Technologies

COMP5028 Object-Oriented Design
Credit points: 6 Session: Semester 1 Classes: 1 hour lecture and 1 hour tutorial per week. Prohibitions: INFO3220 Assumed knowledge: Intermediate level of object oriented programming such as Java Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit introduces essential object-oriented design methods and language mechanisms, especially the principles of modelling through Rational Unified Process and agile processes using Unified Modeling Language (UML) and C++, both of which are industry standard. Students work in small groups to experience the process of object-oriented analysis, object-oriented design, implementation and testing by building a real-world application. C++ is used as the implementation language and a special emphasis is placed on those features of C++ that are important for solving real-world problems. Advanced software engineering features, including exceptions and name spaces are thoroughly covered. Note: The lectures of this unit are co-taught with the corresponding INFO3220.

COMP5045 Computational Geometry
Credit points: 6 Session: Semester 1 Classes: 1 hour lecture and 1 hour tutorial per week. Prohibitions: INFO3220 Assumed knowledge: Intermediate level of object oriented design methods and language mechanisms, especially the principles of modelling through Rational Unified Process and agile processes using Unified Modeling Language (UML) and C++, both of which are industry standard. Students work in small groups to experience the process of object-oriented analysis, object-oriented design, implementation and testing by building a real-world application. C++ is used as the implementation language and a special emphasis is placed on those features of C++ that are important for solving real-world problems. Advanced software engineering features, including exceptions and name spaces are thoroughly covered. Note: The lectures of this unit are co-taught with the corresponding INFO3220.

COMP5046 Statistical Natural Language Processing
Credit points: 6 Session: Semester 1 Classes: 1 hour lecture and 1 hour tutorial per week. Prohibitions: INFO3220 Assumed knowledge:
This unit deals with techniques for the automatic processing of natural languages (such as English, French, etc) and the engineering of such software systems. Engineering processes will be described in the context of methods for creating effective tools for information retrieval and extraction, question answering, classifying and clustering of the documents in a large corpora. Processing sub-systems for such tasks as tokenisation, lexical verification, part-of-speech tagging, parsing and word sense disambiguation will be described. Particular emphasis is given to methods that analyse the meaning in texts and the general application of machine learning methods to these topics. Various applications of these methods to research in health texts and other contexts being pursued in the University of Sydney will be explored.

COMP5047
Pervasive Computing
Credit points: 6 Session: Semester 2 Classes: One 2 hour scheduled small-group class per week, plus 10 hours per week private work. Prohibitions: NETS4047 Assumed knowledge: Networking concepts, operating system concepts, programming expertise. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This is an advanced course in HCI, Human Computer Interaction, with a focus on Pervasive Computing. It introduces the key aspects of HCI and explores these in terms of the new research towards creating user interfaces that disappear into the environment and are available pervasively, for example in homes, workplaces, cars and carried or work.

COMP5048
Information Visualisation

Information Visualisation and Graph Drawing aim to make good pictures of abstract information, such as stock prices, family trees, and software design diagrams. Well designed pictures can convey this information rapidly and effectively. The research challenge for Information Visualisation and Graph Drawing is to design and implement new algorithms that produce such pictures. Applications include visualisation of bioinformatics, social network, software visualisation and network visualisation. This unit will provide basic concepts, techniques and fundamental algorithms to achieve good visualisation of abstract information. Further, it will also provide opportunities for academic research and developing new methods for information visualisation.

COMP5105
Foundations of Data Structures

This unit will teach some powerful ideas that are central to quality software: data abstraction and recursion. It will also show how one can analyse the scalability of algorithms using mathematical tools of asymptotic notation. Contents include: both external "interface" view, and internal "implementation" details, for commonly used data structures, including lists, stacks, queues, priority queues, search trees, hash tables, and graphs; asymptotic analysis of algorithm scalability, including use of recurrence relations to analyse recursive code. This unit covers the way information is represented in each structure, algorithms for manipulating the structure, and analysis of asymptotic complexity of the operations. Outcomes include: ability to write code that recursively performs an operation on a data structure; experience designing an algorithmic solution to a problem using appropriate data structures, coding the solution, and analysing its complexity.

COMP5114
Digital Media Fundamentals
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lecture and one 1 hour tutorial per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Digital media has become indispensable our heterogeneous computing and communication environment. This unit provides an overview of creating, processing, manipulating, and compressing digital media which mainly include image, audio and video. It introduces principles and current techniques such as multimedia data acquisition, analysis, processing and compression and management. It also elaborates different multimedia coding standards, various multimedia systems and cutting-edge multimedia applications such as web media.

COMP5116
Internet Protocols
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lecture and one 1 hour tutorial per week. Prohibitions: ELEC5740 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

In this unit students will gain understanding of the fundamental architecture and protocols used in the TCP/IP protocol stack that is the foundation of the Internet. Furthermore, the unit will provide students with the insight needed to begin to design and analyse protocols in the context of their intended use. Objectives: On completion of this unit students will have developed an understanding of the principles and practice of the layered model of communications architecture, the TCP/IP protocol stack and its component protocols, and various common techniques and tools for protocol analysis.

COMP5138
Relational Database Management Systems
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lecture and one 2 hour tutorial per week. Assumed knowledge: Intermediate level of object oriented programming such as Java. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study provides a conceptual and practical introduction to the use of common platforms that manage large relational databases. Students will understand the foundations of database management and enhance their theoretical and practical knowledge of the widespread relational database systems, as these are used for both operational (OLTP) and decision-support (OLAP) purposes. The unit covers the main aspects of SQL, the industry-standard database query language. Students will further develop the ability to create robust relational database designs by studying conceptual modelling, relational design and normalization theory. This unit also covers aspects of relational database management systems which are important for database administration. Topics covered include storage structures, indexing and its impact on query plans, transaction management and data warehousing.

Objectives: In this unit students will develop the ability to:
- Understand the foundations of database management;
- Strengthen their theoretical knowledge of database systems in general and relational data model and systems in particular;
- Create robust relational database designs;
- Understand the theory and applications of relational query processing and optimization;
- Study the critical issues in data and database administration;
- Explore the key emerging topics in database management.

Note: The lectures of this semester 1 version of COMP5138 is co-taught with INFO2120, the undergraduate database lecture.

COMP5206
Introduction to Information Systems
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lecture and one 1 hour tutorial per week. Prohibitions: INFO5210 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
This unit will provide a comprehensive introduction to the field of information systems from an organisational perspective. The critical role of information and knowledge management will be emphasised from both conceptual and practical standpoints. Methods and techniques for analysing systems and eliciting user requirements will be discussed. Key topics covered will include:

* Basic Information Systems Concepts
* Systems approach and systems thinking
* E-Business and E-Commerce
* Data and Knowledge Management
* Systems Analysis and Development Methodologies
* Ethical, Legal and Social Aspects of Information technologies
* Web 2.0 and Social Computing

Objectives: Students who successfully complete this unit will be able to:
1. Develop a good understanding of important information concepts, 2. Deep understanding of the systems approach and its applicability. 3. Develop skills to perform systems analysis in contemporary systems environments 4. Understanding of major conceptual and technological developments in Information Systems

COMP5211 Algorithms
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lectures and one 1 hour tutorial per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The study of algorithms is a fundamental aspect of computing. This unit of study covers data structures, algorithms, and gives an overview of the main ways of thinking used in IT from simple list manipulation and data format conversion, up to shortest paths and cycle detection in graphs. The objective of the unit are to teach basic concepts in data structure, algorithm, dynamic programming and program analysis. Students will gain essential knowledge in computer science.

COMP5212 Software Construction
Credit points: 6 Session: Semester 1 Classes: One 2 hour lecture and one 2 hour tutorial per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit gives an introduction to C and UNIX, and provides an introduction to parallel programming of modern multi-core architectures using C. The unit also introduces a CUDA, which is an extension of C for massively data-parallel architectures such as GPGPUs. In this unit of study elementary methods for developing robust, efficient and re-usable parallel software will be covered. The unit is taught in C, in a Unix environment. Specific coding topics include memory management, the pragmatic aspects of implementing data structures such as lists and managing concurrent threads. In the lab, debugging tools and techniques are discussee. Emphasis is placed on using common Unix tools to manage aspects of the software construction process, such as make. The subject is taught from a practical and theoretical viewpoint and it includes a considerable amount of programming practice, using existing tools.

COMP5213 Computer and Network Organisation
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour lecture and one 1 hour tutorial per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study provides an overview of hardware and system software infrastructure including: compilers, operating systems, device drivers, network protocols, etc. It also includes user-level Unix skills and network usability. The objectives are to ensure that on completion of this unit students will have developed an understanding of compilers, operating systems, device drivers, network protocols, Unix skills and network usability.
This unit will focus on technological advances supporting the development of e-commerce applications and systems. This includes client and server side development of e-commerce applications. AJAX is the core client side technology covered in this course. Both server scripting and server page technology are covered as key server side technology. It will also examine the emerging trend of web services and its role in E-commerce systems. This unit aims at providing both conceptual understanding and hands-on experiences for the technologies covered.

COMP5424

Information Technology in Biomedicine
Credit points: 6; Session: Semester 1; Classes: (Lec 2hrs & Tut 1hr) per week.
Assumed knowledge: Basic programming skills. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Information technology (IT) has significantly contributed to the research and practice of medicine, biology and health care. The IT field is growing enormously in scope with biomedicine taking a lead role in utilizing the evolving applications to its best advantage. The goal of this unit of study is to provide students with the necessary knowledge to understand the information technology in biomedicine. The major emphasis will be on the principles associated with biomedical digital imaging systems and related biomedicine data processing, analysis, visualization, registration, modelling, compression, management, communication and security. Specialist areas such as Picture Archiving and Communication Systems (PACS), computer-aided diagnosis (CAD), content-based medical image retrieval (CBMIR), and ubiquitous m-Health, etc. will be addressed. A broad range of practical integrated clinical applications will be also elaborated.

COMP5425

Multimedia Storage, Retrieval & Delivery
Credit points: 6; Session: Semester 1; Classes: One 2-hour lecture and 1 1-hour prac per week.
Assumed knowledge: Algorithms (equivalent to COMP5211). Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

The explosive growth of multimedia data, including text, audio, images and video, has generated an extremely challenging job in effective and efficient storing, managing, retrieving and delivering this data across IT infrastructure. This unit provides students with the most updated knowledge in order to address these issues, from multimedia database to multimedia content delivery. The unit content principally covers multimedia data compression; low-level feature extraction; high-level semantic description; storage structures and management; similarity measurement, indexing, and retrieval; security for content distribution. Various applications will be discussed, including multimedia Internet search and video streaming.

COMP5426

Parallel and Distributed Computing
Credit points: 6; Session: Semester 2; Classes: One 2-hour lecture and one 1-hour tutorial per week.
Assumed knowledge: Equivalent of COMP5116. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit is intended to introduce and motivate the study of high performance computer systems. The student will be presented with the foundational concepts pertaining to the different types and classes of high performance computers. The student will be exposed to the description of the technological context of current high performance computer systems. Students will gain skills in evaluating, experimenting with, and optimizing the performance of high performance computers. The unit also provides students with the ability to undertake more advanced topics and courses on high performance computing.

COMP5456

Computational Methods for Life Sciences
Credit points: 6; Session: Semester 2; Classes: One 2 hour lecture, one 1 hour tutorial and one 2 hour lab per week.
Prohibitions: COMP3456. Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit brings together a wide range of skills that are routinely practised in bioinformatics, from the "hard" subjects of mathematics, statistics and computer science, to the "soft" subjects in the biological/health sciences and pharmacology. It covers the essentials of bioinformatics data gathering, manipulation, mining and storage that underpin bioinformatics research, and provides additional practice in the graduate attributes of Research and Inquiry, Information Literacy and Communication through analysis of scientific research, use of large bioinformatics data sets, and writing of reports.
COMP5515
Software Engineering Project
Credit points: 6 Session: Semester 2 Classes: One 1-hour meeting with supervisor, one 2-hour class, and meeting with client. Prerequisites: INFO6007 Prohibitions: COMP3615, INFO3600 Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit will provide students an opportunity to apply the knowledge and practise the skills acquired in the prerequisite and qualifying units, in the context of designing and building a substantial software development system in diverse application domains including life sciences. Working in groups for an external client combined with academic supervision, students will need to carry out the full range of activities including requirements capture, analysis and design, coding, testing and documentation. Students will use the XP methodology and make use of professional tools for the management of their project.

COMP5702
IT Research Project A
Credit points: 12 Session: Semester 1, Semester 2 Classes: Eight hours of practical work per week. Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5703
Information Technology Project
Credit points: 12 Session: Semester 1, Semester 2 Classes: Eight hours of practical work per week. Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5704
IT Research Project B
Credit points: 6 Session: Semester 1, Semester 2 Classes: Four hours of practical work per week. Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

Specialist/Elective/Project

COMP5705
Information Technology Short Project
Credit points: 6 Session: Semester 1, Semester 2, Summer Main, Winter Main Classes: Four hours of practical work per week. Prohibitions: COMP5702, COMP5704 Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

This is a short 6cp IT project unit of study that can be taken either stand-alone as a short IT project during winter or summer schools, or as an internship-project as part of an industry-based scholarship such as the Faculty Postgraduate Industry Project Placement Scheme (PIPPS). The focus is on the development of a client-focused solution with proper project management and documentation. For such students who follow the internship model of one day a week over both semester 1 and semester 2, COMP5705 can be combined with COMP5706 IT Industry Placement Project.

COMP5706
IT Industry Placement Project
Credit points: 6 Session: Semester 1, Semester 2 Classes: Weekly meetings, and about 8 hours of independent study and project work per week. Prohibitions: COMP5702, COMP5703, COMP5704 Campus: Camperdown/Darlington Mode of delivery: Supervision
Note: Department permission required for enrolment.

