Materials Science and Engineering (Honours)

Overview

The field of Materials Science and Engineering offers unlimited possibilities for innovation and development. Attention is being focused on developing and processing metals, ceramics, polymers and composites with improved properties.

The activities of the materials engineer range from materials production, including their extraction from ores and their refining, to the design, development, processing and recycling of materials for use in aerospace, transportation, electronics, energy conversion and biomedical systems.

Advanced materials can provide a major competitive advantage in virtually every part of a country's manufacturing industry. Because Australia is a country rich in minerals, materials science has been designated as a priority area for research and development. Examples of recent and significant developments include the emergence of environmentally friendly and economical metal processing methods, advanced surface coatings, biomedical materials, electrical ceramics, engineering polymers, and advanced composites.

The School of Materials Science and Engineering is in a good position to provide the increased numbers of graduates necessary for development of these new initiatives in materials. It is the only school in Australia that offers professional courses in ceramic engineering, metallurgical engineering and materials engineering as well as providing postgraduate specialisation in these fields.

The School is extremely well equipped with a wide range of advanced computing, thermal analysis, mechanical testing, X-ray and optical and electron microscopy facilities. Students are provided with education and industrial training to prepare them for a significant and important professional career.
<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>4 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, Term 3</td>
</tr>
<tr>
<td><strong>Academic Calendar</strong></td>
<td>3+ Calendar</td>
</tr>
<tr>
<td><strong>Minimum Units of Credit</strong></td>
<td>192</td>
</tr>
<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)</td>
</tr>
<tr>
<td><strong>UAC Code</strong></td>
<td>429600</td>
</tr>
<tr>
<td><strong>CRICOS Code</strong></td>
<td>088873A</td>
</tr>
</tbody>
</table>
Learning Outcomes

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

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

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

4. In-depth understanding of specialist bodies of knowledge within the engineering discipline.
   Scholars

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

6. Understanding of the scope, principles, norms, accountabilities and bounds of sustainable engineering practice in the specific discipline
   Professionals Global Citizens Scholars

7. Application of established engineering methods to complex engineering problem solving.
   Global Citizens Scholars Professionals

8. Fluent application of engineering techniques, tools and resources.
   Scholars Professionals

   Scholars Global Citizens Professionals

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

11. Ethical conduct and professional accountability.
    Professionals Global Citizens

12. Effective oral and written communication in professional and lay domains.
13. Creative, innovative and pro-active demeanour.

14. Professional use and management of information.

15. Orderly management of self, and professional conduct.

16. Effective team membership and team leadership.

Graduate Capabilities:

For more information on Graduate Capabilities, please click on this link.
Program Structure

Students must complete 192 UOC as a standalone program.

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.

**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.

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

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

**MATS2003 | 6 UOC**
<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATS2004</td>
<td>6</td>
<td>Mechanical Behaviour of Materials</td>
</tr>
<tr>
<td>MATS2005</td>
<td>6</td>
<td>Introduction to Fluid Flow and Heat Transfer</td>
</tr>
<tr>
<td>MATS2006</td>
<td>6</td>
<td>Diffusion and Kinetics</td>
</tr>
<tr>
<td>MATS2007</td>
<td>6</td>
<td>Sustainable Materials Processing</td>
</tr>
<tr>
<td>MATS2008</td>
<td>6</td>
<td>Thermodynamics and Phase Equilibria</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>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH2089</td>
<td>6</td>
<td>Numerical Methods and Statistics</td>
</tr>
<tr>
<td>MATS3001</td>
<td>6</td>
<td>Micromechanisms of Mechanical Behaviour of Metals</td>
</tr>
<tr>
<td>MATS3002</td>
<td>6</td>
<td>Fundamentals of Ceramic Processing</td>
</tr>
<tr>
<td>MATS3004</td>
<td>6</td>
<td>Polymer Science and Engineering 1</td>
</tr>
<tr>
<td>MATS3006</td>
<td>6</td>
<td>Design and Application of Materials in Science and Engineering 3</td>
</tr>
</tbody>
</table>
**Level 1 Electives**

