ENGINEERING

UOW Faculty of Engineering graduates are not only involved in a wide range of exciting technical projects, they can also run the organisations in which they work. They are problem solvers; they manage projects, people and finances. They are helping to build a sustainable future.

As a student and potential engineer, you will develop strong fundamental skills in mathematics, science, engineering science, and communications; before branching into one of the many specialisations available. A design thread running through each degree ensures you will develop the skills needed for innovation in the competitive industries of the future.

UOW is a leading engineering research institution in Australia, building on long standing collaboration with local and multinational industries. As a student you will be able to interact with teaching staff at the forefront of their field of research. You can work in well-designed laboratories and workshops, experience essential to develop of engineering skills. An experimental program, which is a feature of UOW Engineering degrees, complements this work.

As a UOW engineering student you can gain credit for relevant work experience, either in Australia or overseas, by participating in our Professional Options Program.

Wollongong has a large industrial base, giving many students exposure to the expertise of practising engineers as well as the opportunity to visit some of the most important industrial sites in the country.

PHYSICS

Physics is the basis of engineering. Physical principles discovered by scientists are exploited by engineers to make materials and machines that answer the needs of humanity.

UOW recognises this fundamental connection by basing physics in the Faculty of Engineering. Courses available include Physics, Photonics and Medical Radiation Physics. UOW has strong research programs in fundamental Physics and the Centre for Medical Radiation Physics is a world leader in its field. Current phenomena being uncovered in Physics research laboratories will form the basis of new engineering techniques and devices in the future. Today's physics is tomorrow's engineering!

GRADUATE DESTINATIONS

- Astronomer
- Civil Engineer
- Computer Systems Engineer
- Construction Manager
- Consulting Engineer
- Design Manager
- Electronics Engineer
- Environmental Engineer
- Geotechnical Engineer
- Maintenance Manager
- Materials Engineer
- Mechanical Engineer
- Medical Physicist
- Metallurgist
- Mine Manager
- Power Station Manager
- Production Engineer
- Project Manager
- Structural Engineer
- Systems Analyst
- Telecommunications Engineer
- Transport Engineer
- Water Quality Manager

Full details of courses offered can be found at: www.uow.edu.au/handbook/current
### DEGREES AT A GLANCE

<table>
<thead>
<tr>
<th>DEGREE</th>
<th>APPROX. UAI</th>
<th>FULL TIME DURATION</th>
<th>ASSUMED KNOWLEDGE</th>
<th>RECOMMENDED STUDIES/ADDITIONAL REQUIREMENTS</th>
<th>LOCATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bachelor of Engineering (Civil) (Environmental) (Materials) (Mechanical) (Mechatronic) (Mining)</td>
<td>78</td>
<td>4 years</td>
<td>Any 2 units of English plus Mathematics1</td>
<td>Physics, Chemistry and HSC Mathematics Extension 1 (Engineering Studies if available)</td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Engineering (Computer)* (Electrical)* (Telecommunications)*</td>
<td>78</td>
<td>4 years</td>
<td>Any 2 units of English plus Mathematics and 2 units of Science</td>
<td>English Advanced, HSC Mathematics Extension 1 and Physics</td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Engineering (Scholars program)</td>
<td>93</td>
<td>4 years</td>
<td>HSC Mathematics Extension 1</td>
<td>4 units of Science</td>
<td>Wollongong</td>
</tr>
<tr>
<td>International Bachelor of Science</td>
<td>93</td>
<td>4 years</td>
<td>Mathematics and any 2 units of Science</td>
<td></td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Medical and Radiation Physics Advanced (Honours)</td>
<td>90</td>
<td>4 years</td>
<td>Any 2 units of English, Mathematics &amp; Physics1</td>
<td>English Advanced, HSC Mathematics Extension 1 &amp; Chemistry</td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Medical and Radiation Physics</td>
<td>80</td>
<td>3 years</td>
<td>Any 2 units of English, Mathematics &amp; Physics1</td>
<td>English Advanced, HSC Mathematics Extension 1 &amp; Chemistry</td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Science – Advanced (Honours) (Physics)</td>
<td>90</td>
<td>4 years</td>
<td>Any 2 units of English plus Mathematics &amp; Physics1</td>
<td>HSC Mathematics Extension 1 plus Chemistry or Physics</td>
<td>Wollongong</td>
</tr>
<tr>
<td>Bachelor of Science (Materials) (Nuclear Science &amp; Technology) (Photonics) (Physics)</td>
<td>74</td>
<td>3 years</td>
<td>Any 2 units of English plus Mathematics1</td>
<td>HSC Mathematics Extension 1 plus Chemistry or Physics</td>
<td>Wollongong</td>
</tr>
</tbody>
</table>

