Prosperity in the 21st Century will rely more on creative minds than on the relative abundance of natural resources. Engineers will provide innovative solutions to the energy, food, shelter, communication and environmental needs of a world population expected to double by 2030. Engineers will be challenged to interact more with people, finance and management as well as delivering technical expertise.

As a result of providing practical industrial solutions to industry over many decades, the Faculty of Engineering has developed postgraduate coursework to train professional engineers in the areas of Mechanical, Materials, Mechatronics, Civil, Mining, Environmental and Physics. Well-designed laboratories, practical implementation of skills and an emphasis on innovation ensure graduates have the skills to meet modern engineering challenges.

The Faculty’s international research has seen the long-term collaboration with partners such as Australian Nuclear Science & Technology Organisation (ANSTO), Bluescope Steel, BaoSteel Co, Fujitsu, John Hopkins University Medical School (US), Pacific Power, Defence Science & Technology Organisation (DSTO), CIGWELD, AGL and US Navy Academy.

This world-class research has led to the creation of a number of Centres of Excellence, which has attracted a critical mass of researchers engaged in significant, well-funded projects with superior equipment infrastructure. This expertise filters straight into the classroom and research labs, important for Master Coursework, Master Research and Doctoral studies. This concentration of high quality research has ensured that the Faculty of Engineering is part of the Go8 – Group of Eight & Associates, the top research faculties in Australia.

For more information about research in Engineering at the University of Wollongong, download a brochure at www.uow.edu.au/eng/research/brochure

Research Centres and Institutes

Below is a brief overview; for information about Research projects in the Faculty, refer to www.uow.edu.au/eng/research

INSTITUTE FOR SUPERCONDUCTING & ELECTRONIC MATERIALS

The Institute for Superconducting and Electronic Materials (ISEM) has secured more than $10m in funding since 1994 from the ARC, and the private and public sectors. With more than 20 full-time researchers, 30 postgraduate students, and visiting researchers, from Australia, Europe, Middle East, and South-East Asia. ISEM is maintaining its outstanding research quality through collaboration with numerous world wide renowned institutions, such as University of Cambridge (UK), Ohio State University (USA), National Institute for Materials Science (Japan).

Research Groups include:
- Applied Superconductivity Group
- Energy Storage Group
- Spintronic and Electronic Materials Group
- Thin Film Technology Group
- Nano-structured Materials Group
- Terahertz Science, Solid State Physics Group
**Professor Shi Xue Dou**

Institute Director Professor Shi Xue Dou is an internationally renowned expert in the field of superconductivity and energy storage. His experience and dedication to the field has been acknowledged with the award of a Doctor of Science at UNSW in 1998. He is an Australian Research Council (ARC) Professorial Fellow, a Fellow of The Australian Academy of Technological Science and Engineering and winner of 13 academic awards for excellence in research and teaching. He actively promotes collaborations uniting industry in the national and international arena. He holds four patents, and has published more than 300 refereed papers and presented more than 40 invited talks at international conferences.

**CRC FOR RAILWAY ENGINEERING & TECHNOLOGIES**

The University of Wollongong is the leading partner in the efficiency of rail industry. The Cooperative Research Centre (CRC) for Railway Engineering and Technologies is a joint venture of Australia’s leading rail industry companies and universities to advance research and development, and increase the efficiency of the Nation’s rail industry.

The key rail partners of University of Wollongong are RailCorp (NSW), Queensland Rail (QR) and Australian Rail Track Corporation (ARTC).

