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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<tr>
<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) \ Master of Biomedical Engineering - MBiomedE</td>
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<tr>
<td><strong>UAC Code</strong></td>
<td>429630</td>
</tr>
<tr>
<td><strong>CRICOS Code</strong></td>
<td>088840K</td>
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</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)

**MATS1 | 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.
CHEM1811  |  6 UOC  
Engineering Chemistry 1A

ENGG1000  |  6 UOC  
Introduction to Engineering Design and Innovation

MATS1192  |  6 UOC  
Design and Application of Materials in Science and Engineering

One of the following:

PHYS1121  |  6 UOC  
Physics 1A

PHYS1131  |  6 UOC  
Higher Physics 1A

One of the following:

MATH1131  |  6 UOC  
Mathematics 1A

MATH1141  |  6 UOC  
Higher Mathematics 1A

One of the following:

MATH1231  |  6 UOC  
Mathematics 1B

MATH1241  |  6 UOC  
Higher Mathematics 1B

One of the following:

COMP1911  |  6 UOC  
Computing 1A

ENGG1811  |  6 UOC  
Computing for Engineers

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2019</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Engineering Mathematics 2E</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2001</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Physical Properties of Materials</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2003</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Materials Characterisation</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2004</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Mechanical Behaviour of Materials</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2005</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Introduction to Fluid Flow and Heat Transfer</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2006</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Diffusion and Kinetics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2007</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Sustainable Materials Processing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2008</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Thermodynamics and Phase Equilibria</td>
<td></td>
</tr>
</tbody>
</table>

**Level 3 Core Courses**

Students must take 36 UOC of the following courses.

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2089</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Numerical Methods and Statistics</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS3001</td>
<td>6 UOC</td>
</tr>
<tr>
<td>Micromechanisms of Mechanical Behaviour of Metals</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS3002</td>
<td>6 UOC</td>
</tr>
</tbody>
</table>
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>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>
<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
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 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 or equal to 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)
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Authorised by Deputy Vice-Chancellor (Academic)

CRICOS Provider Code 00098G
ABN: 57 195 873 179