Materials Science and Engineering (Honours) / Biomedical Engineering

3133

This dual degree program is specifically designed for undergraduate students wishing to pursue a career in either Engineering or Biomedical Engineering. Biomedical Engineering is the application of engineering principles to developing technologies and solving problems in a diverse range of health care related fields e.g. implantable bionics, drug delivery systems, medical imaging, radiotherapies, orthopedic devices, telemedicine, robotic surgery, cell and tissue engineering, records management, physical rehabilitation and others. This program is integrated to provide fundamental engineering skills with an undergraduate focus on Materials Science and Engineering and specialist postgraduate level training in Biomedical Engineering.

At the end of the program successful candidates will graduate with a Bachelor in Engineering (Honours) in Materials Science and Engineering and a Masters of Biomedical Engineering. Students are expected to perform at a credit average (65%) or better in their first three years to be permitted to continue with the Masters part of the program. Students who do not satisfy this requirement can revert to the 3131 Bachelor of Engineering (Honours) in Materials Science and Engineering program.
<table>
<thead>
<tr>
<th><strong>Faculty</strong></th>
<th>Faculty of Science</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Campus</strong></td>
<td>Kensington</td>
</tr>
<tr>
<td><strong>Study Level</strong></td>
<td>Undergraduate</td>
</tr>
<tr>
<td><strong>Typical duration</strong></td>
<td>5 Years</td>
</tr>
<tr>
<td><strong>Delivery Mode</strong></td>
<td>Face-to-face</td>
</tr>
<tr>
<td><strong>Intake Period</strong></td>
<td>Term 1</td>
</tr>
<tr>
<td><strong>Academic Calendar</strong></td>
<td>3+ Calendar</td>
</tr>
<tr>
<td><strong>Minimum Units of Credit</strong></td>
<td>240</td>
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<td><strong>Award type</strong></td>
<td>Bachelors Honours</td>
</tr>
<tr>
<td><strong>Award(s)</strong></td>
<td>Bachelor of Engineering (Honours) - BE (Hons)</td>
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<tr>
<td></td>
<td>Master of Biomedical Engineering - MBiomedE</td>
</tr>
<tr>
<td><strong>UAC Code</strong></td>
<td>429630</td>
</tr>
<tr>
<td><strong>CRICOS Code</strong></td>
<td>088840K</td>
</tr>
</tbody>
</table>
Learning Outcomes

1. Application of systematic approaches to the conduct and management of engineering projects
   - Global Citizens
   - Scholars
   - Professionals
   - Leaders

2. Ethical conduct and professional accountability.
   - Global Citizens
   - Professionals

3. Effective oral and written communication in professional and lay domains.
   - Global Citizens
   - Leaders
   - Scholars

4. Creative, innovative and pro-active demeanour.
   - Scholars
   - Leaders
   - Professionals

5. Professional use and management of information.
   - Scholars
   - Leaders

6. Orderly management of self, and professional conduct.
   - Scholars
   - Professionals
   - Leaders

7. Comprehensive, theory based understanding of the underpinning natural and physical sciences and the engineering fundamentals applicable to the engineering discipline.
   - Scholars

8. Effective team membership and team leadership.
   - Scholars
   - Global Citizens
   - Leaders
   - Professionals

9. Conceptual understanding of the mathematics, numerical analysis, statistics, and computer and information sciences which underpin the engineering discipline.
   - Scholars

10. Discernment of knowledge development and research directions within the engineering discipline.
    - Scholars

11. Knowledge of engineering design practice and contextual factors impacting the engineering discipline.
    - Scholars
    - Professionals
    - Global Citizens

12. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline.
    - Global Citizens
    - Scholars
    - Professionals
13. In-depth understanding of specialist bodies of knowledge within the engineering discipline as well as biomedical engineering through advanced disciplinary courses.

14. Fluent application of engineering techniques, tools and resources.

15. Application of analytical and critical think skills as well as established engineering methods to complex engineering problem solving.