Selected CRC-Rail Projects at University of Wollongong:

- Ballast-track interaction and the effective use of geosynthetics
- Foundation soil properties and stabilisation
- Dynamic analysis of track and assessment of its capacity
- Onboard wheel-wear and wheel-rail-noise assessment system
- Development of novel insulated joints
- Improving rail infrastructure by introducing native vegetation and ‘green’ corridors
- Stress-strain and filtration characteristics of sub-ballast

**Professor Buddhima Indraratna**

Professor Buddhima Indraratna has been involved in ground improvement research for over 15 years. He received a Swedish Geotechnical Society Award for his contribution to Ground Improvement in 1999. He has successfully supervised over 30 PhD students and written approximately 300 scholarly articles including over 100 peer-reviewed journal papers and 5 books. He has also successfully managed numerous ARC Discovery, Linkage and CRC-Rail projects on fundamental and applied research, accounting for nearly $500,000 per year. He has been an invited Keynote Speaker at more than 20 International Conferences, and Core Member of 3 Technical Committees covering unstable granular materials, soft soil foundations and the geotechnical impact of natural disasters under the International Society for Soil Mechanics and Geotechnical Engineering (ISSMGE). He has been an active consultant, the United Nation Development Program (UNDP) expert and adviser to the Government of Sri Lanka on recent post-tsunami rehabilitation for disturbed coastal soils.

**DEFENCE MATERIALS TECHNOLOGY CENTRE**

The Defence Materials Technology Centre brings together expertise in the materials sciences from the Australian Government, industry, and leading Australian Universities to make a significant contribution to improving Australian Defence Force (ADF) capability across military platforms in the battlespace. By developing world leading materials engineering capabilities to develop, integrate and sustain new materials and manufacturing technologies across existing and planned Defence platforms.

The Defence Materials Technology Centre includes four research programs: air platforms; maritime platforms; armour applications; and propulsion systems.

The research aims of which are:

- Development of new materials such as high-strength steels, multi-functional composites
- Manufacturing processes such as forming, joining, surface engineering and robot automation
- Prediction and assessment of performance
- Embedded electronic systems for health monitoring and system performance

The centre also has Technology transfer program to assist non-defence applications such as civilian aerospace, marine, power generation and general manufacturing industries.

**ENGINEERING MANUFACTURING**

Engineering Manufacturing Research (EMR) is based on several key manufacturing research groups in; Metal Working, Welding and Joining and Bulk Materials Handling. These strategic areas are supported by a Power Quality and Reliability Centre and an Intelligent Mechatronics Group. Extensive use is made of computer aided design, numerical modelling and computer simulation techniques, but this is supported by experimental work in several well equipped laboratories.

Research Groups include:

- Centre for Engineering Mechanics
- Centre for Intelligent Mechatronics Research

**ADVANCED STRUCTURAL ENGINEERING CONSTRUCTION MATERIALS**

Advanced Structural Engineering and Construction Materials (ASEACM) researchers generate solutions to some of the most extreme situations that structures are subjected to. ASEACM is developing novel structural solutions in blast engineering, resources and offshore engineering.

Fundamental work by the ASEACM group on improving the strength of concrete structures has resulted in a number of patents for helically reinforced concrete beams. The group has also done groundbreaking work in the use of novel materials such as metallic glasses and fibre reinforced polymers to improve the performance of columns and beams under extreme loads. This work enables structures to withstand the large forces generated by earthquakes and both accidental and intentional explosions. Our laboratories are equipped for full-scale beam tests and large impact tests.

Projects include:

- Advanced analysis and design of structures
- High performance concrete
- High performance metallic alloys
- Ground-structure interaction investigating the interaction between foundations with soil under variable loading, and reinforcement systems with rock

**Professor Tim McCarthy**

Professor Tim McCarthy joined the University of Wollongong in late 2004 having previously been at UMIST and the University of Manchester in the United Kingdom. He is an international leader in the application of artificial intelligence in structural design. His work combines analysis of highly complex structures with real world constraints such as cost, buildability and longevity. He held the Royal Academy of Engineering Fellowship in 2004 when he worked on the UK efforts to implement the Eurocode for Steel Design at the Steel Construction Institute UK. He has been a Visiting Fellow at Stanford University’s Centre for Integrated Facilities Engineering in 2004 and 1994/5. His current work involves the development of AI approaches to optimising risers and pipeline designs in offshore engineering.
COURSE OPTIONS AND ARTICULATION PATHWAYS

UOW Engineering Programs have been designed with a considerable amount of flexibility, and there are several options available to provide the course duration and outcome that meets your needs.