This is a short 6cp IT project unit of study that can be taken in combination with COMP5705 Information Technology Short Project by students taking an industry-based scholarship such as the Faculty’s Research Industry Placement Project Scholarship (RIPPS), which they split over one day a week over both semester 1 and semester 2.

INFO5001
System Analysis and Modelling
Credit points: 6 Session: Semester 2 Classes: 2 hours lecture and 2 hour lab per week. Prohibitions: INFO2110, ELEC3610 and ELEC5743
Assumed knowledge: Experience with a data model as in COMP5212 or COMP5214 or COMP5028 or COMP5138
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit provides a comprehensive introduction to the analysis of complex systems. Key topics are the determination and expression of system requirements (both functional and on-functional), and the representation of structural and behavioural models of the system in UML notations. Students will be expected to evaluate requirements documents and models as well as producing them. This unit covers essential topics from the ACM/IEEE SE2004 curriculum, especially from MAA Software Modelling and Analysis. Note: The lectures of this unit are co-taught with INFO2110.

INFO5010
IT Advanced Topic A
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour scheduled small-group class per week. Prerequisites: Permission of Head of School Prohibitions: INFO4010
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit will cover some topic of active and cutting-edge research within IT: the content of this unit may be varied depending on special opportunities such as a distinguished researcher visiting the University.

INFO5011
IT Advanced Topic B
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour scheduled small-group class per week. Prerequisites: Permission of Head of School Prohibitions: INFO4010
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit will cover some topic of active and cutting-edge research within IT: the content of this unit may be varied depending on special opportunities such as a distinguished researcher visiting the University.

INFO5030
Information Security Management
Credit points: 6 Session: Semester 1 Classes: 2 hrs of lecture, 1 hr of lab/tut per week. Assumed knowledge: Basic IT knowledge of databases and networks. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This unit of study gives a broad view of the management aspects of information security. We emphasise corporate governance for information security, organisational structures within which information security is managed, risk assessment, and control structures. Planning for security, and regulatory issues, are also addressed.

INFO5090
Professional Practice in IT
Credit points: 6 Session: Semester 1, Semester 2 Classes: (Lec 2hrs & Tut 1hr) per week Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

This Unit of Study introduces the students to some of the concepts, standards and techniques associated with the current professional practice of information technology as part of their involvement in professional practice. The students are presented with a wide range of core conceptual ideas, techniques and relevant professional issues associated with the fields of Interpersonal and Organisational Communication, Conflict Management, IT and Sustainability, IT and Globalisation, Negotiation Strategies, Professional Ethics and Social Implications, Data Quality, Auditing and Quality Assurance and key project management principles.
INFO5991
Services Science Management and Eng
Credit points: 6 Session: Semester 1, Semester 2 Classes: 1 hour lecture and 2 hour tutorial/seminar per week. Assumed knowledge: INFO5990
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

The service sector plays a dominant and growing role in economic growth and employment in most parts of the world and information technology (IT) is a key enabler of this. Services Science, Management and Engineering (SSME) takes a multi-disciplinary approach to services as socio-technical systems. This unit of study offers IT professionals an understanding of the role of IT-centric services in a social, economic and business context as well as knowledge of the principles of their design, engineering and management in a service-oriented computing framework. Delivery of the unit is driven by a critical approach to the literature and live case studies presented by industry professionals. The unit’s learning outcomes are driven by stated industry needs.

INFO5992
Understanding IT Innovations
Credit points: 6 Session: Semester 1, Semester 2 Classes: 2hr Lecture & 1hr Tutorial per week. Prohibitions: PMGT5875 Assumed knowledge: INFO5990
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

An essential skill for an IT manager is the ability to keep up-to-date with emerging technologies, and be able to evaluate the significance of these technologies to their organisation’s business activities. This unit of study is based around a study of current technologies and the influence of these technologies on business strategies. Important trends in innovation in IT are identified and their implications for innovation management explored. Major topics include: drivers of innovation; the trend to open information (“open source”) rather than protected intellectual property; and distribution of innovation over many independent but collaborating actors. On completion of this unit, students will be able to identify and analyse an emerging technology and write a detailed evaluation of the impact of this technology on existing business practices.

INFO5993
IT Research Methods
Credit points: 6 Session: Semester 1, Semester 2 Classes: One 2 hour scheduled small-group class per week, plus private work (including interaction with research supervisors). Prohibitions: INFO4990 Assumed knowledge: Elementary statistics
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This unit will provide an overview of the different research methods that are used in IT. Students will learn to find and evaluate research on their topic and to present their own research plan or results for evaluation by others. The unit will develop a better understanding of what research in IT is and how it differs from other projects in IT. This unit of study is required for students in IT who are enrolled in a research project as part of their Honours or MIT/MITM degree. It is also recommended for students enrolled or planning to do a research degree in IT and Engineering.

ISYS5050
Knowledge Management Systems
Credit points: 6 Session: Semester 1 Classes: One 2 hour scheduled small-group class per week. Prohibitions: ISYS4050 Assumed knowledge: Information systems concepts, database concepts
Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

The need to track and facilitate the sharing of the core knowledge resources in contemporary organisations is widely recognised. This unit will offer a comprehensive introduction to the emerging area of Knowledge Management (KM) from both the technological and organisational perspectives. A diverse range of published papers and other publications that deal with a variety of KM-related topics will be reviewed. Topics include KM: Conceptual Foundations; Taxonomies of organisational knowledge and KM mechanisms; Case/Field Studies of KM Initiatives; Ontologies; Semantic Web; Customer Relationship Management (CRM) systems; Communities-of-Practice; Knowledge Sharing/Open Source Software Development; and Social Network Analysis and KM.

General units offered by the Faculty

ENGG5001
Professional Development
This unit of study is not available in 2012
Credit points: 6 Session: Semester 1 Classes: 1hr lectures, 1hr tutorials and workshops per week. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This UoS is designed to provide graduate engineers studying for a Master's degree by coursework with an introduction to the professional engineering skills necessary to practice as an engineer. These include the various elements of engineering practice, an understanding of the role of the engineer in industry, teamwork and leadership skills, an understanding of the professional responsibilities of engineers, competence in verbal communication and presentations and in reading and writing reports, and an understanding of ethical considerations. The material, learning and assessment is tailored for graduates from Australian and overseas universities.

ENGG5011
Foundation Engineering Studies A
Credit points: 6 Session: Semester 1, Semester 2 Classes: no formal classes. regular meetings with supervisor will be required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Foundations studies covers content that may be assumed knowledge or prerequisite information for follow-on Master of Professional Engineering units. Completion of assigned project work in prescribed background material by the coordinators of the specialist programs will allow students to meet the entry requirements of the MPE degree.

ENGG5012
Foundation Engineering Studies B
Credit points: 6 Session: Semester 1, Semester 2 Classes: No formal classes. Regular meetings with supervisor is required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Foundations studies covers content that may be assumed knowledge or prerequisite information for follow-on Master of Professional Engineering units. Completion of assigned project work in prescribed background material by the coordinators of the specialist programs will allow students to meet the entry requirements of the MPE degree.

ENGG5013
Foundation Engineering Studies C
Credit points: 6 Session: Semester 1, Semester 2 Classes: No formal classes. Regular meetings with supervisor are required. Campus: Camperdown/Darlington Mode of delivery: Normal (lecture/lab/tutorial) Day

Foundations studies covers content that may be assumed knowledge or prerequisite information for follow-on Master of Professional Engineering units. Completion of assigned project work in prescribed
Leadership skills, an understanding of the professional responsibilities of the law of contracts and legal responsibility, teamwork and understanding of the role of the engineer in industry, basic knowledge of various elements of engineering practice, and professional engineering skills necessary to practice as an engineer. These include the professional environment for today's project management practitioners as well as typical challenges and issues facing them;

2. demonstrate the importance of project management to engineering and organizations;

3. demonstrate the progression from strategy formulation to execution of the project;

4. provide a set of tools and techniques at different stages of a project's lifecycle with emphasis on scope, time, cost and integration related issues;

5. highlight examples of project success/failures in project management and to take lessons from these;

6. consider the roles of project manager in the organization and management of people;

7. provide a path for students seeking improvements in their project management expertise.

Textbooks

ENGG5201
Foundation Engineering Studies D
Credit points: 6
Session: Semester 1, Semester 2
Classes: Project Work - own time. Regular meetings with supervisor required.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

Foundations studies covers content that may be assumed knowledge or prerequisite information for follow-on Master of Professional Engineering units. Completion of assigned project work in prescribed background material by the coordinators of the specialist programs will allow students to meet the entry requirements of the MPE degree.

ENGG5202
Sustainable Design, Eng and Mgt
Credit points: 6
Session: Semester 1
Classes: 2 lectures per week, tutorials 2 hour per week and projects and self assisted learning (4 hours per week)
Assumed knowledge: General knowledge in science and calculus and have completed 24 credit points of specialist units of study in their selected discipline.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

The aim of this UoS is to give students an insight and understanding of the environmental and sustainability challenges that Australia and the planet are facing and how these have given rise to the practice of Sustainable Design, Engineering and Management. The objective of this course is to provide a comprehensive overview of the nature and causes of the major environmental problems facing our planet, with a particular focus on energy and water, and how engineering is addressing these challenges.

The course starts with a description of the physical basis of global warming, and proceeds with a discussion of Australia’s energy and water use, an overview of sustainable energy and water technologies and sustainable building design. Topics include the principles of sustainability, sustainable design and social responsibility, sustainable and renewable energy sources, and sustainable use of water. Aspects of designing a sustainable building, technologies that minimise energy and water consumption, consider recycling and reducing waste disposal using advanced design will also be discussed during this course.

ENGG5203
Quality Engineering and Management
Credit points: 6
Session: Semester 2
Classes: Presentation 2.00 hours per week
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

This subject is designed to support Engineers in the implementation of engineering tasks in the workplace. It addresses the use of quality and systems assurance. It is designed to enable engineers entering practice from other related disciplines or with overseas qualifications to do so in a safe and effective way. The study program will include management of quality in research, design and delivery of engineering works and investigation, as well as of safe work practices and systems assurance.

ENGG5204
Engineering Professional Practice
Credit points: 6
Session: Semester 1
Classes: Lecture 1 hour per week. Tutorial 1 hour per week, Workgroup 1 hour per week.
Assumed knowledge: As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

his UoS is designed to provide graduate engineers studying for a Master of Professional Engineering degree with an introduction to the professional engineering skills necessary to practice as an engineer. These include the various elements of engineering practice, an understanding of the role of the engineer in industry, basic knowledge of the law of contracts and legal responsibility, teamwork and leadership skills, an understanding of the professional responsibilities of engineers, competence in verbal communication and presentations and in reading and writing reports, and an understanding of ethical considerations. The material, learning and assessment is tailored for graduates from Australian and overseas universities.

ENGG5205
Professional Practice in PM
Credit points: 6
Session: Semester 1, Semester 2
Classes: Lecture 3hrs per week, E-Learning 1 hr per week.
Assumed knowledge: Basic engineering or science knowledge. At least 2-3 years of work experience preferred.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

"This UoS teaches the fundamental knowledge on the importance, organizational context and professional practice in project management. It serves as an introduction to project management practices for non-PM students. For PM students, this UoS lays the foundation to progress to advanced PM subjects. Although serving as a general introduction unit, the focus has been placed on scope, time, cost, and integration related issues.

Specifically, the UoS aims to

1. introduce students to the institutional, organisational and professional environment for today’s project management practitioners as well as typical challenges and issues facing them;

2. demonstrate the importance of project management to engineering and organizations;

3. demonstrate the progression from strategy formulation to execution of the project;

4. provide a set of tools and techniques at different stages of a project's lifecycle with emphasis on scope, time, cost and integration related issues;

5. highlight examples of project success/failures in project management and to take lessons from these;

6. consider the roles of project manager in the organization and management of people;

7. provide a path for students seeking improvements in their project management expertise.

Textbooks

ENGG5210
Research Methods in Engineering (Intro)
This unit of study is not available in 2012
Credit points: 6
Session: Semester 1, Semester 2
Classes: Lecture 1 hr per week, Workgroup 5 hrs per week for part of semester.
Prohibitions: INFO5993
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day
Note: Department permission required for enrolment.

This UoS is designed for research students enrolled in MPhil or PhD programs and runs for 13 weeks. Post-graduate coursework students thinking of joining such programs in the future may also enroll. This UoS provides candidates with a sound understanding of the overall research process from the formulation of a research proposal to writing a thesis. Any research involves problem definition, literature survey, execution of research and reporting in an appropriate manner. Students will write their own research proposal, critique a number of scientific papers and conduct their own literature survey. Students will also carry out assignments involving design of small experiments and learn how to best analyse data and report results. Time will be devoted to developing the communication skills through seminars. The UoS is delivered through lectures from the staff-in-charge and guest lecturers who have carried out significant engineering research. The student has to give a ten minutes seminar based on the literature search he/she has conducted.

ENGG5214
Management of Technology
Credit points: 6
Session: Semester 2
Classes: 1 hr Lecture per week, 1hr Tutorial per week, 2hrs Project work in class per week.
Assumed knowledge: As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.
Campus: Camperdown/Darlington
Mode of delivery: Normal (lecture/lab/tutorial) Day

273
This UoS is designed to introduce students to the global context of much of contemporary engineering and the consequent strategic and operational issues. It will address the nature, characteristics and variety of risks of global businesses, the opportunities and pressures for effective strategies, and the many management challenges in international business. In particular it will focus on Australian consulting, logistics and construction engineering firms that are operating on a global basis.