**Graduate Capabilities:**

For more information on Graduate Capabilities, please click on this [link](#).
Program Structure

Students must complete 240 UOC as a standalone program.

Biomedical Engineering Specialisation Requirements

Students must complete at least one of the specialisations below.

SPECIALISATION:

BIOMDS | 72 UOC
Biomedical Engineering (Dual Mode)

Specialisation Requirements

Students must complete at least one of the specialisations below.

MAJOR:

MATSE1 | 36 UOC
Materials Science and Engineering (Physical Metallurgy)

MATSF1 | 36 UOC
Materials Science and Engineering (Functional Materials)

MATSG1 | 36 UOC
Materials Science and Engineering (Process Metallurgy)

MATSH1 | 36 UOC
Materials Science and Engineering (Materials Engineering)

MATSJ1 | 36 UOC
Materials Science and Engineering (Ceramic Engineering)

Level 1 Core Courses

Students must take 42 UOC of the following courses.
<table>
<thead>
<tr>
<th>Code</th>
<th>UOC</th>
<th>Course</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM1811</td>
<td>6</td>
<td>Engineering Chemistry 1A</td>
</tr>
<tr>
<td>ENGG1000</td>
<td>6</td>
<td>Introduction to Engineering Design and Innovation</td>
</tr>
<tr>
<td>MATS192</td>
<td>6</td>
<td>Design and Application of Materials in Science and Engineering</td>
</tr>
<tr>
<td>PHYS1121</td>
<td>6</td>
<td>Physics 1A</td>
</tr>
<tr>
<td>PHYS1131</td>
<td>6</td>
<td>Higher Physics 1A</td>
</tr>
<tr>
<td>MATH1131</td>
<td>6</td>
<td>Mathematics 1A</td>
</tr>
<tr>
<td>MATH1141</td>
<td>6</td>
<td>Higher Mathematics 1A</td>
</tr>
<tr>
<td>MATH1231</td>
<td>6</td>
<td>Mathematics 1B</td>
</tr>
<tr>
<td>MATH1241</td>
<td>6</td>
<td>Higher Mathematics 1B</td>
</tr>
<tr>
<td>COMP1911</td>
<td>6</td>
<td>Computing 1A</td>
</tr>
</tbody>
</table>

**Level 2 Core Courses**
Students must take 48 UOC of the following courses.

**MATH2019 | 6 UOC**  
Engineering Mathematics 2E

**MATS2001 | 6 UOC**  
Physical Properties of Materials

**MATS2003 | 6 UOC**  
Materials Characterisation

**MATS2004 | 6 UOC**  
Mechanical Behaviour of Materials

**MATS2005 | 6 UOC**  
Introduction to Fluid Flow and Heat Transfer

**MATS2006 | 6 UOC**  
Diffusion and Kinetics

**MATS2007 | 6 UOC**  
Sustainable Materials Processing

**MATS2008 | 6 UOC**  
Thermodynamics and Phase Equilibria

**Level 3 Core Courses**

Students must take 36 UOC of the following courses.

**MATH2089 | 6 UOC**  
Numerical Methods and Statistics

**MATS3001 | 6 UOC**  
Micromechanisms of Mechanical Behaviour of Metals

**MATS3002 | 6 UOC**
Fundamentals of Ceramic Processing

MATS3004  |  6 UOC  
Polymer Science and Engineering 1

MATS3006  |  6 UOC  
Design and Application of Materials in Science and Engineering 3

MATS3007  |  6 UOC  
Materials Industry Management

**Level 1 Electives**

Students must take at least 6 UOC of the following courses.