Students seeking a two-year program of professionally oriented studies can apply for the Master of Professional Engineering. This can be completed by applying for the two-year program upfront, or completing the Master of Engineering Practice (one-year program) first, and then extending your study by articulating into second year of the Master of Professional Engineering.

It is also possible to complete two Masters degrees in two years, by following the articulation paths shown in the table below.

ENTRY

YEAR ONE

Master of Professional Engineering
- Professional Practice
- Advanced Technical Skills via Majors

Master of Engineering Practice
- Professional & Organisational practice for Engineers
- Advanced Technical Skills via Majors

Master of Engineering Management
- Management & Organisational practice for Engineers

YEAR TWO

Enter the engineering workplace as professional engineer**

Master of Engineering Management
- Articulate into Year 2 of the Master of Professional Engineering
- Industrial Experience#
- Research*
- Engineering Management

CAREERS

Master of Engineering Practice
- MBA with advanced standing for up to 6 subjects (see page 64)
- Master of Science (Logistics)

RESEARCH DEGREES

- Bachelor of Engineering (Honours)
- Master of Engineering Practice
- Master of Professional Engineering

Doctor of Philosophy (3 years)

Master of Engineering Research (1.5 years)

Career as a researcher in industry or universities

Master of Engineering (1 year)

* Subject to meeting the entry requirement
* Subject to a 75% average in coursework
** Graduates are required to complete the accreditation process with Engineers Australia
LIZANDRO ADRIAN DURÁN LESMES
COLOMBIA
MASTER OF ENGINEERING PRACTICE (MECHANICAL)

I have always liked challenges, and I am always looking for more. After finishing my degree in Colombia, I decided to abandon the comfort of home and come to Australia to further my studies, improve my professional profile and my perception of the world. Australia sounded right to me from the very beginning. I wanted to pursue a Masters degree and I chose Wollongong because of all the publicity I saw in newspapers and magazines in my country—without actually knowing the institution.

I’m glad I chose Wollongong. It was nothing like a big and crowded metropolis, but felt like a friendly town. The University is enormous, and had all the resources that a contemporary institution needs in order to give a good education. It even had access to counselling for international students! Without a doubt, it is a comprehensive University.

The subjects I took and the research I completed at UOW were quite compatible with what industry was looking for. So, after graduating and moving to Sydney, doors opened for me straight away. So far, I have traveled overseas and around Australia sponsored by my employers, met many interesting people, been involved in different technological fields and made the best of this journey. I even became an Australian citizen two years ago!

If you have the determination to succeed, then Australia will give you the chance. And universities like the one in Wollongong will take you by the hand during your entire journey—so no worries, mate!

GEOTECHNICS & RAILWAY ENGINEERING RESEARCH CENTRE

The Research Centre for Geomechanics and Railway Engineering has been built around several interdisciplinary research phases to undertake research with regard to the design and performance of major infrastructure, such as dams and transportation systems.

The key research areas are:
- Soft Soil Engineering and Ground Improvement
- Rail Track Engineering
- Dams and Foundation Engineering
- Rock Engineering and Mining
- Geomechanics and Mine Planning
- Minimisation of Geo-hazards and Geo-environmental Impact
- Computational and numerical Geomechanics

CENTRE FOR MEDICAL RADIATION PHYSICS

The Centre for Medical Radiation Physics is internationally recognised and has attracted competitive funding from the National Health & Medical Research Council (NH&MRC), the Australian Research Council (ARC) and National Space Biomedical Research Institute (NSBRI) at the National Aeronautics Space Administration Centre (NASA) as well as industry support. CMRP has close links with two major hospitals, St George Cancer Care Centre and Illawarra Cancer Care Centre, which provide opportunities for transnational research and medical physics training.