**ENGG5215**

**International Eng Strategy & Operations**

**Credit points:** 6  
**Session:** Semester 2  
**Classes:** Lecture 2 hours per week, Tutorial 2 hours per week, Project Work - in class 2 hours per week.  
**Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This UoS is designed to introduce students to the global context of much of contemporary engineering and the consequent strategic and operational issues. It will address the nature, characteristics and variety of risks of global businesses, the opportunities and pressures for effective strategies, and the many management challenges in international business. In particular it will focus on Australian consulting, logistics and construction engineering firms that are operating on a global basis.

**ENGG5216**

**Management of Engineering Innovation**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** 1hr Lecture per week, 1 hr Tutorials per week, 2 hr Project work in class per week for first half of semester.  
**Assumed knowledge:** As graduates, they will have a soundly based technical knowledge in engineering or a related area, life skills and work experience.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day

This unit is designed as enable students to grapple with the challenges of engaging in, facilitating and managing innovation and technology commercialisation. Key learning outcomes are: developing an understanding of the processes of management, and in particular of innovation, dealing with uncertain and inadequate information, how to communicate effectively and motivate a group of people to work out what to do, and how to do it. Content will include the challenges of modern management; understanding of the new rules of innovation; the role of globalisation on innovation and economic performance; the competitiveness of Australian firms; the generation of employment and wealth; the changing requirements of the engineer; the engineer as manager and strategist; the role of innovation in business management; product innovation and commercialisation; IP recognition and management; starting a high-tech company.

**ENGG5217**

**Practical Experience**

**Session:** Semester 1, Semester 2  
**Classes:** no formal classes  
**Prerequisites:** Students will have completed a minimum of 48cp towards the MPE.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Professional Practice

The MPE requires students to obtain industrial work experience of twelve weeks duration (60 working days) or its equivalent towards satisfying the requirements for award of the degree. Students can undertake their work experience in either Year 1 or 2, however, Year 2 is encouraged. Students may have prior work in an Engineering field carried out on completion of their undergraduate degree accepted as meeting the requirements of this component. Students must be exposed to professional engineering practice to enable them to develop an engineering approach and ethos, and to gain an appreciation of engineering ethics. The student is required to inform the Faculty of any work arrangements by emailing the Graduate School of Engineering and Information Technologies. Assessment in this unit is by the submission of a portfolio containing written reports on the involvement with industry. For details of the reporting requirements, go to the faculty's Practical Experience portfolio web site.

**ENGG5218**

**Research Dissertation**

**Credit points:** 24  
**Session:** Semester 1, Semester 2  
**Classes:** Each student will be assigned an academic supervisor from their chosen stream or specialisation. Students will meet with an academic supervisor for approximately 1 hour per week for one semester.  
**Prerequisites:** Completion of a minimum of 48cp of MPE UoS and have received a WAM of 75% or greater  
**Corequisites:** ENGG5210 Introduction to Research Methods in Engineering  
**Prohibitions:** AMME5218  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision  
**Note:** Department permission required for enrolment.

To complete a substantial research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis. Department permission required for enrolment in the following session(s): 1, 2

**ENGG5219**

**Research Project**

**Credit points:** 12  
**Session:** Semester 1, Semester 2  
**Classes:** Students will be assigned a supervisor who they will meet on a weekly basis to discuss their progress.  
**Prerequisites:** Students will have completed a minimum of 48cp towards the MPE.  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Supervision  
**Note:** Department permission required for enrolment.

The ability to plan, systemically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s): 1, 2

**ENGG5220**

**Engineering Project A**

*This unit of study is not available in 2012*

**Credit points:** 6  
**Session:** Semester 1, Semester 2  
**Classes:** Independent project work.  
**Prerequisites:** 48 credits from MPE degree program  
**Prohibitions:** ENGG5222, ENGG5223, ENGG5218, ENGG5219  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.

The ability to plan, systemically conduct and report on a major research project is an important skill for professional engineers. This unit of study builds on technical competencies previously obtained, as well as making use of the report writing and communication skills the students have developed. In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s): 1, 2

**ENGG5221**

**Engineering Project B**

**Credit points:** 6  
**Session:** Semester 1  
**Classes:** Independent project work.  
**Corequisites:** ENGG5220  
**Prohibitions:** ENGG5222, ENGG5223, ENGG5218, ENGG5219  
**Campus:** Camperdown/Darlington  
**Mode of delivery:** Normal (lecture/lab/tutorial) Day  
**Note:** Department permission required for enrolment.
In this unit of study, students are required to plan and begin work on a major research project, which is very often some aspect of a staff member's research interests. Some of the projects will be experimental in nature, while others may involve computer-based simulation, design or literature surveys. In this unit students will learn how to examine published and experimental data, set objectives, organize a program of work and devise an experimental or developmental program. The skills acquired will be invaluable to students undertaking engineering work. Students are expected to take the initiative when pursuing their research project. Department permission required for enrolment in the following session(s); 1, 2

**ENGG5222**

**Dissertation A**

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: Independent project work  
Prerequisites: Distinction Average in 48 credit points of MPE program  
Prohibitions: ENGG5220, ENGG5221, ENGG5218, ENGG5219  
Campus: Camperdown/Darlington  
Mode of delivery: Supervision  
Note: Department permission required for enrolment.

To complete a substantial research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis. Department permission required for enrolment in the following session(s); 1, 2

**ENGG5223**

**Dissertation B**

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: Independent project work  
Corequisites: ENGG5222  
Prohibitions: ENGG5220, ENGG5221, ENGG5218, ENGG5219  
Campus: Camperdown/Darlington  
Mode of delivery: Supervision  
Note: Department permission required for enrolment.

To complete a substantial research project and successfully analyse a problem, devise appropriate experiments, analyse the results and produce a well-argued, in-depth thesis. Department permission required for enrolment in the following session(s); 1, 2

**ENGG5701**

**Doctoral Thesis 1A**

This unit of study is not available in 2012

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: Candidate must have at least one meeting with supervisor per week  
Corequisites: ENGG5210  
Research Methods in Engineering  
Practical field work: Must carry out at least 8 hours of research per week.  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

Candidates enrolled in this UoS will begin research on an approved project. The research may be performed in a candidate's place of employment on a project that has been approved by the Faculty. A supervisor from the Faculty of Engineering and Information Technology will be appointed for the duration of the research project. The objective of this UoS is to provide a formal platform through which the candidate can complete a research project from a thorough review of the various stages of literature survey, research proposal, research plan, conduct of research, data analysis and presentation of outcomes.

**ENGG5702**

**Thesis and Doctoral Seminar 1B**

This unit of study is not available in 2012

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: No formal classes.  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

In the doctoral seminar program the candidate must present the first of three research colloquia to his or her peers in the form of a research proposal. The candidate will be able to give a thorough review of the various stages of literature survey, research proposal, research plan, conduct of research, data analysis and presentation of outcomes.

**ENGG5703**

**Doctoral Thesis 2A**

This unit of study is not available in 2012

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: Candidate must have at least 1 meeting per week with supervisor.  
Corequisites: ENGG5701  
Practical field work: Candidate must carry out at least a minimum of 8 hours per week on research.  
Campus: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

Candidates enrolled in this UoS will continue their research on their approved project as outlined in ENGG5701 Doctoral Thesis 1A.

**ENGG5704**

**Thesis and Doctoral Seminar 2B**

This unit of study is not available in 2012

Credit points: 12  
Session: Semester 1, Semester 2  
Classes: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

The candidate must carry out research for the fourth semester of the Doctoral research program, and at the end of the semester, must present the second of the three research colloquia (of approximately half an hour's duration) to his or her peers as a work in progress seminar, one of which might be analogous to an oral defence of the nearly completed thesis. The Seminar will be considered in the annual progress report on progress.

**ENGG5705**

**Thesis and Doctoral Seminar 3A**

This unit of study is not available in 2012

Credit points: 24  
Session: Semester 1, Semester 2  
Classes: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

The candidate must carry out research for the fifth semester of the degree, and present the third of the three research colloquia (of approximately half an hour's duration) to his or her peers as a work in progress seminar, one of which might be analogous to an oral defence of the nearly completed thesis to the academic staff and postgraduate students of the Faculty of Engineering and Information Technology.

**ENGG5706**

**Thesis and Oral Defence**

This unit of study is not available in 2012

Credit points: 24  
Session: Semester 1, Semester 2  
Classes: Camperdown/Darlington  
Mode of delivery: Normal (lecture/lab/tutorial) Day  
Note: Department permission required for enrolment.

Carry out research for the final semester, and at the end of the Semester, present the results of the research in a thesis of approximately 60,000 words. The candidate is required to present a final Seminar which is similar to an oral defence of the thesis before staff and research students of the Faculty of Engineering and Information Technology at the end of the semester.