NB: UAI is to be used as a guide only and are based on the previous year's demand.
*For further information, refer to the Faculty of Informatics on pages 76–78.
†Students with limited background in Physics or Chemistry are advised to enrol in bridging courses held in February each year. Students with General Maths or a low Maths HSC result will be required to enrol in a Maths Enabling Subject in the first session of study. For information on the Bridging Courses and the Maths Enabling Subject, refer to page 66.

### BACHELOR OF ENGINEERING

The general course structure for the Bachelor of Engineering is as follows:

**first year** The first year is largely common and focuses on the foundations of Engineering, including Mechanics, Design and Innovation, Materials, Computing, Mathematics, Chemistry, and Physics. This provides students with the basic engineering and science skills required for future years.

**second & third years** A strong thread of design subjects runs through each major; and students will develop an important set of communication, management, research and information skills, as well as an understanding of the role of an engineer in society, and the significance of sustainable development. Students also take specialist subjects in their major area of study.

**fourth year** A research project is included in the final year as well as additional coursework from the major study. Honours are awarded at the end of the course on the basis of overall performance throughout the four years of study. All students must complete 12 weeks of approved professional work experience before graduation, usually in the period between the third and fourth years.

### PROFESSIONAL RECOGNITION

Bachelor of Engineering degrees are accredited by Engineers Australia and relevant world engineering bodies through the Washington Accord. This ensures recognition by equivalent professional engineering bodies in the USA, UK, Hong Kong, Japan, New Zealand, Canada, South Africa and others. The Malaysian Public Service Department (JPA) accredits the University’s Engineering degrees and the Professional Engineering Board, Singapore accredits the Civil, Mechanical, Electrical and Computer Engineering degrees.

### MAJORS

#### CIVIL

**Bachelor of Engineering (Civil Engineering)**
Civil engineers plan, design, construct, operate and maintain buildings, bridges, dams, harbours, water supply systems, waste management systems, airports, roads, tunnels and railways. Subjects cover topics such as engineering design and innovation, geotechnical engineering, hydraulics and hydrology, and structural design.

#### ENVIRONMENTAL

**Bachelor of Engineering (Environmental Engineering)**
Environmental engineers are concerned with assessing, planning and managing the effects of human and other activity on the natural and built environment; through applications such as environmental impact assessment, natural resource management, pollution control and cleaner production; hazardous waste management, and environmental engineering design.

#### MATERIALS

**Bachelor of Engineering (Materials Engineering)**
This major focuses on the development, manufacture and use of metals, ceramics, polymers and composite materials in engineering design and construction. Topics covered include: the structure and properties of materials; mechanical behaviour and fractures; and thermodynamics. In the final year, students choose elective subjects from the specialist areas of materials science and technology, metallurgical processing and materials manufacturing.

#### MECHANICAL

**Bachelor of Engineering (Mechanical Engineering)**
This major includes all aspects of the design, installation, operation and maintenance of machinery. Final-year electives cover topics including sustainable energy and engineering systems, applied mechanics, bulk materials handling, machine control, aerodynamics, and manufacturing.

#### MECHATRONIC

**Bachelor of Engineering (Mechatronic Engineering)**
Mechtronics is a combination of electrical, computer and mechanical technologies, and it is a key element in state-of-the-art developments such as Internet control of machines, robotics and autonomous robots, and engine management systems.