Projects centre around:
- Radiation Detection and Instrumentation
- Radiation Oncology – Radiotherapy Physics
- Micro- and nano-dosimetry and new radiation oncology modalities
- Applied Medical Imaging

ENGINEERING MATERIALS INSTITUTE

The Engineering Materials Institute (EMI) incorporates the BlueScope Steel Metallurgy Centre (BSMCC) which co-ordinates research of specific relevance to the steel industry. Materials innovations are often a central part of new product development and current research is involved in the development of advanced materials for automotive, building/construction, pipelines and even biomedical applications.

Research Groups include:
- Materials Process Engineering Group
- PYROMETallurgy Research Group
- Welding and Environmental Degradation of Materials (WeldED) Group
- Special Materials Advanced Research & Technology Group
- Polymer Properties Group
- Rolling Mechanics Group
- Engineering Alloy Design and Characterisation

SUSTAINABLE WATER & ENERGY RESEARCH GROUP

The Sustainable Water and Energy Research Group’s objective is to advance high calibre research and training with an interdisciplinary focus using modern environmental and other engineering and scientific techniques to find solutions that directly contribute to ecologically sustainable development.

Collaborating with industry partners such as Sydney Catchment Authority, Water Quality Research Australia, Clear Water Technologies, Enertech Australia, Wollongong City Council, Sydney Water Corporation and BHP.

Major research areas:
- Integrated water cycle management
- Membrane filtration
- Sustainable water treatment and recycling technologies
- Renewable energy technologies
- Geo-environmental engineering

RESEARCH PROGRAMS

DOCTOR OF PHILOSOPHY (PHD)
CRICOS 001245D

Duration 3 years

MASTER OF ENGINEERING – RESEARCH
CRICOS 042554G

Duration 1.5 years
Starting sessions Autumn/Spring
Entry requirements Listed on page 18.

Research areas include:
- Civil Engineering
- Environmental Engineering
- Materials Engineering
- Mechanical Engineering
- Mechatronic Engineering
- Mining Engineering

MASTER OF SCIENCE – RESEARCH (PHYSICS)
CRICOS 042555F

Duration 1–1.5 years
Starting sessions Autumn/Spring
Entry requirements Listed on page 18.
The Master of Professional Engineering is made up of three stages:

- Core Professional Development
- Major – Technical Enhancement
- Professional Options

**CORE PROFESSIONAL DEVELOPMENT**

All students complete the following core subjects (42 cp):
- Innovation and Design
- Engineering Project Management
- Engineering Computing
- Strategic Management for Engineers and Technologists
- Principles and Practices of Sustainability
- Professional Practice

**PROFESSIONAL PRACTICE SUBJECT IN THE MPE**

The Professional Practice component of the MPE core is designed to provide students with skills and knowledge to prepare them for the Australian workplace. The content incorporates elements developed in the University’s Certificate in Global Workplace Practice (see page 5).

Workplace practices, regulatory requirements and recruitment processes will be covered, as well as communication, marketing and career development, which will assist graduates in their future employment. Topics include:

- Intercultural communication skills, with emphasis on team work
- Australian workplace culture and practices
- Communication skills for job search and recruitment processes in the Australian context
- Practical workplace settings via work placements

**MAJORS**

Students select one major from the following list and complete 6 subjects (36cp) from that major as required. The subjects indicated are a guide to topics available; for further information see the Course Handbook.

**ENVIRONMENTAL ENGINEERING**


**MATERIALS ENGINEERING**


**MECHANICAL ENGINEERING**


**MECHATRONIC ENGINEERING**


**MINING ENGINEERING**


Major in Electrical, Computer or Telecommunications is available under the Faculty of Informatics please see page 48.

**PROFESSIONAL OPTIONS**

A further 18 credit point from one of the following pathways:

**PATHWAY 1**

Internship and Professional Practice Report and/or Research Dissertation and/or Engineering Management electives

**PATHWAY 2**

Research Dissertation and/or Engineering Management electives

Note: Internship, Professional Practice and Research Dissertation are subject to meeting the entry requirement.
MASTER OF ENGINEERING PRACTICE
CRICOS 020204M
Duration 1 year (48cp)
Starting sessions Autumn/Spring
Entry requirements A recognised four-year Bachelor of Engineering degree.