275
Units of study
<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCT1003</td>
<td>Financial Accounting Concepts</td>
<td>79</td>
</tr>
<tr>
<td>ACCT1004</td>
<td>Management Accounting Concepts</td>
<td>79</td>
</tr>
<tr>
<td>AERO1400</td>
<td>Intro to Aircraft Construction &amp; Design</td>
<td>43, 47, 104</td>
</tr>
<tr>
<td>AERO1560</td>
<td>AERO1560 Introduction to Aerospace Engineering</td>
<td>43, 47, 104</td>
</tr>
<tr>
<td>AERO1400</td>
<td>AERO1400 Intro to Aircraft Construction &amp; Design</td>
<td>43, 47, 104</td>
</tr>
<tr>
<td>AERO2703</td>
<td>Aerospace Technology 1</td>
<td>43, 104</td>
</tr>
<tr>
<td>AERO2705</td>
<td>Space Engineering 1</td>
<td>43, 47, 104</td>
</tr>
<tr>
<td>AERO2711</td>
<td>Space Engineering Project 1</td>
<td>104, 106, 145</td>
</tr>
<tr>
<td>AERO3260</td>
<td>Aerodynamics 1</td>
<td>44, 47, 104</td>
</tr>
<tr>
<td>AERO3261</td>
<td>Propulsion</td>
<td>44, 48, 104</td>
</tr>
<tr>
<td>AERO3360</td>
<td>Aerospace Structures 1</td>
<td>43, 47, 105</td>
</tr>
<tr>
<td>AERO3460</td>
<td>Aerospace Design 1</td>
<td>44, 47, 105</td>
</tr>
<tr>
<td>AERO3465</td>
<td>Aerospace Technology 2</td>
<td>43, 47, 105</td>
</tr>
<tr>
<td>AERO3560</td>
<td>Flight Mechanics 1</td>
<td>44, 48, 105</td>
</tr>
<tr>
<td>AERO3660</td>
<td>Aerospace Management</td>
<td>44, 48, 105</td>
</tr>
<tr>
<td>AERO3711</td>
<td>Space Engineering Project 2</td>
<td>106, 107, 145</td>
</tr>
<tr>
<td>AERO3760</td>
<td>Space Engineering 2</td>
<td>43, 47, 105</td>
</tr>
<tr>
<td>AERO4206</td>
<td>Rotary Wing Aircraft</td>
<td>45, 106</td>
</tr>
<tr>
<td>AERO4260</td>
<td>Aerodynamics 2</td>
<td>44, 48, 106</td>
</tr>
<tr>
<td>AERO4360</td>
<td>Aerospace Structures 2</td>
<td>43, 47, 105</td>
</tr>
<tr>
<td>AERO4460</td>
<td>Aerospace Design 2</td>
<td>44, 48, 106</td>
</tr>
<tr>
<td>AERO4491</td>
<td>Advanced Aircraft Design</td>
<td>45, 107</td>
</tr>
<tr>
<td>AERO4560</td>
<td>Flight Mechanics 2</td>
<td>43, 47, 107</td>
</tr>
<tr>
<td>AERO4591</td>
<td>Advanced Flight Mechanics</td>
<td>43, 47, 107</td>
</tr>
<tr>
<td>AERO4701</td>
<td>Space Engineering 3</td>
<td>43, 47, 107</td>
</tr>
<tr>
<td>AERO4711</td>
<td>Space Engineering Project 3</td>
<td>107, 145</td>
</tr>
<tr>
<td>AERO4712</td>
<td>Space Engineering Project 4</td>
<td>107, 145</td>
</tr>
<tr>
<td>AEROS010</td>
<td>Optimisation Methods in Engineering</td>
<td>193, 194, 195, 233</td>
</tr>
<tr>
<td>AEROS200</td>
<td>Advanced Aerodynamics</td>
<td>191, 193, 194, 233</td>
</tr>
<tr>
<td>AEROS510</td>
<td>Foundations of Aerodynamics</td>
<td>193, 194, 233</td>
</tr>
<tr>
<td>AEROS211</td>
<td>Foundations of Propulsion Systems</td>
<td>193, 194, 233</td>
</tr>
<tr>
<td>AEROS301</td>
<td>Applied Finite Element Analysis</td>
<td>193, 194, 196, 233</td>
</tr>
<tr>
<td>AEROS310</td>
<td>Foundations of Aerospace Structures</td>
<td>193, 194, 234</td>
</tr>
<tr>
<td>AEROS400</td>
<td>Advanced Aircraft Design Analysis</td>
<td>193, 194, 234</td>
</tr>
<tr>
<td>AEROS410</td>
<td>Foundations of Aerospace Design</td>
<td>193, 194, 234</td>
</tr>
<tr>
<td>AEROS500</td>
<td>Flight Mechanics Test and Evaluation Adv</td>
<td>191, 193, 194, 234</td>
</tr>
<tr>
<td>AEROS510</td>
<td>Foundations of Flight Mechanics</td>
<td>193, 194, 234</td>
</tr>
<tr>
<td>AEROS660</td>
<td>Safety Systems Management</td>
<td>192, 193, 194, 195, 235</td>
</tr>
<tr>
<td>AEROS760</td>
<td>Spacecraft and Satellite Design</td>
<td>191, 193, 194, 195, 235</td>
</tr>
<tr>
<td>AMME0011</td>
<td>International Exchange B</td>
<td>107</td>
</tr>
<tr>
<td>AMME0012</td>
<td>International Exchange C</td>
<td>107</td>
</tr>
<tr>
<td>AMME0013</td>
<td>International Exchange D</td>
<td>108</td>
</tr>
<tr>
<td>AMME0014</td>
<td>International Exchange E</td>
<td>108</td>
</tr>
<tr>
<td>AMME0015</td>
<td>International Exchange F</td>
<td>108</td>
</tr>
<tr>
<td>AMME0016</td>
<td>International Exchange G</td>
<td>108</td>
</tr>
<tr>
<td>AMME0017</td>
<td>International Exchange H</td>
<td>108</td>
</tr>
<tr>
<td>AMME0018</td>
<td>International Exchange I</td>
<td>108</td>
</tr>
<tr>
<td>AMME1550</td>
<td>Dynamics 1</td>
<td>43, 47, 51, 55, 59, 63, 67, 108</td>
</tr>
<tr>
<td>AMME2200</td>
<td>Thermodynamics and Fluids</td>
<td>43, 47, 51, 55, 59, 64, 68, 108</td>
</tr>
<tr>
<td>AMME2301</td>
<td>Mechanics of Solids</td>
<td>43, 47, 51, 55, 59, 63, 67, 108</td>
</tr>
<tr>
<td>AMME2302</td>
<td>Materials 1</td>
<td>43, 47, 51, 55, 59, 63, 67, 108</td>
</tr>
<tr>
<td>AMME2500</td>
<td>Engineering Dynamics</td>
<td>43, 47, 51, 55, 63, 67, 108</td>
</tr>
<tr>
<td>AMME3110</td>
<td>Project A</td>
<td>109</td>
</tr>
<tr>
<td>AMME3500</td>
<td>System Dynamics and Control</td>
<td>43, 48, 51, 56, 59, 63, 67, 109</td>
</tr>
<tr>
<td>AMME4010</td>
<td>Major Industrial Project</td>
<td>109</td>
</tr>
<tr>
<td>AMME4100</td>
<td>Practical Experience</td>
<td>237</td>
</tr>
<tr>
<td>AMME4110</td>
<td>Project B</td>
<td>109</td>
</tr>
<tr>
<td>AMME4111</td>
<td>Honours Thesis A</td>
<td>44, 48, 52, 56, 60, 64, 68, 109, 110</td>
</tr>
<tr>
<td>AMME4112</td>
<td>Honours Thesis B</td>
<td>44, 48, 52, 56, 60, 64, 68, 110</td>
</tr>
<tr>
<td>AMME4121</td>
<td>Engineering Project A</td>
<td>44, 48, 52, 56, 60, 64, 68, 110</td>
</tr>
<tr>
<td>AMME4122</td>
<td>Engineering Project B</td>
<td>44, 48, 52, 56, 60, 64, 68, 110</td>
</tr>
<tr>
<td>AMME4210</td>
<td>Computational Fluid Dynamics</td>
<td>45, 49, 53, 57, 61, 110</td>
</tr>
<tr>
<td>AMME4241</td>
<td>Renewable Energy</td>
<td>53, 61, 110</td>
</tr>
<tr>
<td>AMME4260</td>
<td>Management, Employees and Industrial Rel</td>
<td>53, 61, 111</td>
</tr>
<tr>
<td>AMME4710</td>
<td>Computer Vision and Image Processing</td>
<td>65, 69, 111</td>
</tr>
<tr>
<td>AMME4790</td>
<td>Introduction to Biomechatronics</td>
<td>57, 65, 69, 111</td>
</tr>
<tr>
<td>AMME4971</td>
<td>Tissue Engineering</td>
<td>57, 111</td>
</tr>
<tr>
<td>AMME4981</td>
<td>Applied Biomedical Engineering</td>
<td>57, 111</td>
</tr>
<tr>
<td>AMME4990</td>
<td>Biomedical Product Development</td>
<td>57, 92, 111</td>
</tr>
<tr>
<td>AMME4992</td>
<td>Regulatory Affairs in Medical Industry</td>
<td>57, 92, 112</td>
</tr>
<tr>
<td>AMME5101</td>
<td>Power Plant Engineering</td>
<td>191, 195, 236</td>
</tr>
<tr>
<td>AMME5200</td>
<td>Foundations of Thermodynamics and Fluids</td>
<td>236</td>
</tr>
<tr>
<td>AMME5202</td>
<td>Advanced Computational Fluid Dynamics</td>
<td>191, 192, 193, 194, 195, 202, 205, 236</td>
</tr>
<tr>
<td>AMME5218</td>
<td>Research Dissertation</td>
<td>236</td>
</tr>
<tr>
<td>AMME5271</td>
<td>Computational Nanotechnology</td>
<td>191, 195, 236</td>
</tr>
<tr>
<td>AMME5301</td>
<td>Foundations of Mechanics of Solids</td>
<td>1, 237</td>
</tr>
<tr>
<td>AMME5302</td>
<td>Foundations of Materials</td>
<td>1, 237</td>
</tr>
<tr>
<td>AMME5500</td>
<td>Foundations of Engineering Dynamics</td>
<td>237</td>
</tr>
<tr>
<td>AMME5501</td>
<td>Foundations: System Dynamics and Control</td>
<td>193, 194, 195, 237</td>
</tr>
<tr>
<td>AMME5601</td>
<td>Professional Engineering</td>
<td>192, 193, 194, 195, 237</td>
</tr>
<tr>
<td>AMME5602</td>
<td>Product Life Cycle Design</td>
<td>191, 192, 196, 238</td>
</tr>
</tbody>
</table>
Index by alpha code

AMME5900 Project 1 in Manufacturing & Automation, 238
AMME5901 Anatomy and Physiology for Engineers, 238
AMME5912 Crash Analysis using LS-DYNA, 191, 196, 238
AMME5921 Biomedical Engineering Tech 2, 191, 192, 238
AMME5961 Biomaterials Engineering, 191, 192, 195, 238
AMME5971 Applied Tissue Engineering, 191, 192, 238
AMME5981 Computational Biomedical Engineering, 191, 192, 239
AMME5990 Biomedical Engineering Tech 1, 191, 192, 239

B
BDES1010 Architecture Studio 101, 83
BDES1011 Architectural History/Theory 1, 83
BDES1012 Architectural Communications 1, 83
BDES1020 Architecture Studio 102, 83
BDES1023 Architectural Technologies 1, 83
BDES1024 Art Workshop 1, 83
BDES2010 Architecture Studio 201, 83
BDES2012 Architectural Communications 2, 84
BDES2013 Architectural Technologies 2, 84
BDES2020 Architecture Studio 202, 84
BDES2021 Architectural History/Theory 2, 84
BDES3010 Architecture Studio 301, 84
BDES3012 Architectural Communications 3, 84
BDES3020 Architecture Studio 302, 84
BDES3023 Architectural Technologies 3, 84
BDES3025 Architectural Professional Practice, 84
BIOL1001 Concepts in Biology, 91, 93, 95, 97, 99, 101
BIOL1003 Human Biology, 59, 91

C
CHEM1101 Chemistry 1A, 39, 55, 71, 91, 93, 95, 97, 99, 101, 199, 247
CHEM1102 Chemistry 1B, 71, 199, 247
CHEM2403 Chemistry of Biological Molecules, 71
CHEM2404 Forensic and Environmental Chemistry, 71
CHNG1103 Material & Energy Transformations Intro, 71, 117
CHNG2801 Conservation and Transport Processes, 71, 117
CHNG2802 Applied Maths for Chemical Engineers, 71, 118
CHNG2803 Energy and Fluid Systems Practice, 72, 118
CHNG2804 Chemical & Biological Systems Behaviour, 72, 118
CHNG2805 Industrial Systems and Sustainability, 72, 118
CHNG2806 Materials Purification and Recovery, 72, 118
CHNG3041 Exchange Program 3A, 119
CHNG3042 Exchange Program 3B, 119
CHNG3801 Process Design, 72, 119
CHNG3802 Operating/Improving Industrial Systems, 72, 119
CHNG3803 Chemical/Biological Process Design, 72, 119
CHNG3804 Biochemical Engineering, 73, 120
CHNG3805 Product Formulation and Design, 72, 120
CHNG3806 Management of Industrial Systems, 72, 120
CHNG3807 Products and Value Chains, 72, 120
CHNG3808 Polymer Engineering, 74, 121
CHNG4001 Practical Experience, 72, 121
CHNG4008 Chemical Engineering Advanced Concepts, 121
CHNG4041 Exchange Program 4A, 121
CHNG4042 Exchange Program 4B, 121
CHNG4203 Major Industrial Project, 74, 122, 123
CHNG4802 Chemical Engineering Design A, 72, 122
CHNG4806 Chemical Engineering Design B, 73, 122
CHNG4811 Honours Thesis A, 73, 122
CHNG4812 Honours Thesis B, 73, 122
CHNG4813 Engineering Project A, 73, 123
CHNG4814 Engineering Project B, 73, 123
CHNG5001 Process Systems Engineering, 74, 197, 200, 242
CHNG5003 Green Engineering, 74, 197, 200, 242
CHNG5004 Particles and Surfaces, 74, 197, 200, 243
CHNG5005 Wastewater Eng - Systems and Practice, 74, 197, 198, 200, 202, 243
CHNG5008 Chemical & Biomolecular Engineering Adv, 200, 243
CHNG5112 Found of Chemical Eng Design A, 200, 243
CHNG5116 Found of Chemical Eng Design B, 200, 244
CHNG5205 Major Industrial Placement Project, 244
CHNG5601 Membrane Science, 74, 197, 200, 244
CHNG5602 Cellular Biophysics, 74, 197, 200, 244
CHNG5603 Analysis, Modelling, Control: BioPhy Sys, 74, 197, 200, 244
CHNG5604 Membrane Science Laboratory, 74, 197, 244
CHNG5605 Bio-Products: Laboratory to Marketplace, 74, 197, 200, 245
CHNG5701 Found of Conservation & Transport Proc, 199, 245
CHNG5702 Found of Applied Maths for Chem Eng, 245
CHNG5703 Found of Energy and Fluid Systems, 199, 245
CHNG5704 Found: Chem & Biological Syst Behaviour, 199, 245
CHNG5705 Found: Industrial Syst & Sustainability, 246
CHNG5801 Foundations of Process Design, 199, 246
CHNG5802 Found: Operation & Improving Ind Systems, 199, 246
CHNG5803 Found of Chem & Biological Processes, 199, 247
CHNG5804 Found of Biochemical Eng, 199, 247
CHNG5805 Foundation of Prod Formulation & Design, 199, 247
CHNG5806 Found of Manag of Industrial Syst, 199, 247
CHNG5901 Project Part A, 247
CHNG5902 Project Part B, 247
CHNG5906 Extended Project, 248
CHNG5907 Extended and Enhanced Project, 248
CIVL0011 Civil Exchange A, 123
CIVL0012 Civil Exchange B, 123
CIVL0013 Civil Exchange C, 123
CIVL0014 Civil Exchange D, 123
CIVL0015 Civil Exchange E, 123
CIVL0016 Civil Exchange F, 124
CIVL0017 Civil Exchange G, 124
CIVL0018 Civil Exchange H, 124
CIVL2110 Materials, 75, 79, 80, 84, 86, 124, 125
CIVL2201 Structural Mechanics, 75, 76, 79, 80, 83, 84, 85, 86, 124, 125, 203, 205, 206, 207, 252
Index by alpha code

COMP4014 Computer Science Honours D, 140
COMP4551 Computer Science Exchange, 140
COMP4552 Computer Science Exchange, 140
COMP4553 Computer Science Exchange, 141
COMP4554 Computer Science Exchange, 141
COMP5028 Object-Oriented Design, 218, 225, 228, 231, 267
COMP5045 Computational Geometry, 156, 159, 225, 228, 267
COMP5046 Statistical Natural Language Processing, 156, 159, 225, 228, 230, 267
COMP5047 Pervasive Computing, 156, 159, 211, 218, 225, 227, 228, 268
COMP5048 Information Visualisation, 156, 159, 225, 228, 268
COMP5105 Foundations of Data Structures, 268
COMP5114 Digital Media Fundamentals, 225, 227, 231, 268
COMP5116 Internet Protocols, 225, 227, 228, 229, 231, 268
COMP5128 Relational Database Management Systems, 225, 228, 231, 268
COMP5206 Introduction to Information Systems, 225, 229, 230, 231, 268
COMP5211 Algorithms, 225, 228, 231, 269
COMP5212 Software Construction, 231, 269
COMP5213 Computer and Network Organisation, 231, 269
COMP5214 Software Development in Java, 225, 228, 231, 269
COMP5318 Knowledge Discovery and Data Mining, 156, 159, 225, 228, 269
COMP5321 Logic and System Verification, 269
COMP5328 Advanced Data Models, 156, 159, 219, 225, 228, 269
COMP5347 e-Commerce Technology, 225, 228, 270
COMP5348 Enterprise Scale Software Architecture, 100, 156, 159, 218, 226, 228, 229, 270
COMP5415 Multimedia Authoring and Production, 226, 227, 270
COMP5416 Advanced Network Technologies, 156, 159, 211, 226, 227, 228, 270
COMP5424 Information Technology in Biomedicine, 157, 159, 226, 230, 270
COMP5425 Multimedia Storage, Retrieval & Delivery, 157, 159, 226, 227, 228, 270
COMP5426 Parallel and Distributed Computing, 157, 159, 211, 219, 226, 227, 270
COMP5456 Computational Methods for Life Sciences, 226, 228, 230, 270
COMP5615 Software Engineering Project, 218, 271
COMP5702 IT Research Project A, 227, 231, 271
COMP5703 Information Technology Project, 226, 227, 228, 229, 230, 271
COMP5704 IT Research Project B, 227, 231, 271
COMP5705 Information Technology Short Project, 226, 231, 271
COMP5706 IT Industry Placement Project, 226, 231, 271