#### MINING

**Bachelor of Engineering (Mining Engineering)**
This degree builds knowledge of mining methods, ventilation, environmental engineering, planning and development, environmental issues, and rock mechanics; with a focus in the later years of the degree on mine planning, occupational health and safety and mining economics.

### DOUBLE MAJORS

Double majors are available in the following combinations:
- Civil and Mining
- Civil and Environmental
- Mining and Environmental

### COMPUTER, ELECTRICAL OR TELECOMMUNICATIONS ENGINEERING

For information about Computer, Electrical or Telecommunications Engineering, please refer to the Informatics section on pages 76–78.
BACHELOR OF ENGINEERING (SCHOLARS PROGRAM)

The Engineering Scholars Program is open to students who have gained University entry with a UAI above 90 (or equivalent). Students without the required UAI may still enter the Program by gaining a Weighted Average Mark of 75+ over their first two full-time sessions of study. Scholars students will be able to undertake personalised programs of study after consultation with the Scholars Program Coordinator. Other benefits may include:

- Certified recognition of enrolment in the Scholars Program
- Opportunity to finish a four-year degree in three years, or a five-year double degree in four years (including two summer sessions of study)
- Access to a wider range of electives
- Involvement in Faculty Research Activities by replacing certain core or elective subjects with special engineering project subjects. Students work on a research project in an area of interest to them, under the guidance of a research supervisor from one of the Faculty Research Centres, Groups or Institutes
- Guaranteed vacation employment at the end of third year

HSC Students must apply through UAC. Non-HSC students who are applying to the University must also submit a Scholars application. Contact UniAdvice on 1300 367 869 or uniadvice@uow.edu.au for more information.

The Scholars Program is not a scholarship. Students intending to apply for a place in this degree are encouraged to apply for a UOW undergraduate scholarship separately (see page 32).

FURTHER STUDY

Continuing education is a requirement for registration as a professional engineer and most engineers undertake postgraduate university study and/or short courses. Research opportunities are also available for engineering graduates.

- Master of Engineering Asset Management
- Master of Engineering Management
- Master of Engineering Practice
- Master of Engineering
- Master of Engineering – Research
- Master of Rolling Stock Engineering
- Doctor of Philosophy (PhD)

MATERIALS

Bachelor of Science (Materials)

In addition to the Bachelor of Engineering (Materials), the Faculty offers a Bachelor of Science (Materials) comprising a core of science and mathematics, with a major study of the structure and properties of metals, ceramics and polymers. The Materials Science course provides the scientific knowledge and technical skills necessary for a successful materials-based career in areas such as quality control and laboratory testing, materials process control, and research and development in government and private sector laboratories. It also provides an ideal basis for those who wish to pursue a career in secondary teaching.

NUCLEAR SCIENCE & TECHNOLOGY

Bachelor of Science (Nuclear Science & Technology)

There is an increasing need for people to have expertise as health physicists, nuclear technologists and radiation workers. The nuclear research industry in Australia has been reinvigorated, and a new research reactor has been brought online. Also, the expansion of the uranium mining industry and development of mid- and high-level radioactive storage facilities will require trained health physicists. This new major will include topics such as mechanics and thermodynamics, quantum mechanics, nuclear physics, the nuclear fuel cycle and the physics of radiation detectors.

PHOTONICS

Bachelor of Science (Photonics)

Photonics is a rapidly developing area associated with the development of detectors, light sources and optical fibres to support research and development in a wide range of industries including opto-electronics, telecommunications and defence. This degree provides students with training in experimental and theoretical physics and electronics, with a strong focus on the optics, electronics and computing necessary to begin a career in the photonics industry.

PHYSICS

Bachelor of Science (Physics)

Physics, as one of the fundamental sciences, provides the basis for making, interpreting and extending observations relating to the behaviour and structure of matter. Physics is fundamental to the study of all sciences and has a key role to play in generating and supporting new technologies. All Science and Engineering graduates will at some time in their careers use equipment and techniques or make judgements which require a basic grounding in physics. Topics covered in Physics include solid-state physics, nuclear physics, astronomy and astrophysics, radiation physics, optics, thermodynamics and a number of advanced mathematics subjects.