The Master of Engineering Practice is designed to develop the key professional skills of engineering leaders of the future. The core subjects are designed to produce graduates with strong engineering professional practice, in conjunction with the choice of specialist studies in majors outlined below:

COURSE STRUCTURE
All students complete a core of 4 subjects (24cp) chosen from the following:
- Innovation & Design
- Engineering Project Management
- Strategic Management for Engineering & Technologists
- Engineering Computing
- Principles and Practice of Sustainability

Students then complete a further 4 subjects (24cp) from one of the following engineering majors:
- Asset Management
- Civil
- Environmental
- Mechanical
- Materials
- Mining
- Mechatronics
- Manufacturing

Subjects available within in each major are as provided in the Master of Professional Engineering above.

Students may elect to replace two electives with a dissertation (subject to academic approval) to complement the Masters with a research project.

ARTICULATION
The Faculty of Engineering provides a number of pathways and articulation options, see the table on page 39.

MASTER OF ENGINEERING MANAGEMENT
CRICOS 051350M
Duration 1 year (48cp)
Starting sessions Autumn/Spring
Entry requirements A recognised four-year Bachelor of Engineering degree, or other qualifications together with at least four years’ experience in a senior management position.

The Master of Engineering Management is aimed at engineers who see their careers progressing into management. The course provides a very strong grounding in some of the most modern management thinking applicable to engineering and manufacturing industries. Graduates of this degree will be able to work in teams with, and understand, managers from other disciplines including finance, human resources and marketing. They will be equipped to advance their careers into senior managerial positions.

COURSE STRUCTURE
Core subjects
Students complete four 6cp subjects chosen from the list below
- Innovation and Design
- Engineering Project Management
- Modelling of Engineering Management Systems
- Strategic Management for Engineers & Technologists
- Financial Management for Engineered Assets

Elective subjects
Four 6cp elective subjects are chosen from a range of engineering and business subjects—the following is indicative of topics available:

ARTICULATION
The Faculty of Engineering provides a number of pathway and articulation options, see table on page 39.

ELECTRICAL, COMPUTER & TELECOMMUNICATIONS ENGINEERING

Programs in Electrical, Computer and Telecommunications Engineering are offered by the Faculty of Informatics (see page 48).

PHYSICS AND MEDICAL RADIATION PHYSICS

MASTER OF MEDICAL RADIATION PHYSICS
CRICOS 035592D
Duration 1 year (48cp)
Entry requirements Recognised Bachelor of Science (Honours), or equivalent, with Physics as a major study. Applicants with other Bachelor degrees which do not include a relevant study in Physics will be considered, and will be required to complete additional subjects in Physics.

The Masters program is for graduate physicists working in public health and related areas who have a need for current knowledge and technical expertise in medical radiation physics. Students will gain an unrivalled background in medical radiation physics through program and practical work, which will prepare them for a career as a medical physicist.

MASTER OF SCIENCE (MEDICAL RADIATION PHYSICS)
CRICOS 067176M
Duration 2 years (96cp)
Starting sessions Autumn/Spring
Entry requirements Bachelor degree in a related area without significant physics background.

The Master of Science (Medical Radiation Physics) is a combination of the Graduate Diploma in Physics and Master of Medical Radiation Physics, for graduates who do not qualify for direct entry to the Master of Medical Radiation Physics.

GRADUATE DIPLOMA IN SCIENCE (PHYSICS)
CRICOS 002363A
Duration 1 year (48cp)
Starting sessions Autumn/Spring
Entry requirements Recognised Bachelor degree in a relevant discipline.

This program is designed to provide:
- a Masters qualifying program for students who have inadequate preparation for direct entry into the Master of Science – Research, or Master of Medical Radiation Physics
- an opportunity for students without a full major in Physics to update their knowledge of Physics
- an opportunity for science teachers who have a degree, but have taken Physics to first- or second-year level only, to improve their understanding of Physics. Students complete 48cp of subjects chosen from those available in Physics.

FEES
For a full schedule of fees, please turn to pages 67–71.