D
DAAE2001 20th Century Australian Architecture, 85
DAAE2002 Architecture, Place and Society, 85
DESC9014 Building Construction Technology, 86
DESC9047 Strategic Facility Management, 86
DESC9151 Introduction to Building Services, 86
DESP1001 Introductory Urban Design and Planning, 86

E
ECON1001 Introductory Microeconomics, 85
ELEC1103 Fundamentals of Elec and Electronic Eng, 40, 63, 67, 91, 93, 95, 97, 101, 129, 147, 149, 151, 153, 155, 157
ELEC1601 Foundations of Computer Systems, 91, 93, 95, 97, 99, 101, 129, 147, 149, 151, 153, 155, 157
ELEC2103 Simulation & Numerical Solutions in Eng, 91, 93, 95, 97, 100, 101, 129
ELEC2104 Electronic Devices and Circuits, 63, 67, 91, 93, 95, 97, 100, 101, 130
ELEC2302 Signals and Systems, 91, 93, 95, 97, 100, 101, 130, 264
ELEC2602 Digital System Design, 92, 93, 94, 95, 96, 97, 100, 101, 102, 130, 132, 148, 150, 152, 154, 156, 158, 211, 214, 219, 226, 227, 262
ELEC3104 Engineering Electromagnetics, 94, 96, 102, 130
ELEC3203 Electricity Networks, 96, 98, 130
ELEC3204 Power Electronics and Applications, 64, 68, 98, 130
ELEC3206 Electrical Energy Conversion Systems, 96, 98, 130
ELEC3304 Control, 92, 94, 96, 98, 102, 131
ELEC3305 Digital Signal Processing, 92, 94, 96, 102, 131
ELEC3404 Electronic Circuit Design, 63, 68, 92, 94, 96, 102, 131
ELEC3405 Communications Electronics and Photonics, 102, 131, 210, 214, 226, 229, 261
ELEC3505 Communications, 96, 102, 131, 133, 157, 159, 209, 210, 214, 215, 217, 218, 226, 227, 229, 261, 267
ELEC3506 Data Communications and the Internet, 94, 102, 132, 148, 150, 152, 154, 156, 157, 158, 159, 209, 210, 214, 215, 218, 226, 227, 229, 261
ELEC3607 Embedded Computing, 157, 159, 209, 211, 215, 216, 219, 226, 229, 262
ELEC3608 Computer Architecture, 94, 132
ELEC3609 Internet Software Platforms, 86, 100, 132, 148, 150, 152, 154, 156, 158
ELEC3610 E-Business Analysis and Design, 86, 132, 148, 149, 152, 153, 156, 158
ELEC3702 Management for Engineers, 94, 96, 102, 132
ELEC3802 Fundamentals of Biomedical Engineering, 56, 92, 132
ELEC3803 Bioelectronics, 92, 133
ELEC3901 Electrical Exchange Unit 1A, 133
ELEC3902 Electrical Exchange Unit 1B, 133
ELEC3903 Electrical Exchange Unit 1C, 133
ELEC3904 Electrical Exchange Unit 2A, 133
ELEC3905 Electrical Exchange Unit 2B, 133
ELEC3906 Electrical Exchange Unit 2C, 133
ELEC4505 Digital Communication Systems, 102, 133, 209, 210, 214, 218, 226, 229, 261
ELEC4702 Practical Experience, 92, 94, 96, 98, 100, 102, 134
ELEC4706 Project Management, 134
ELEC4710 Engineering Project A, 92, 94, 96, 98, 100, 102, 134
ELEC4711 Engineering Project B, 92, 94, 96, 98, 100, 102, 134
ELEC4712 Honours Thesis A, 92, 94, 96, 98, 100, 102, 134
ELEC4713 Honours Thesis B, 92, 94, 96, 98, 100, 102, 134
ELEC5101 Antennas and Propagation, 209, 210, 214, 217, 259
ELEC5203 Topics in Power Engineering, 210, 214, 216, 259
ELEC5204 Power Systems Analysis and Protection, 98, 210, 214, 217, 259
ELEC5205 High Voltage Engineering, 98, 210, 214, 217, 259
ELEC5206 Sustainable Energy Systems, 210, 214, 217, 260
ELEC5303 Computer Control System Design, 210, 214, 217, 226, 229, 260
ELEC5402 Digital Integrated Circuit Design, 210, 214, 226, 229, 260
ELEC5403 Radio Frequency Engineering, 209, 210, 214, 218, 260
ELEC5507 Error Control Coding, 209, 210, 214, 218, 226, 229, 260
ELEC5508 Wireless Engineering, 157, 159, 209, 210, 214, 216, 218, 226, 229, 261
ELEC5509 Mobile Networks, 157, 159, 209, 210, 214, 215, 218, 226, 227, 229, 261
ELEC5510 Satellite Communication Systems, 209, 210, 214, 218, 226, 229, 261
ELEC5511 Optical Communication Systems, 210, 214, 226, 229, 261
ELEC5512 Optical Networks, 209, 211, 214, 215, 226, 229, 261
ELEC5514 Networked Embedded Systems, 157, 159, 209, 211, 214, 216, 261
ELEC5515 Gigabits Wireless Systems, 209, 211, 214, 216, 218, 262
ELEC5613 Image Processing and Computer Vision, 211, 214, 219, 226, 227, 262
ELEC5614 Real Time Computing, 157, 159, 209, 211, 215, 216, 219, 226, 229, 262
ELEC5615 Advanced Computer Architecture, 211, 215, 219, 226, 229, 262
ELEC5616 Computer and Network Security, 157, 159, 210, 211, 215, 216, 217, 219, 226, 228, 229, 262
ELEC5618 Software Quality Engineering, 100, 157, 159, 211, 218, 263
ELEC5619 Object Oriented Application Frameworks, 100, 157, 159, 211, 218, 226, 228, 263
ELEC5620 Model Based Software Engineering, 157, 159, 211, 218, 263
ELEC5621 Digital Systems Design, 211, 263
ELEC5701 Technology Venture Creation, 211, 263
ELEC5720 Foundations Electronic Devs and Circuits, 264
ELEC5721 Foundations of Signals and Systems, 264
ELEC5723 Found: Simulations & Numerical Solutions, 264
ELEC5730 Foundations of Electromagnetics, 213, 264
ELEC5731 Foundations of Circuit Theory and Design, 264
ELEC5732 Foundations of Electricity Networks, 213, 216, 264
ELEC5733 Foundations of Power Electronics & Apps, 216, 264
ELEC5734 Foundations Elec Energy & Conversion Sys, 213, 216, 265
ELEC5735 Foundations of Control, 213, 216, 265
ELEC5736 Foundations of Digital Signal Processing, 213, 215, 217, 265
ELEC5737 Foundations of Electronic Circuit Design, 213, 265
ELEC5738 Foundations Comm Electronics & Photonics, 266
ELEC5739 Foundations of Communications, 213, 215, 217, 266
ELEC5740 Foundations of Data Comm & the Internet, 215, 217, 266
ELEC5742 Foundations: Internet Software Platforms, 218, 266
ELEC5743 Foundations of E-Business Anal & Design, 266
ELEC5745 Foundations of Computer Architecture, 267
ELEC8900 Project, 267
ELEC8901 Project Part A, 267
ELEC8902 Project Part B, 267
ENGG1061 Advanced Engineering IA, 141, 145
ENGG1000 Engineering Disciplines (Intro) Stream A, 39, 71, 75, 79, 83, 85, 141, 145
ENGG1001 Engineering Computing, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 85, 142, 145
ENGG1002 Engineering Mechanics, 39, 43, 47, 51, 55, 59, 63, 67, 75, 76, 79, 80, 83, 84, 85, 86, 124, 125, 126, 142, 145
ENGG1003 Professional Engineering I, 39, 43, 47, 51, 55, 59, 71, 75, 79, 83, 142, 146, 192, 193, 194, 195, 237
ENGG1005 Professional Engineering and IT, 39, 91, 93, 95, 97, 99, 101, 142, 146, 147, 148, 151, 152, 155, 157
ENGG2004 Engineering Studies B, 142
ENGG2005 Engineering Studies C, 142
ENGG2006 Engineering Studies A, 142
ENGG2006E Project Engineering: Business Plan 2 Adv, 142, 145
ENGG3005 Engineering & Industrial Management Fund, 142, 146
ENGG3062 Technology Education (Advanced), 143, 145
ENGG4000 Practical Experience, 44, 48, 52, 56, 60, 64, 68, 76, 80, 84, 109, 146
ENGG4061 Innovation/Technology Commercialisation, 143
ENGG4064 Advanced Engineering Design A, 143, 145
ENGG4065 Advanced Engineering Design B, 143, 145
ENGG5001 Professional Development, 272
ENGG5011 Foundation Engineering Studies A, 272
ENGG5012 Foundation Engineering Studies B, 272
ENGG5013 Foundation Engineering Studies C, 272
ENGG5014 Foundation Engineering Studies D, 273
ENGG5023 Quality Engineering and Management, 214, 215, 216, 217, 222, 223, 273
ENGG5024 Engineering Professional Practice, 200, 203, 205, 206, 207, 213, 215, 216, 217, 273
ENGG5025 Professional Practice in PM, 200, 203, 205, 206, 207, 214, 215, 216, 217, 222, 224, 273
ENGG5020 Research Methods in Engineering (Intro), 273
ENGG5021 Management of Technology, 200, 214, 215, 216, 217, 218, 273
ENGG50216 Management of Engineering Innovation, 200, 214, 215, 216, 217, 218, 274
ENGG50218 Research Dissertation, 274
ENGG50219 Research Project, 274
ENGG50220 Engineering Project A, 274
ENGG50221 Engineering Project B, 274
ENGG50222 Dissertation A, 200, 275
ENGG5223 Dissertation B, 200, 275
ENGG5601 Greenhouse Gas Mitigation, 205
ENGG5701 Doctoral Thesis A, 275
ENGG5702 Thesis and Doctoral Seminar 1B, 275
ENGG5703 Doctoral Thesis 2A, 275
ENGG5704 Thesis and Doctoral Seminar 2B, 275
ENGG5705 Thesis and Doctoral Seminar 3A, 275
ENGG5706 Thesis and Oral Defence, 275

G
GEOL1501 Engineering Geology 1, 75, 76, 83

H
HIMT5058 Health Informatics Applications, 226, 230
HIMT5060 Integration for Health Informatics, 226, 230
HIMT5069 Health Care Systems, 226, 230

I
INFO1003 Foundations of Information Technology, 83, 136, 147, 148, 151, 152, 155, 157
INFO1013 Introduction to Programming, 40, 85, 91, 93, 95, 97, 99, 101, 136, 147, 149, 151, 152, 155, 157
INFO1015 Data Structures, 85, 91, 93, 95, 97, 99, 101, 136, 147, 149, 151, 152, 155, 157
INFO1551 Information Technology Exchange, 137
INFO1903 Informatics (Advanced), 137, 147, 149, 151, 153, 155, 157
INFO1905 Data Structures (Advanced), 137
INFO1911 IT Special Project 1A, 137, 145
INFO1912 IT Special Project 1B, 137, 145
INFO2110 Systems Analysis and Modelling, 86, 99, 137, 147, 149, 151, 155, 157
INFO2120 Database Systems 1, 86, 99, 137, 148, 149, 155, 157
INFO2315 Introduction to IT Security, 99, 137, 147, 149, 151, 153, 155, 157
INFO2551 Information Technology Exchange, 137
INFO2555 Information Technology Exchange, 138
INFO2820 Database Systems 1 (Advanced), 138, 151, 153
INFO2911 IT Special Project 2A, 138, 145
INFO2912 IT Special Project 2B, 138, 145
INFO3220 Object Oriented Design, 100, 138, 148, 150, 152, 154, 156, 159
INFO3315 Human-Computer Interaction, 100, 138, 148, 149, 152, 153, 156, 158, 159
INFO3401 Management of IT Projects and Systems, 100, 138, 148, 149, 151, 153, 156, 158
INFO3402 Management of IT Projects and Systems, 100, 138, 148, 149, 151, 153, 156, 158
INFO3404 Database Systems 2, 138, 148, 149, 152, 153, 156, 158
INFO3554 Database Systems 2 (Adv), 138, 148, 149, 152, 153, 156, 158
INFO3557 Information Technology Exchange, 139
INFO3559 Information Technology Exchange, 139
INFO3555 Information Technology Exchange, 139
INFO3556 Information Technology Exchange, 140
INFO3557 Information Technology Exchange, 140
INFO3559 Information Technology Exchange, 140
INFO3560 Major Development Project (Advanced), 139, 152, 153, 156, 158
INFO3911 IT Special Project 3A, 139, 145
INFO3912 IT Special Project 3B, 139, 145
INFO4991 IT Research Thesis A, 141, 150, 154, 160
INFO4992 IT Research Thesis B, 141, 150, 154, 160
INFO4999 Computer Science Honours Result, 141, 150, 154, 160
INFO5001 System Analysis and Modelling, 225, 228, 229, 271
INFO5010 IT Advanced Topic A, 226, 271
INFO5011 IT Advanced Topic B, 226, 271
INFO5301 Information Security Management, 227, 229, 230, 271
INFO5990 Professional Practice in IT, 218, 227, 230, 271
INFO5991 Services Science Management and Eng, 157, 159, 227, 229, 230, 272
INFO5992 Understanding IT Innovations, 157, 159, 230, 272
INFO5993 IT Research Methods, 150, 154, 160, 227, 231, 272
INF6007 Project Management in IT, 218, 227, 230, 272
INF6012 Business Process Integration, 227, 229, 231
INF6013 Information Risk, Governance & Assurance, 231
INF6016 Technology Enabled Business Innovation, 231
INF6017 Strategic Information & Knowledge Mgmt, 227, 229, 231
INF6018 Managing Business Intelligence, 231
ISYS1551 Information Systems Exchange, 139
ISYS1552 Information Systems Exchange, 139
ISYS2140 Information Systems, 139, 147, 149, 151, 153, 155, 158
ISYS2554 Information Systems Exchange, 139
ISYS2555 Information Systems Exchange, 139
ISYS2556 Information Systems Exchange, 140
ISYS2557 Information Systems Exchange, 140
ISYS3400 Information Systems Project, 140, 148, 149
ISYS3401 Analytical Methods & Information Systems, 140, 148, 149, 152, 153, 156, 158
ISYS3554 Information Systems Exchange, 140
ISYS3555 Information Systems Exchange, 140
ISYS3556 Information Systems Exchange, 140
ISYS3557 Information Systems Exchange, 140
ISYS4301 Information Systems Honours A, 141
ISYS4302 Information Systems Honours B, 141
ISYS4303 Information Systems Honours C, 141
ISYS4304 Information Systems Honours D, 141
ISYS5050 Knowledge Management Systems, 157, 159, 230, 272