BABS1201  |  6 UOC  
Molecules, Cells and Genes

BIOM1010  |  6 UOC  
Engineering in Medicine and Biology

BIOS1301  |  6 UOC  
Ecology, Sustainability and Environmental Science

CEIC1000  |  6 UOC  
Sustainable Product Engineering and Design

CEIC1001  |  6 UOC  
Engineering Chemistry

COMP1921  |  6 UOC  
Computing 1B

CVEN1701  |  6 UOC  
Environmental Principles and Systems
<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELEC1111</td>
<td>6</td>
<td>Electrical and Telecommunications Engineering</td>
</tr>
<tr>
<td>ENGG1400</td>
<td>6</td>
<td>Engineering Infrastructure Systems</td>
</tr>
<tr>
<td>GMAT1110</td>
<td>6</td>
<td>Surveying and Geospatial Engineering</td>
</tr>
<tr>
<td>MATH1081</td>
<td>6</td>
<td>Discrete Mathematics</td>
</tr>
<tr>
<td>MATS1101</td>
<td>6</td>
<td>Engineering Materials and Chemistry</td>
</tr>
<tr>
<td>MINE1010</td>
<td>6</td>
<td>Mineral Resources Engineering</td>
</tr>
<tr>
<td>MMAN1300</td>
<td>6</td>
<td>Engineering Mechanics</td>
</tr>
<tr>
<td>PHYS1231</td>
<td>6</td>
<td>Higher Physics 1B</td>
</tr>
<tr>
<td>PSYC1001</td>
<td>6</td>
<td>Psychology 1A</td>
</tr>
<tr>
<td>PTRL1010</td>
<td>6</td>
<td>Introduction to the Petroleum Industry</td>
</tr>
<tr>
<td>SOLA1070</td>
<td>6</td>
<td>Sustainable Energy</td>
</tr>
</tbody>
</table>

One of the following:

<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEM1021</td>
<td>6</td>
<td>Chemistry 1B: Elements, Compounds and Life</td>
</tr>
</tbody>
</table>
CHEM1041 | 6 UOC  
Higher Chemistry 1B: Elements, Compounds and Life

One of the following:
CVEN1300 | 6 UOC  
Engineering Mechanics for Civil Engineers

MINE1300 | 6 UOC  
Engineering Mechanics

MMAN1300 | 6 UOC  
Engineering Mechanics

One of the following:
GEOS1111 | 6 UOC  
Fundamentals of Geology

GEOS3321 | 6 UOC  
Fundamentals of Petroleum Geology

**General Education**

Students must take 6 UOC of the following courses.

In most cases, either a depth elective from the BE (Hons) stream or an elective from the Biomedical Engineering program will be used for satisfying General Education, however students are advised to consult with the Graduate School of Biomedical Engineering.

any General Education course

**Level 2 Maturity Requirement**

Students must have completed 36 UOC before taking any of the following courses.

MATH2019 | 6 UOC  
Engineering Mathematics 2E

MATS2001 | 6 UOC
Level 3 Maturity Requirement

Students must have completed all Introductory core courses before taking any Level 3 course.

Level 4 Maturity Requirement

Students must have completed 102 UOC before taking any of the following courses.

MATS4009  |  9 UOC
Materials Engineering Project

MATS4010  |  12 UOC
Materials Engineering Project
Recommended Level 1 Electives

The following courses are recommended:
- CVEN1300 or MINE1300 or MMAN1300 (6 UOC)

Sample Programs

To access sample program(s), please visit:

Sample Science Programs

Enrolment Disclaimer

You are responsible for ensuring you enrol in courses according to your program requirements. myUNSW enrolment checks that you have met enrolment requirements such as pre-requisites for individual courses but not that a course will count towards your program requirements. Do not assume that because you have enrolled in a course that the course will be credited towards your program.
Related Programs

Bachelor of Engineering (Honours) - BE(Hons)
3131 Materials Science and Engineering (Honours)

Faculty: Faculty of Science
Campus: Kensington
Units of Credit: 192
Typical Duration: 4 Years

Read More

Bachelor of Science - BSc
3970 Science

Faculty: Faculty of Science
Campus: Kensington
Units of Credit: 144
Typical Duration: 3 Years

Read More

Master of Biomedical Engineering - MBiomedE
8660 Biomedical Engineering

Faculty: Faculty of Engineering
Campus: Kensington
Units of Credit: 72
Typical Duration: 1.7 Years

Read More
Program Requirements

Progression Requirements

If any of the conditions below apply, students will be transferred to the Bachelor of Science program, with such transfer subject to appeal:

2 fails in any given core course

After half or more of the BE program attempted (more than 84UOC), 50% or more of BE program courses have been failed

Prior to the final 48 UOC of the BE program, a WAM of less than 55%

For more information on university policy on progression requirements please visit Academic Progression.