ADVANCED PHYSICS (HONOURS)

Bachelor of Science – Advanced

Designed for high-achieving students in physics, this program includes the opportunity for students to undertake research projects from second year. It offers a greater degree of flexibility, the opportunity to undertake individual research subjects at second, third and fourth year level; the chance to participate in various enrichment activities and to develop a close association with an appropriate member of one of the Faculty’s research teams. In the final year, all students undertake a substantial piece of supervised research in their major discipline, together with other required seminar and/or coursework subjects.

THE FLEXIBILITY OF THE PHYSICS PROGRAM

The first-year requirements of the physics-based degrees have a large common component. Fundamental Physics (12cp) and Mathematics (12cp) form the core of the Physics, Photonics and Medical & Radiation Physics degrees, and account for half the credit points taken in first year.

Taking Anatomy and Physiology allows students to proceed to second year in Medical & Radiation Physics.

Taking Electrical Engineering allows progression to second year in Photonics.

Taking Anatomy, Physiology and Electrical Engineering allows progression to second year in any of Physics, Photonics and Medical & Radiation Physics—and students still have the choice of another elective subject in first year.

PROFESSIONAL RECOGNITION

Both the Physics major and Honours degree conform to the requirements for membership of the Australian Institute of Physics. Recognition as a professional physicist requires the completion of a higher degree or an equivalent amount of professional experience.

MINOR STUDIES

Students can take a minor study from any area of Science or Engineering.

FURTHER STUDY

- Honours
- Master of Science – Research
- Doctor of Philosophy (PhD)

MEDICAL AND RADIATION PHYSICS

Bachelor of Medical & Radiation Physics

The Bachelor of Medical & Radiation Physics opens a number of career paths for graduates, including medical physics, occupational health and safety, and radiation research and development. The strengths of this degree lie in the practical experience gained in hospital environments in the final year, and the networking that results.

Bachelor of Medical and Radiation Physics Advanced

The first three years of this degree are common, with students studying the Bachelor of Medical & Radiation Physics (e.g. anatomy and physiology) as well as specialist radiation physics subjects, including radiotherapy; electromagnetism and opto-electronics; nuclear physics; and radiation detection. The Honours year is entirely devoted to Medical Physics topics. It has a substantial 24 credit point research component which is carried out in collaboration with community, local, state or federal organisations. This research project is supported by three special subjects that deal with the major activities of a Medical Radiation Physicist: medical imaging, nuclear medicine, and radiobiology and radiation protection.

These are taught in collaboration with honorary staff drawn from St George Hospital, the Illawarra Cancer Care Centre and Royal Prince Alfred Hospital in Sydney. Students benefit from the strong collaborative links in research and development that staff have with local and international companies and leading Medical Radiation Physics institutions.

PROFESSIONAL RECOGNITION

The Bachelor of Medical & Radiation Physics and the Advanced (Honours) programs in these areas conform to the requirements for membership of the Australian Institute of Physics.

FURTHER STUDY

- Honours
- Coursework Masters
- Master of Science – Research
- Doctor of Philosophy (PhD)
HANNAH RUSSELL

Bachelor of Engineering (Scholar) Mechanical Engineering

I knew I wanted to come to UOW when I spoke to several lecturers who seemed very eager to talk to me and passionate about what they taught; this attracted me, because I am keen to learn.

I am really interested in how things work, enjoy maths and physics and like a challenge, so I thought Mechanical Engineering sounded perfect. Engineering at UOW has a strong focus on problem solving as part of a team, which is great because that’s how we’ll have to solve problems in the real world.