L
LAW1006 Foundations of Law, 23, 33

M
MATH1001 Differential Calculus, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 85, 86, 91, 93, 95, 97, 99, 100, 101, 125, 130, 199, 247, 264
MATH1002 Linear Algebra, 39, 40, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 85, 91, 93, 95, 97, 99, 100, 101, 130, 199, 247, 264
MATH1003 Integral Calculus and Modelling, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 85, 91, 93, 95, 97, 99, 100, 101, 130, 199, 247, 264
MATH2061 Linear Mathematics and Vector Calculus, 43, 51, 63, 75, 79, 83, 92, 93, 95, 97, 99, 100, 101
MATH2065 Partial Differential Equations (Intro), 43, 51, 63, 76
MATH2067 DEs and Vector Calculus for Engineers, 47, 55, 59, 67
MATH2069 Discrete Mathematics and Graph Theory, 99
MECH1400 Mechanical Construction, 51, 59, 112
MECH1560 Introduction to Mechanical Engineering, 51, 59, 112
Index by alpha code
Index by name

Numeric
20th Century Australian Architecture DAAE2001, 85

A
Advanced Aerodynamics AERO5200, 191, 193, 194, 233
Advanced Aircraft Design AERO4491, 45, 107
Advanced Aircraft Design Analysis AERO5400, 191, 193, 194, 234
Advanced Combustion MECH5265, 191, 195, 240
Advanced Computational Fluid Dynamics AMME5202, 191, 192, 193, 194, 202, 205, 236
Advanced Computer Architecture ELEC5615, 211, 215, 219, 226, 229, 262
Advanced Data Models COMP5338, 156, 159, 219, 225, 228, 269
Advanced Design and Analysis MECH5416, 192, 195, 196, 241
Advanced Engineering 1A ENGG1061, 141, 145
Advanced Engineering Design A ENGG4064, 143, 145
Advanced Engineering Design B ENGG4065, 143, 145
Advanced Engineering Materials MECH4310, 53, 61, 115
Advanced Engineering Materials MECH5310, 191, 192, 193, 194, 195, 240
Advanced Flight Mechanics AERO4591, 45, 49, 107
Advanced Knowledge in Project Management PMGT6869, 222, 224, 258
Advanced Network Technologies COMP5416, 156, 159, 211, 226, 227, 228, 270
Advanced Renewable Energy MECH5275, 191, 195, 240
Advanced Water Resources Management CIVL5665, 77, 197, 200, 202, 204, 205, 207, 208, 253
Aerodynamics 1 AERO2360, 44, 47, 104
Aerodynamics 2 AERO4260, 44, 48, 106
Aerospace Design 1 AERO3460, 44, 47, 105
Aerospace Design 2 AERO4460, 44, 106
Aerospace Management AERO3660, 44, 48, 105
Aerospace Structures 1 AERO3360, 43, 47, 105
Aerospace Structures 2 AERO4360, 44, 48, 106
Aerospace Technology 1 AERO2703, 43, 104
Aerospace Technology 2 AERO3465, 44, 105
Air Conditioning and Refrigeration (Adv) MECH5255, 191, 195, 239
Air Conditioning and Refrigeration MECH4255, 53, 61, 114
Algorithms and Complexity (Advanced) COMP2907, 135, 149, 151, 153, 158
Algorithms and Complexity COMP2007, 99, 134, 147, 149, 155, 158
Algorithms COMP5211, 225, 228, 231, 269
Analysis, Modelling, Control: BioPhy Sys CHNG5603, 74, 197, 200, 244
Analysis and Design of Pile Foundations CIVL5450, 201, 204, 205, 206, 208, 250
Analytical Methods & Information Systems ISYS3401, 140, 148, 149, 152, 153, 156, 158
Anatomy and Physiology for Engineers AMME5901, 238
Anatomy and Physiology for Engineers MECH2901, 55, 92, 112
Antennas and Propagation ELECS101, 209, 210, 214, 217, 259
Applied Biomedical Engineering AMME4981, 57, 111
Applied Finite Element Analysis AERO5301, 191, 193, 194, 196, 233
Applied Fluid Engineering Computing CIVL5669, 202, 204, 205, 208, 254
Applied Maths for Chemical Engineers CHNG2802, 71, 118
Applied Tissue Engineering AMME5971, 191, 192, 238
Architectural Communications 1 BDES1012, 83
Architectural Communications 2 BDES2012, 84
Architectural Communications 3 BDES3012, 84
Architectural History/Theory 1 BDES1011, 83
Architectural History/Theory 2 BDES2021, 84
Architectural Professional Practice BDES3025, 84
Architectural Technologies 1 BDES1023, 83
Architectural Technologies 2 BDES2013, 84
Architectural Technologies 3 BDES3023, 84
Architecture, Place and Society DAAE2002, 85
Architecture Studio 101 BDES1010, 83
Architecture Studio 102 BDES1020, 83
Architecture Studio 201 BDES2010, 83
Architecture Studio 202 BDES2020, 84
Architecture Studio 301 BDES3010, 84
Architecture Studio 302 BDES3020, 84
Art Workshop 1 BDES1024, 83

B
Bio-Products: Laboratory to Marketplace CHNG5605, 74, 197, 200, 245
Biochemical Engineering CHNG3804, 73, 120
Bioelectronics ELEC3803, 92, 133
Biomaterials Engineering AMME5961, 191, 192, 195, 238
Biomechanics and Biomaterials MECH4961, 53, 56, 61, 116
Biomedical Design and Technology MECH3921, 56, 114
Biomedical Engineering Tech 1 AMME5990, 191, 192, 239
Biomedical Engineering Tech 2 AMME5921, 191, 192, 238
Biomedical Product Development AMME4990, 57, 92, 111
Building Construction Technology DESC9014, 86
Business Process Integration INF56012, 227, 229, 231

C
Cellular Biophysics CHNG5602, 74, 197, 200, 244
Chemical & Biological Systems Behaviour CHNG2804, 72, 118
Chemical & Biomolecular Engineering Adv CHNG5008, 200, 243
Chemical/Biological Process Design CHNG3803, 72, 119
Index by name

Chemical Engineering Advanced Concepts CHNG4008, 121
Chemical Engineering Design A CHNG4802, 72, 122
Chemical Engineering Design B CHNG4806, 73, 122
Chemistry 1A CHEM1101, 39, 55, 71, 91, 93, 95, 97, 99, 101, 195, 247
Chemistry 1B CHEM1102, 71, 199, 247
Chemistry of Biological Molecules CHEM2403, 71
Civil Engineering Design CIVL4903, 76, 81, 84, 129
Civil Engineering Project 1 CIVL5901, 254
Civil Engineering Project 2 CIVL5902, 255
Civil Exchange A CIVL0011, 123
Civil Exchange B CIVL0012, 123
Civil Exchange C CIVL0013, 123
Civil Exchange D CIVL0014, 123
Civil Exchange E CIVL0015, 123
Civil Exchange F CIVL0016, 124
Civil Exchange G CIVL0017, 124
Civil Exchange H CIVL0018, 124
Combustion MECH4265, 53, 61, 114
Communications ELEC3505, 96, 102, 131, 133, 157, 159, 209, 210, 214, 215, 217, 218, 226, 227, 229, 261, 267
Communications Electronics and Photonics ELEC3405, 102, 131, 210, 214, 226, 229, 261
Complex Project Leadership PMGT5898, 258
Composite Steel-Concrete Structures CIVL5264, 201, 204, 205, 206, 207, 248
Computational Biomedical Engineering AMME5981, 191, 192, 239
Computational Fluid Dynamics AMME4210, 45, 49, 53, 57, 61, 110
Computational Geometry COMP5045, 156, 159, 225, 228, 267
Computational Methods for Life Sciences COMP3456, 135, 148, 150, 152, 153, 156, 158
Computational Methods for Life Sciences COMP4546, 226, 228, 230, 270
Computational Nanotechnology AMME5271, 191, 195, 236
Computer and Network Organisation COMP5213, 231, 269
Computer and Network Security ELEC5616, 157, 159, 210, 211, 215, 216, 217, 218, 226, 228, 229, 262
Computer Applications in PM PMGT5887, 221, 223, 256
Computer Architecture ELEC3608, 94, 132
Computer Control System Design ELEC5303, 210, 214, 217, 226, 229, 260
Computer Methods in Geotechnical Eng CIVL5451, 201, 204, 205, 206, 208, 250
Computer Science Exchange COMP2555, 135
Computer Science Exchange COMP2556, 135
Computer Science Exchange COMP2557, 135
Computer Science Exchange COMP2558, 135
Computer Science Exchange COMP3556, 136
Computer Science Exchange COMP3557, 136
Computer Science Exchange COMP3558, 136
Computer Science Exchange COMP3559, 136
Computer Science Exchange COMP4551, 140
Computer Science Exchange COMP4552, 140
Computer Science Exchange COMP4553, 141
Computer Science Exchange COMP4554, 141
Computer Science Honours A COMP4011, 140
Computer Science Honours B COMP4012, 140
Computer Science Honours C COMP4013, 140
Computer Science Honours D COMP4014, 140
Computer Science Honours Result INFO4999, 141, 150, 154, 160
Computers in Real-Time Control and Inst MECH4730, 65, 69, 115
Computers in Real Time Control and Inst MECH5701, 192, 196, 241
Computer Vision and Image Processing AMME4710, 65, 69, 111
Concepts in Biology BIOL1001, 91, 93, 95, 97, 99, 101
Concrete Structures - Strength & Service CIVL5269, 77, 81, 201, 203, 207, 249
Concrete Structures 1 CIVL3205, 75, 76, 80, 81, 84, 125, 129
Concrete Structures: Prestressed CIVL5257, 201, 204, 205, 206, 207, 248
Conservation and Transport Processes CHNG2801, 71, 117
Contracts Formulation and Management CIVL3813, 77, 79, 127
Contracts Management PMGT5895, 257
Control ELEC3304, 92, 94, 96, 98, 102, 131
Crash Analysis using LS-DYNA AMME5912, 191, 196, 238

D
Database Systems 1 (Advanced) INFO2820, 138, 151, 153
Database Systems 1 INFO2120, 86, 99, 137, 138, 147, 149, 155, 158
Database Systems 2 (Adv) INFO3504, 138, 148, 149, 152, 153, 156, 158
Data Communications and the Internet ELEC3506, 94, 102, 132, 148, 150, 152, 154, 156, 157, 158, 159, 209, 210, 214, 215, 218, 226, 227, 229, 261
Data Structures (Advanced) INFO1905, 137
Data Structures INFO1105, 85, 91, 93, 95, 97, 99, 101, 136, 147, 149, 151, 152, 155, 157
DEs and Vector Calculus for Engineers MATH2067, 47, 55, 59, 67
Differential Calculus MATH1001, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 83, 85, 86, 91, 93, 95, 97, 99, 100, 101, 125, 130, 199, 247, 264
Digital Communication Systems ELEC4505, 102, 133, 209, 210, 214, 218, 226, 229, 261
Digital Integrated Circuit Design ELEC5402, 210, 214, 226, 229, 260
Digital Media Fundamentals COMP5114, 225, 227, 231, 268
Digital Signal Processing ELEC3305, 92, 94, 96, 102, 131
Digital System Design ELEC2602, 92, 93, 94, 95, 96, 97, 100, 101, 102, 130, 132, 148, 150, 152, 154, 156, 158, 211, 214, 219, 226, 227, 262
Digital Systems Design ELEC5621, 211, 263
Disaster Project Management PMGT5897, 258
Discrete Mathematics and Graph Theory MATH2069, 99
Dissertation A ENGS5222, 200, 275
Dissertation B ENGS5223, 200, 275
Distributed Systems & Network Principles COMP2121, 135
Distributed Systems: Knowledge Management COMP2123, 135
Doctoral Thesis 1A ENGS5701, 275
Doctoral Thesis 2A ENGS5703, 275
Dynamics 1 AMME1550, 43, 47, 51, 55, 59, 63, 67, 108