Internships and Placements

At least 60 days of approved industrial training must be completed before graduation. Industrial Training should be concurrent with enrolment and is best accumulated in the summer recesses at the end of years 2 and 3, but must be completed by the end of year 4.
Professional Outcomes

Professional Recognition
The professional body for engineering in Australia is Engineers Australia, which has as its first objective the promotion of the science and practice of engineering in all its branches. Engineers Australia has its national headquarters in Canberra and functions through a series of divisions, the local one being the Sydney Division. Within each division are branches representing the main interests within the profession, e.g. civil, mechanical, electrical, engineering management and environmental engineering. Students of an approved school of engineering may join the Institution as a student member (StudIEAust). Student members receive the monthly publication Engineers Australia and for a small fee they also receive The Transactions which contains articles on a particular branch of engineering. Student members are invited to participate in the Excellence Award for Work Experience, the National Young Engineer of the Year Award and to avail themselves of other Engineers Australia services including the Mentor Scheme and industrial experience guidance. For more information and membership application forms, contact Engineers Australia, Sydney Division, Level 3, 8 Thomas Street, CHATSWOOD NSW 2067 - telephone 02 9410 5600 www.engineersaustralia.org.au

Career Opportunities

Engineering Professionals, Engineering Professionals nec, Engineering Manager, Engineering Managers
Recognition of Achievement

University Medal

The University Medal is awarded to recognise outstanding academic performance by a bachelor degree student in line with the University Medal Policy and University Medal Procedure.

Honours Classes

Recognition of achievement for Honours in the program is as follows:

- Class 1: Honours WAM $> 80$ and Thesis mark of $> 65$
- Class 2 Division 1: Honours WAM $> 75$ and Thesis mark of $> 65$
- Class 2 Division 2: Honours WAM $> 65$ and Thesis mark of $> 65$

The Honours WAM is calculated to one decimal place as a weighting of courses according to UOC and the particular level, the latter being:

- General Education = 1
- Level 1 Courses = 1
- Level 2 Courses = 2
- Level 3 Courses = 3
- Level 4 Courses = 4

Only the first attempt at a course counts.

The above weighing reflects the embedded Honours model of the program and a significant research project (18 or 24UOC) is included in the final year of study.
Additional Information

Award with Excellence

A student may also be eligible for the Award with Excellence (https://student.unsw.edu.au/award-with-excellence) for the Master’s degree.

University Medal

Medallists will be determined in accordance with UNSW Policy and Procedure, as per Recognition of Achievement. However, to be considered for a university medal students will need to have achieved at a minimum an Honours WAM greater than or equal to 85 and a thesis mark greater than 65.

Faculty of Science Rules

The Faculty of Science has some rules that relate to all students enrolled in programs offered by the Faculty in relation to recognition for prior learning, general education, course exclusions, study load, and cross-institutional study. All students should read the information contained on the Faculty General Rules and Requirements page.
Program Fees

At UNSW fees are generally charged at course level and therefore dependent upon individual enrolment and other factors such as student's residency status. For generic information on fees and additional expenses of UNSW programs, click on one of the following:

- Domestic Students
- Commonwealth Supported Students
- International Students
Pre-2019 Handbook Editions

Access past handbook editions (2018 and prior)

Pre-2019 Handbook Editions
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this Handbook is indicative only. While every effort is made to keep this information
up-to-date, the University reserves the right to discontinue or vary arrangements,
programs and courses at any time without notice and at its discretion. While the
University will try to avoid or minimise any inconvenience, changes may also be
made to programs, courses and staff after enrolment. The University may also set
limits on the number of students in a course.

Authorised by Deputy Vice-Chancellor (Academic)
CRICOS Provider Code 00098G
ABN: 57 195 873 179