UOW definitely embraces difference and diversity, and sees them as something positive. Being one of the few girls in Engineering hasn’t been a bother at all, I’ve never felt awkward or like I didn’t belong. We’re encouraged to work as a team, to learn how to rely on each other and our different skills.
THE OPPORTUNITY PROGRAM

Opportunity Program places are available by interview to assist students who are highly motivated to study engineering and physics but who are less well prepared academically. Students will be assisted in their first year with Mathematics, Chemistry and/or Physics. The individually tailored programs include additional tutorial support, mentor assistance and flexible programs to reduce annual study loads. To be part of the Opportunity Program, you need to first apply through UAC for entry to the Bachelor of Engineering degree or Physics degree of your choice.

The Opportunity program is for those who:

→ anticipate a UAI slightly below 78
→ are not studying HSC Maths
→ are not studying Physics and/or Chemistry for the HSC

Contact 1300 367 869 for more information.

BRIDGING COURSES

Bridging courses in Biology, Chemistry and Physics are held during Summer Session, usually for the first two weeks of February prior to the start of the University year. Students who do not meet standard entry levels in these subjects are advised to register on enrolment day. These subjects do not count towards the degree requirements, and cost $150 each for Physics and Chemistry and $75 for Biology (correct at the time of publication).

MATHS ENABLING SUBJECT

Students with General Maths or a low Maths HSC result will be required to enrol in a Maths Enabling Subject in the first session of study. Contact the Faculty of Engineering on 02 4221 3491 for more information.

PROFESSIONAL OPTIONS FOR THE WORKPLACE

Engineering skills and knowledge gained in the workplace are encouraged through Professional Option subjects. Part-time students who are working in an approved engineering role with professional engineering supervision can gain approval to enrol in Professional Option subjects that involve completing work plans, reports and seminars based on the workplace. The completion of Professional Option subjects may enable part-time students to complete a degree in six or seven years.

WOMEN IN ENGINEERING & PHYSICS SOCIETY

The Women in Engineering & Physics Society (WEPS) is an organisation for female students studying Engineering and Physics. WEPS organises presentations, site tours, a first-year welcome meeting and an Engineering Lifestyles seminar.

GRADUATE PROFILE

PAUL IRWIN
Bachelor of Engineering – 2002.
Civil Engineering
Senior Civil Engineer, Beca

I manage the design and drafting of civil infrastructure, industrial, residential, and commercial projects for a broad range of local and international clients in both the government and private sectors. This design can range from the preliminary investigation and estimation of potential developments through to the detailed design and construction phases of a project.

The UOW Bachelor of Engineering course provided me with a foundation of first principal skills and understanding of the design requirements of both civil and structural engineering projects while allowing me to choose my preferred career path by not pigeon-holing me with over-specialisation.

By teaching its students to think creatively around problems and to use fundamentals of engineering, UOW graduates can better appreciate the inner workings of the design tools and procedures encountered in the profession—rather than just accept blindly that something ‘works’.

I chose UOW because it had a strong reputation as a leader in engineering education throughout the state, and was located conveniently to my home in the Illawarra. The university is well laid out with plenty of space for relaxation, study, and recreation between lectures.

The most valued part of my studies at UOW was definitely the friendships made during my studies and the time spent catching up with these friends between lectures out of class time around the campus.
STEVEN DUDA
Bachelor of Engineering – Scholar’s (Mechatronic)
Radford College, Canberra

At the end of high school, we were always told to choose something that will take you where you want to go; something you enjoy doing. For me, I’ve always dreamed of being able to build stuff, my own designs, and that’s what made me want to study Engineering.

UOW has a close working relationship with some of my possible future employers, such as BlueScope Steel, who have already been guest lecturers in my degree! I’m interested in Intelligent Machines, Automation Systems and Artificial Intelligence, so perhaps I’ll go into research. I also see some exciting new prospects opening up in limb replacements and artificial organs, so I may later look at continuing my study in some biological fields. UOW rewards students who work hard, by allowing them to get involved in research projects.

I spent several weekends travelling to nearby universities, going to careers markets and talking to the students to find out which university would cater to who I am. Unlike some other universities I considered, UOW offered a lot of student-run activities such as the FSAE race team, and other society groups. For me, UOW was an opportunity to broaden my horizons, meet new people, do new things—while still being able to continue my education and help me reach my goal career.