E
E-Business Analysis and Design ELEC3610, 86, 132, 148, 149, 152, 153, 156, 158
e-Commerce Technology COMP347, 225, 228, 270
Electrical Energy Conversion Systems ELEC3206, 96, 98, 130
Electrical Exchange Unit 1A ELEC3901, 133
Electrical Exchange Unit 1B ELEC3902, 133
Electrical Exchange Unit 1C ELEC3903, 133
Electrical Exchange Unit 2A ELEC3904, 133
Electrical Exchange Unit 2B ELEC3905, 133
Electrical Exchange Unit 2C ELEC3906, 133
Electricity Networks ELEC3203, 96, 98, 130
Electronic Circuit Design ELEC3404, 63, 68, 92, 94, 96, 102, 131
Electronic Devices and Circuits ELEC2104, 63, 67, 91, 93, 95, 97, 100, 101, 130
Embedded Computing ELEC3607, 157, 159, 209, 211, 215, 216, 219, 226, 229, 262
Energy and Fluid Systems Practice CHNG2803, 72, 118
Energy and the Environment MECH4241, 53, 61, 114
Engineering & Industrial Management Fund ENGG3005, 142, 146
Engineering and Society CIVL3010, 75, 79, 125
Engineering Behaviour of Soils CIVL5455, 202, 204, 205, 206, 208, 250
Engineering Computing ENGG1801, 39, 43, 47, 51, 55, 59, 63, 67, 71, 75, 79, 85, 142, 145
Engineering Construction and Surveying CIVL2810, 75, 79, 84, 125
Engineering Design and Construction CIVL4811, 75, 80, 84, 128
Engineering Disciplines (Intro) Stream A ENGG1800, 39, 71, 75, 79, 83, 85, 141, 145
Engineering Dynamics AMME2500, 43, 47, 51, 55, 59, 63, 67, 108
Engineering Electromagnetics ELEC3104, 94, 96, 102, 130
Engineering Geology 1 GEOL1501, 75, 76, 83
Engineering Management MECH3661, 52, 56, 60, 64, 68, 114, 193, 194, 195, 237
Engineering Mechanics ENGG1802, 39, 43, 47, 51, 55, 59, 63, 67, 75, 76, 79, 80, 83, 84, 85, 86, 124, 125, 126, 142, 145
Engineering Professional Practice ENGG5204, 200, 203, 205, 206, 207, 213, 215, 216, 217, 273
Engineering Project: Business Plan 2 Adv ENGG2062, 142, 145
Engineering Project A AMME4121, 44, 48, 52, 56, 60, 64, 68, 110
Engineering Project A CHNG4813, 73, 123
Engineering Project A CIVL4024, 76, 80, 84, 127, 128
Engineering Project A ELEC4710, 92, 94, 96, 98, 100, 102, 134
Engineering Project A ENGG5220, 274
Engineering Project B AMME4122, 44, 48, 52, 56, 60, 64, 68, 110
Engineering Project B CHNG4814, 73, 123
Engineering Project B CIVL4025, 76, 80, 84, 127
Engineering Project B ELEC4711, 92, 94, 96, 98, 100, 102, 134
Engineering Project B ENGG5221, 274
Engineering Studies A ENGG2008, 142
Engineering Studies B ENGG2004, 142
Engineering Studies C ENGG2005, 142
Enterprise Scale Software Architecture COMP348, 100, 156, 159, 218, 226, 228, 229, 270
Error Control Coding ELEC5507, 209, 210, 214, 218, 226, 229, 260
Exchange Program 3A CHNG3041, 119
Exchange Program 3B CHNG3042, 119
Exchange Program 4A CHNG4041, 121
Exchange Program 4B CHNG4042, 121
Experimental Robotics MTRX4700, 65, 69, 117
Experimental Robotics MTRX5700, 192, 196, 242
Extended and Enhanced Project CHNG5907, 248
Extended Project CHNG5906, 248
F
Financial Accounting Concepts ACCT1003, 79
Flight Mechanics 1 AERO3560, 44, 48, 105
Flight Mechanics 2 AERO4560, 44, 48, 107
Flight Mechanics Test and Evaluation Adv AERO5500, 191, 193, 194, 234
Flow-Induced Vibrations CIVL4614, 80
Fluid Mechanics: Inviscid Flow CIVL2611, 80
Fluid Mechanics CIVL3612, 75, 80, 84, 126
Fluid Mechanics MECH3261, 51, 55, 59, 112
Forensic and Environmental Chemistry CHEM2404, 71
Found: Chem & Biological Syst Behaviour CHNG5704, 199, 245
Found: Industrial Syst & Sustainability CHNG5705, 246
Found: Operation & Improving Ind Systems CHNG5802, 199, 246
Found: Simulations & Numerical Solutions ELEC5723, 264
Foundation Engineering CIVL5452, 77, 201, 203, 206, 250
Foundation Engineering Studies A ENGG5011, 272
Foundation Engineering Studies B ENGG5012, 272
Foundation Engineering Studies C ENGG5013, 272
Foundation Engineering Studies D ENGG5014, 273
Foundation of Eng Design & Construction CIVL5512, 203, 204, 206, 207, 253
Foundation of Prod Formulation & Design CHNG5805, 199, 247
Foundations-Eng Construction & Surveying CIVL5512, 203, 204, 206, 207, 253
Foundations: Internet Software Platforms CIVL5506, 251
Foundations: System Dynamics and Control ELEC5742, 218, 266
Foundations: System Dynamics and Control AMME5501, 193, 194, 195, 237
Foundations Comm Electronics & Photonics ELEC5738, 266
Foundations Elec Energy & Conversion Sys ELEC5734, 213, 216, 265
Foundations Electronic Devs and Circuits ELEC5720, 264
Foundations of Aerodynamics AERO5210, 193, 194, 233
Foundations of Aerospace Design AERO5410, 193, 194, 234
Foundations of Aerospace Structures AERO5310, 193, 194, 234
Foundations of Circuit Theory and Design ELEC5731, 264
Foundations of Civil Engineering Design CIVL5510, 203, 205, 206, 207, 252
Foundations of Communications ELEC5739, 213, 215, 217, 266
Foundations of Computer Architecture ELEC5745, 267
<table>
<thead>
<tr>
<th>Course Name</th>
<th>Code</th>
<th>Pages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundations of Computer Systems</td>
<td>ELEC1601</td>
<td>91, 93, 95, 97, 99, 101, 129, 147, 149, 151, 153, 155, 157</td>
</tr>
<tr>
<td>Foundations of Concrete Structures</td>
<td>CIVL5507</td>
<td>203, 204, 206, 207, 252</td>
</tr>
<tr>
<td>Foundations of Control</td>
<td>ELEC5735</td>
<td>213, 216, 265</td>
</tr>
<tr>
<td>Foundations of Data Comm &amp; the Internet</td>
<td>ELEC5740</td>
<td>215, 217, 266</td>
</tr>
<tr>
<td>Foundations of Data Structures</td>
<td>COM5105</td>
<td>268</td>
</tr>
<tr>
<td>Foundations of Digital Comm Systems</td>
<td>ELEC5744</td>
<td>215, 217, 267</td>
</tr>
<tr>
<td>Foundations of Digital Signal Processing</td>
<td>ELEC5736</td>
<td>213, 215, 216, 265</td>
</tr>
<tr>
<td>Foundations of E-Business Anal &amp; Design</td>
<td>ELEC5743</td>
<td>266</td>
</tr>
<tr>
<td>Foundations of Electricity Networks</td>
<td>ELEC5732</td>
<td>213, 216, 264</td>
</tr>
<tr>
<td>Foundations of Electronic Circuit Design</td>
<td>ELEC5737</td>
<td>213, 265</td>
</tr>
<tr>
<td>Foundations of Eng Electromagnetics</td>
<td>ELEC5730</td>
<td>213, 264</td>
</tr>
<tr>
<td>Foundations of Engineering Dynamics</td>
<td>AMME5500</td>
<td>237</td>
</tr>
<tr>
<td>Foundations of Flight Mechanics</td>
<td>AERO5510</td>
<td>193, 194, 234</td>
</tr>
<tr>
<td>Foundations of Fluid Mechanics</td>
<td>CIVL5511</td>
<td>203, 204, 206, 207, 252</td>
</tr>
<tr>
<td>Foundations of Fluid Mechanics</td>
<td>MECH5261</td>
<td>194, 240</td>
</tr>
<tr>
<td>Foundations of Geotechnical Engineering</td>
<td>CIVL5514</td>
<td>204, 253</td>
</tr>
<tr>
<td>Foundations of Information Technology</td>
<td>INFO1003</td>
<td>83, 136, 147, 148, 151, 155, 157</td>
</tr>
<tr>
<td>Foundations of Intro. Fluid Mechanics</td>
<td>CIVL5505</td>
<td>204, 251</td>
</tr>
<tr>
<td>Foundations of Law</td>
<td>LAWS1006</td>
<td>23, 33</td>
</tr>
<tr>
<td>Foundations of Manufacturing Engineering</td>
<td>MECH5660</td>
<td>195, 241</td>
</tr>
<tr>
<td>Foundations of Materials</td>
<td>AMME5302</td>
<td>237</td>
</tr>
<tr>
<td>Foundations of Materials</td>
<td>CIVL5501</td>
<td>195, 241</td>
</tr>
<tr>
<td>Foundations of Mechanical Design</td>
<td>MECH5400</td>
<td>241</td>
</tr>
<tr>
<td>Foundations of Mechanics of Solids</td>
<td>AMME5301</td>
<td>237</td>
</tr>
<tr>
<td>Foundations of Mechanics of Solids</td>
<td>CIVL5561</td>
<td>194, 241</td>
</tr>
<tr>
<td>Foundations of Ocean and Coastal Eng</td>
<td>CIVL5515</td>
<td>253</td>
</tr>
<tr>
<td>Foundations of Power Electronics &amp; Apps</td>
<td>ELEC5733</td>
<td>216, 264</td>
</tr>
<tr>
<td>Foundations of Process Design</td>
<td>CHNG5801</td>
<td>199, 246</td>
</tr>
<tr>
<td>Foundations of Propulsion Systems</td>
<td>AEROS211</td>
<td>193, 194, 233</td>
</tr>
<tr>
<td>Foundations of Signals and Systems</td>
<td>ELEC5721</td>
<td>264</td>
</tr>
<tr>
<td>Foundations of Soil Mechanics</td>
<td>CIVL5504</td>
<td>251</td>
</tr>
<tr>
<td>Foundations of Steel Structures</td>
<td>CIVL5508</td>
<td>203, 205, 206, 207, 252</td>
</tr>
<tr>
<td>Foundations of Structural Concepts &amp; Design</td>
<td>CIVL5509</td>
<td>252</td>
</tr>
<tr>
<td>Foundations of Structural Analysis</td>
<td>CIVL5513</td>
<td>204, 253</td>
</tr>
<tr>
<td>Foundations of Structural Mechanics</td>
<td>CIVL5502</td>
<td>204, 251, 253</td>
</tr>
<tr>
<td>Foundations of Thermodynamic</td>
<td>MECH5262</td>
<td>195, 240</td>
</tr>
<tr>
<td>Foundations of Thermodynamics and Fluids</td>
<td>AMME5200</td>
<td>236</td>
</tr>
<tr>
<td>Found of Applied Maths for Chem Eng</td>
<td>CHNG5702</td>
<td>245</td>
</tr>
<tr>
<td>Found of Biochemical Eng</td>
<td>CHNG5804</td>
<td>199, 247</td>
</tr>
<tr>
<td>Found of Chem &amp; Biological Processes</td>
<td>CHNG5803</td>
<td>199, 247</td>
</tr>
<tr>
<td>Found of Chemical Eng Design</td>
<td>CHNG5112</td>
<td>200, 243</td>
</tr>
<tr>
<td>Found of Chemical Eng Design</td>
<td>CHNG5116</td>
<td>200, 244</td>
</tr>
<tr>
<td>Found of Conservation &amp; Transport Proc</td>
<td>CHNG5701</td>
<td>199, 245</td>
</tr>
<tr>
<td>Found of Energy and Fluid Systems</td>
<td>CHNG5703</td>
<td>199, 245</td>
</tr>
<tr>
<td>Found of Manag of Industrial Syst</td>
<td>CHNG5806</td>
<td>199, 247</td>
</tr>
<tr>
<td>Fundamentals of Biomedical Engineering</td>
<td>ELEC3802</td>
<td>56, 92, 132</td>
</tr>
<tr>
<td>Fundamentals of Elec and Electronic Eng</td>
<td>ELEC1103</td>
<td>40, 63, 67, 91, 93, 95, 97, 101, 129, 147, 149, 151, 153, 155, 157</td>
</tr>
<tr>
<td>Geotechnical Engineering</td>
<td>CIVL3411</td>
<td>76, 80, 126</td>
</tr>
<tr>
<td>Gigabits Wireless Systems</td>
<td>ELEC5515</td>
<td>209, 211, 214, 216, 218, 262</td>
</tr>
<tr>
<td>Global Project Management</td>
<td>PMGT5888</td>
<td>221, 223, 256</td>
</tr>
<tr>
<td>Graphics and Multimedia</td>
<td>COMP3419</td>
<td>135, 148, 150, 152, 153, 156, 158</td>
</tr>
<tr>
<td>Green Engineering</td>
<td>CHNG5003</td>
<td>74, 197, 200, 242</td>
</tr>
<tr>
<td>Greenhouse Gas Mitigation</td>
<td>ENGG5601</td>
<td>205</td>
</tr>
<tr>
<td>Health Care Systems</td>
<td>HIMT5069</td>
<td>226, 230</td>
</tr>
<tr>
<td>Health Informatics Applications</td>
<td>HIMT5058</td>
<td>226, 230</td>
</tr>
<tr>
<td>High Voltage Engineering</td>
<td>ELEC5205</td>
<td>98, 210, 214, 217, 259</td>
</tr>
<tr>
<td>Honours Thesis A</td>
<td>AMME4111</td>
<td>44, 48, 52, 56, 60, 64, 68, 109, 110</td>
</tr>
<tr>
<td>Honours Thesis A</td>
<td>CHNG4811</td>
<td>73, 122</td>
</tr>
<tr>
<td>Honours Thesis A</td>
<td>CIVL4022</td>
<td>76, 80, 84, 127</td>
</tr>
<tr>
<td>Honours Thesis A</td>
<td>ELEC4712</td>
<td>92, 94, 96, 98, 100, 102, 134</td>
</tr>
<tr>
<td>Honours Thesis B</td>
<td>AMME4112</td>
<td>44, 48, 52, 56, 60, 64, 68, 110</td>
</tr>
<tr>
<td>Honours Thesis B</td>
<td>CHNG4812</td>
<td>73, 122</td>
</tr>
<tr>
<td>Honours Thesis B</td>
<td>CIVL4023</td>
<td>76, 80, 84, 127</td>
</tr>
<tr>
<td>Honours Thesis B</td>
<td>ELEC4713</td>
<td>92, 94, 96, 98, 100, 102, 134</td>
</tr>
<tr>
<td>Human-Computer Interaction</td>
<td>INFO3315</td>
<td>100, 138, 148, 149, 152, 153, 156, 158, 159</td>
</tr>
<tr>
<td>Human Biology</td>
<td>BIOL1003</td>
<td>55, 91</td>
</tr>
<tr>
<td>Image Processing and Computer Vision</td>
<td>ELEC5613</td>
<td>211, 214, 219, 226, 227, 262</td>
</tr>
<tr>
<td>Industrial Systems and Sustainability</td>
<td>CHNG2805</td>
<td>72, 76, 80, 126</td>
</tr>
<tr>
<td>Informatics (Advanced)</td>
<td>INFO1903</td>
<td>137, 147, 149, 151, 153, 155, 157</td>
</tr>
<tr>
<td>Information Risk, Governance &amp; Assurance</td>
<td>INFS6013</td>
<td>231</td>
</tr>
<tr>
<td>Information Security Management</td>
<td>INFO5301</td>
<td>227, 229, 230, 271</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS1551</td>
<td>139</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS1552</td>
<td>139</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS2554</td>
<td>139</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS2555</td>
<td>139</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS2556</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS2557</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS3554</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS3555</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS3556</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS3557</td>
<td>140</td>
</tr>
<tr>
<td>Information Systems Exchange</td>
<td>ISYS4301</td>
<td>141</td>
</tr>
<tr>
<td>Information Systems Honours B</td>
<td>ISYS4302</td>
<td>141</td>
</tr>
<tr>
<td>Information Systems Honours C</td>
<td>ISYS4303</td>
<td>141</td>
</tr>
<tr>
<td>Information Systems Honours D</td>
<td>ISYS4304</td>
<td>141</td>
</tr>
</tbody>
</table>
Index by name