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>UOC</th>
<th>Course Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>BABS1201</td>
<td>6</td>
<td>Molecules, Cells and Genes</td>
</tr>
<tr>
<td>BIOM1010</td>
<td>6</td>
<td>Engineering in Medicine and Biology</td>
</tr>
<tr>
<td>BIOS1301</td>
<td>6</td>
<td>Ecology, Sustainability and Environmental Science</td>
</tr>
<tr>
<td>CEIC1000</td>
<td>6</td>
<td>Sustainable Product Engineering and Design</td>
</tr>
<tr>
<td>CEIC1001</td>
<td>6</td>
<td>Engineering Chemistry</td>
</tr>
<tr>
<td>COMP1921</td>
<td>6</td>
<td>Computing 1B</td>
</tr>
<tr>
<td>CVEN1701</td>
<td>6</td>
<td>Environmental Principles and Systems</td>
</tr>
<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>Code</td>
<td>UOC</td>
<td>Course Name</td>
</tr>
<tr>
<td>----------</td>
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<td>-----------------------------------------------</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>
<tr>
<td>CHEM1041</td>
<td>6</td>
<td>Higher Chemistry 1B: Elements, Compounds and Life</td>
</tr>
<tr>
<td>CVEN1300</td>
<td>6</td>
<td>Engineering Mechanics for Civil Engineers</td>
</tr>
</tbody>
</table>
One of the following:

- GEOS1111 | 6 UOC
  Fundamentals of Geology

GEOS3321 | 6 UOC
Fundamentals of Petroleum Geology

**Professional Electives**

Students must take at least 12 UOC of the following courses.

- MATS3003 | 6 UOC
  Engineering in Process Metallurgy

- MATS3005 | 6 UOC
  Phase Transformations

- MATS4001 | 6 UOC
  Secondary Processing of Metals

- MATS4002 | 6 UOC
  Design and Advanced Ceramics

- MATS4003 | 6 UOC
  Process Metallurgy Advanced

- MATS4004 | 6 UOC
  Fracture Mechanics and Failure Analysis

- MATS4005 | 6 UOC
  Composites and Functional Materials
General Education

Students must take 12 UOC of the following courses.

Any course defined as a Science course see Table 1 cannot be taken as General Education (GE). Any exceptions to these rules must be approved by the Associate Dean (Academic Programs) or nominee.

any General Education course

Excluded General Education Courses

Students may not undertake any of the following courses towards their General Education requirement.

any Computer Science course

any Food Technology course

any course offered by Faculty of Science

any General Education - Faculty of Engineering course

any General Education course offered by Faculty of Science

any Medical Science course

Maximum Level 1 UOC

Students may only undertake a maximum of 60 UOC of the following courses.

any level 1 course
Level 2 Maturity Requirement

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

any level 2 course

Level 3 Maturity Requirement

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

any level 3 course

Level 4 Maturity Requirement

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

any level 4 Materials Science and Engineering course

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

Unless advised otherwise by your program authority, you should follow the rules for the handbook for the year you commenced your program. You are also 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.
Related Programs

Related Double Degree Programs

Bachelor of Engineering (Honours) - **BE(Hons)**
Bachelor of Engineering Science - **BEngSc**
**3132 Materials Science and Engineering (Honours) / Engineering Science**

Faculty: Faculty of Science, Faculty of Engineering
Campus: Kensington
Units of Credit: 240
Typical Duration: 5 Years

Read More

Bachelor of Engineering (Honours) - **BE(Hons)**
Bachelor of Commerce - **BCom**
**3134 Materials Science and Engineering (Honours) / Commerce**

Faculty: Faculty of Science, UNSW Business School
Campus: Kensington
Units of Credit: 264
Typical Duration: 5.7 Years

Read More

Related Programs

Bachelor of Engineering (Honours) - **BE (Hons)**
**3707 Engineering (Honours)**

Faculty: Faculty of Engineering
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
Program Requirements

Recognition of Prior Learning

UNSW Students may be granted Recognition for Prior Learning (RPL) which may or may not reduce the amount of learning required to achieve a degree at UNSW. Generally, RPL is only granted based on the completion of tertiary-level studies, but in exceptional circumstances may also include non-formal or informal learning such as professional experience. RPL will not be granted based on partly completed tertiary courses. All applications for RPL at UNSW are subject to UNSW Recognition of Prior Learning (Coursework Programs) Policy and Procedures. Students seeking credit for courses completed at another university are required to submit documentary evidence (course outlines, academic transcripts) to support their application, and to nominate the course(s) for which they seek credit. In addition, the following conditions apply for all UNSW Science programs (including the Science component of dual award programs): Specified course credit, i.e. credit granted for an exact or near exact equivalence to a course at UNSW, will not be granted when more than 7 years has elapsed from the successful completion of the course (or other learning) and the student’s commencement in the Science program. Where this time period is shorter it will be stipulated in the individual rules for the relevant program. Unspecified course credit (e.g. General Education or free electives) will not be granted when more than 10 years has elapsed from the successful completion of the course (or other learning) and the student’s commencement in the Science program. Students may only receive credit of up to a maximum of 50% of the coursework component of their Science program, excluding Honours. For most undergraduate programs this will be 72 UOC. For dual award programs that include a Science component, it will be a maximum of 50% of the Science component of the dual degree, excluding Honours. Credit for the other program will be assessed by the Faculty that administers that program. Applications for RPL will only be assessed for students who have accepted a place to study in a UNSW Science program. Students must formally apply for RPL unless they become a UNSW student as part of a formal Articulation Agreement. Applications for RPL should be made as early as possible in the student’s program. Students who are readmitted into a Science program after a period of unapproved absence or deferment, or after exclusion, will not necessarily retain credit for all units completed at UNSW prior to the absence if the date of completion of the units of study is greater than the 7 and 10-year rules outlined in points 1 and 2 above. In these cases, the credit retained will be decided by the Associate Dean (Academic Programs) in consultation (when necessary) with the Program and/or Course Authority.
**Progression Requirements**

Students are not permitted to continue in Program 3131 and will be transferred to Program 3970 BSc (Materials Science Major), with such transfer subject to appeal, if any of the following apply:

- 2 fails in any given core course
- Less than 50% of program courses have been passed after half or more of the BE program (>84 UOC) has been attempted
- A WAM of less than 55% prior to the final 48 UOC of the BE program (i.e., after 120 UOC of the BE program completed)

The School of Materials Science and Engineering Education Committee will consider appeals against transfer out of the BE Program and will take into account academic, medical, and personal issues in accordance with the UNSW Special Consideration Policy and the Re-Enrolment Appeal Committee process.

For more information on university policy on progression requirements please visit [Academic Progression](#).

**Internships and Placements**

**Industrial Experience Requirement**

All students are required to have gained at least 12 weeks of approved industrial experience before graduation and to have submitted satisfactory reports on such work. Industrial experience is usually obtained during a long vacation at the end of Stages 2 and 3.
Professional Outcomes

Accreditations

Professional institutes that offer accreditation on completion of this program:

- Engineers Australia

Professional Recognition

The Engineers Australia recognises the degree of BE in any of the 4 undergraduate streams as meeting the examination requirements for admission to graduate and corporate membership. Similarly, substantial or complete recognition is accorded to the BE degree programs by overseas engineering institutions. Graduates in Ceramic Engineering are also eligible for membership of the Institute of Ceramics of Great Britain, the Royal Australian Chemical Institute and the National Institute of Ceramic Engineers USA.
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 24 UOC) is included in the final year of study.
**Additional Information**

**University Medal**

Medalists will be determined in accordance with UNSW Policy and Procedure. 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.

**Science Handbook Rules and Editions**

Students must follow the program rules and requirements in the UNSW Handbook published in the year they commence their studies with the Faculty of Science.

Students who transfer from another UNSW Faculty into Science (for example, from a Bachelor of Arts into a Bachelor of Science) must follow the program rules and requirements in the UNSW Handbook published in the year of their transfer.

Students, who are readmitted to UNSW after a period of unapproved absence or deferment, or after exclusion, must satisfy the program rules in the Handbook published in the year of their readmission. In addition, these students may be subject to restrictions on which courses taken at UNSW may be counted on their return. In some cases, students returning from an unapproved absence may be required to repeat courses. See the Recognition of Prior Learning (RPL) and Advanced Standing section below for more details. Students who take approved leave or deferment will follow the Handbook for the year of their original commencement unless otherwise approved by the Associate Dean (Academic Programs).

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