Mechanics of Solids 2 MECH361, 51, 55, 59, 113
Mechanics of Solids AMME2301, 43, 47, 51, 55, 59, 63, 67, 108
Mechatronics 1 MTRX1702, 63, 67, 116
Mechatronics 2 MTRX2700, 63, 67, 117
Mechatronics 3 MTRX3700, 63, 67, 117
Mechatronics Engineering Introductory MTRX1701, 63, 67, 116
Membrane Science CHNG5601, 74, 197, 200, 244
Membrane Science Laboratory CHNG5604, 74, 197, 244
Mgmt of People, Quality and Risk in PE CIVL4810, 77, 80, 128
Mobile Networks ELEC5609, 157, 159, 209, 210, 214, 215, 218, 226, 227, 229, 261
Model Based Software Engineering ELEC5620, 157, 159, 211, 218, 263
Multimedia Authoring and Production COMP5415, 226, 227, 270
Multimedia Storage, Retrieval & Delivery COMP5425, 157, 159, 226, 227, 228, 270
N
Networked Embedded Systems ELEC5514, 157, 159, 209, 211, 214, 216, 261
Numerical Methods in Civil Engineering CIVL5458, 77, 81, 201, 203, 206, 208, 251
Object-Oriented Design COMP5028, 216, 225, 228, 231, 237
Object Oriented Application Frameworks ELEC5619, 100, 157, 159, 211, 218, 226, 263
Object Oriented Design INFO3220, 100, 138, 148, 150, 152, 154, 156, 159
Ocean and Coastal Engineering CIVL3613, 76, 80, 126
Open Channel Flow & Hydraulic Structures CIVL5666, 202, 204, 205, 207, 208, 254
Operating/Improving Industrial Systems CHNG3802, 72, 119
Operating Systems and Machine Principles CHNG5800, 94, 96, 98, 99, 102, 135, 147, 149, 151, 153, 155, 158
Operating Systems Internals COMP5320, 94, 136, 148, 150, 152, 154, 156, 158
Optical Communication Systems ELEC5511, 210, 214, 226, 229, 261
Optical Networks ELEC5512, 209, 211, 214, 215, 226, 229, 261
Optimisation Methods in Engineering AERO5010, 193, 194, 195, 233
Orthopaedic and Surgical Engineering MECH4902, 57, 116
Parallel and Distributed Computing COMP5426, 157, 159, 211, 219, 226, 227, 270
Partial Differential Equations (Intro) MATH2065, 43, 51, 63, 76
Particles and Surfaces CHNG5004, 74, 197, 200, 243
People and Leadership PMGT5872, 222, 224, 255
Pervasive Computing COMP5047, 156, 159, 211, 218, 223, 227, 229, 268
Physics 1 (Regular) PHYS1001, 39, 75, 79, 83, 92, 94, 96, 98, 102
Physics 1 (Technological) PHYS1003, 91, 93, 95, 97, 101
Physics 2EE PHYS2213, 94, 96, 98, 100, 102
Polymer Engineering CHNG3808, 74, 121
Power Electronics and Applications ELEC3204, 64, 68, 98, 130
Power Plant Engineering AMME5101, 191, 195, 236
Power Systems Analysis and Protection ELEC5204, 98, 210, 214, 217, 259
Practical Experience AMME4100, 237
Practical Experience CHNG4001, 72, 121
Practical Experience ELEC4702, 92, 94, 96, 98, 100, 102, 134
Practical Experience ENGG4000, 44, 48, 52, 56, 60, 64, 68, 76, 80, 109, 146
Process Design CHNG3801, 72, 119
Process Systems Engineering CHNG5001, 74, 197, 200, 242
Product Formulation and Design CHNG3805, 72, 120
Product Life Cycle Design AMME5602, 191, 192, 196, 238
Products and Value Chains CHNG3807, 72, 120
Professional Development ENGG5001, 272
Professional Engineering 1 ENGG1803, 39, 43, 47, 51, 55, 59, 71, 75, 79, 83, 142, 146, 192, 193, 194, 195, 237
Professional Engineering 2 MECH4601, 52, 56, 60, 64, 68, 109, 115
Professional Engineering AMME5601, 192, 193, 194, 195, 237
Professional Engineering and IT ENGG1805, 39, 91, 93, 95, 97, 101, 142, 146, 147, 148, 151, 152, 155, 157
Professional Practice in IT INFO5990, 218, 227, 230, 271
Professional Practice in PM ENGG5205, 200, 203, 205, 206, 207, 214, 215, 216, 217, 222, 224, 273
Programming Languages and Paradigms COMP3109, 135, 148, 150, 152, 153, 156, 158
Project 1 in Manufacturing & Automation AMME5900, 238
Project A AMME3110, 109
Project Appraisal CIVL3812, 75, 77, 79, 80, 84, 126, 128
Project B AMME4110, 109
Project Economics and Finance PMGT5873, 221, 223, 255
Project ELEC8900, 267
Project Formulation CIVL4815, 77, 80, 128
Project Innovation Management PMGT5875, 86, 222, 224, 255
Project Management ELEC4706, 134
Project Management Industrial Project PMGT5892, 222, 224, 257
Project Management in IT INFO6007, 218, 227, 230, 272
Project Management Thesis PMGT5900, 258
Project Part A CHNG5901, 247
Project Part A ELEC8901, 267
Project Part B CHNG5902, 247
Project Part B ELEC8902, 267
Project Process Planning and Control PMGT5871, 221, 223, 231, 255
Project Procurement and Tendering CIVL4814, 77, 80, 128
Project Risk Management PMGT5891, 222, 223, 257
Project Scope, Time and Cost Management CIVL3805, 76, 77, 79, 80, 126, 128
Propulsion AERO3261, 44, 48, 104
Psychology 1002 PSYC1002, 85
Quantitative Methods: Project Management PMGT6867, 86, 221, 222, 223, 224, 227, 230, 231, 258
Index by name

R
Radio Frequency Engineering ELEC5403, 209, 210, 214, 218, 260
Real Time Computing ELEC5614, 157, 159, 209, 211, 215, 216, 219, 226, 229, 262
Regulatory Affairs in Medical Industry AMME4992, 57, 92, 112
Relational Database Management Systems COMPS138, 225, 228, 231, 268
Renewable Energy AMME4241, 53, 61, 110
Research Dissertation AMMES218, 236
Research Dissertation ENGG5218, 274
Research Methods in Engineering (Intro) ENGG5210, 273
Research Project ENGG5219, 274
Reservoir Stream & Coastal Eng CIVL5670, 202, 204, 205, 207, 208, 254
Rock Engineering CIVL5454, 201, 204, 205, 208, 250
Rotary Wing Aircraft AERO4206, 45, 106

S
Safety Systems Management AERO5660, 192, 193, 194, 195, 235
Satellite Communication Systems ELEC5510, 209, 210, 214, 218, 226, 229, 261
Sensors and Signals MECH4720, 65, 69, 115
Sensors and Signals MECH5720, 192, 196, 242
Services Science Management and Eng INFO5991, 157, 159, 227, 229, 230, 272
Signals and Systems ELEC2302, 91, 93, 95, 97, 100, 101, 130, 264
Simulation & Numerical Solutions in Eng ELEC2103, 91, 93, 95, 97, 100, 101, 129
Smart Materials MECH5305, 191, 193, 194, 195, 240
Software Construction COMPS5212, 231, 269
Software Development in Java COMPS5214, 225, 228, 231, 269
Software Development Project COMPS615, 100, 136, 148, 150
Software Engineering Project COMPS615, 218, 271
Software Quality Engineering ELEC5618, 100, 157, 159, 211, 218, 263
Soil Mechanics CIVL2410, 75, 76, 79, 80, 83, 86, 124, 126
Spacecraft and Satellite Design AERO5760, 191, 193, 194, 196, 235
Space Engineering 1 AERO2705, 47, 59, 67, 104
Space Engineering 2 AERO3760, 48, 60, 67, 106
Space Engineering 3 AERO4701, 48, 60, 68, 107
Space Engineering Project 1 AERO2711, 104, 106, 145
Space Engineering Project 2 AERO3711, 106, 107, 145
Space Engineering Project 3 AERO4711, 107, 145
Space Engineering Project 4 AERO4712, 107, 145
Statistical Methods in PM PMGT5893, 86, 221, 222, 223, 257
Statistical Natural Language Processing COMPS5046, 156, 159, 225, 227, 228, 230, 267
Steel Structures - Advanced Design CIVL5267, 201, 204, 205, 206, 207, 248
Steel Structures - Stability CIVL5266, 77, 81, 201, 203, 207, 248
Steel Structures 1 CIVL53206, 75, 76, 80, 81, 84, 125, 129
Strategic Delivery of Change PMGT5876, 86, 222, 224, 231, 255
Strategic Facility Management DESC9047, 86
Strategic Information & Knowledge Mgmt INF6017, 227, 229, 231
Strategic Portfolio & Program Management PMGT5879, 86, 222, 224, 256
Structural Analysis CIVL3235, 76, 80, 84, 126, 203, 205, 206, 207, 252
Structural Dynamics CIVL5268, 201, 203, 204, 205, 206, 207, 249
Structural Mechanics CIVL2201, 75, 76, 79, 80, 83, 84, 85, 86, 124, 125, 203, 205, 206, 207, 252
Sustainability & Intelligence in P.M. PMGT5896, 258
Sustainable Design, Eng and Mgt ENGG5202, 193, 194, 185, 196, 198, 199, 213, 215, 216, 217, 273
Sustainable Energy Systems ELEC5206, 210, 214, 217, 260
System Analysis and Modelling INFO5001, 225, 228, 229, 271
System Dynamics and Control AMME3500, 43, 48, 51, 56, 59, 63, 67, 109
System Dynamics Modelling for PM PMGT5886, 86, 221, 223, 256
Systems Analysis and Modelling INFO2110, 86, 99, 137, 147, 149, 151, 153, 155, 157
T
Technology Education (Advanced) ENGG3062, 143, 145
Technology Enabled Business Innovation INF6016, 231
Technology Venture Creation ELEC5701, 211, 263
Thermal Engineering MECH3260, 52, 60, 112
Thermodynamics and Fluids AMME2200, 43, 47, 51, 55, 59, 64, 68, 108
Thesis and Doctoral Seminar 1B ENGG5670, 275
Thesis and Doctoral Seminar 2B ENGG5670, 275
Thesis and Doctoral Seminar 3A ENGG5670, 275
Thesis and Oral Defence ENGG5706, 275
Tissue Engineering AMME4971, 57, 111
Topics in Power Engineering ELEC5203, 210, 214, 216, 259
U
Understanding IT Innovations INFO5992, 157, 159, 230, 272
W
Wastewater Eng - Systems and Practice CHNG5005, 74, 197, 198, 200, 202, 243
Water Resources and Hydrology CIVL4615, 77, 81
Wind Engineering for Design-Fundamentals CIVL5668, 77, 202, 204, 205, 207, 208, 254
Wireless Engineering ELEC5508, 157, 159, 209, 210, 214, 215, 218, 226, 229, 261
Index by name