Engineering is at the leading edge of the application of scientific, mathematical and human resources to meet the needs and demands of an ever-changing world. Learning is a lifetime experience for engineers and professionals must keep abreast of the latest developments in their specialisation. Continued development is necessary to maintain registration as a practising engineer. The Faculty of Engineering offers three kinds of postgraduate courses for engineers:

Firstly, broadening courses that extend knowledge into new areas, for example, civil engineers becoming aware of environmental engineering or mechanical engineers taking up maintenance management; or engineers from any discipline undertaking courses in a variety of general and commercial management areas. Secondly, advanced courses that may include specialisation in areas such as structural engineering; materials handling; and environmental remediation. The coursework programs are flexible; many subjects are presented at times convenient to busy engineers in full-time employment.

Lastly, research programs allow engineers to contribute significantly to the advancement of engineering knowledge. Working in a team under the broad supervision of an outstanding experienced engineer, the research scholar acquires the knowledge and skills to solve problems that promote advances in engineering.

It is now also possible to combine specialised training with general management training with our new double Masters degrees. The flexibility built into our postgraduate programs mean students can complete a Master of Engineering Management and a Master of Engineering Practice in just two years of full-time study.

We are a leading research Faculty in a leading research university. This success is built on world leading technology, strong industry relationships, and an international reputation for research excellence in areas such as bulk materials handling; environmental engineering; geomechanics; intelligent polymers; manufacturing and mechatronics; railway engineering; solid state physics and medical radiation physics; steel processing and products; and superconducting and electronic materials.

Should you require additional information please consult the Faculty of Engineering web page: www.uow.edu.au/eng

For information on courses available please visit http://coursefinder.uow.edu.au/coursefinder
RESEARCH CENTRES AND INSTITUTES

> INSTITUTE FOR SUPERCONDUCTING & ELECTRONIC MATERIALS
www.uow.edu.au/eng/research/ISEM

ISEM is a world-class research facility specialising in superconducting and electronic materials, science and technology, which aims to stimulate technological and commercial development of the Australian industry in this field. Research projects include:

- **Applied Superconductivity Group**: theory and mechanism of superconductors; phase relation, phase evolution and chemistry of superconductors; single crystal growth and study of intrinsic properties; fabrication of bulk, wires and tapes superconductors; critical current density; transport mechanism and flux pinning; and studies on structure, microstructure and stability.

- **Electronic Materials Group**: colloidal magnetoresistance materials; spintronic materials; magnetocaloric materials; magneto-electronic materials.

- **Solid State Physics**: optical spectroscopy of germanium; piezo- and magneto-spectroscopy of Fano resonances; photothermal ionisation spectroscopy of acceptors in gas; Zeeman studies of acceptors in silicon and germanium; quantum tunneling and electrical characterisation of semiconductor nanostructures; nonlinear transport in low dimensional systems in the terahertz region; hypersonic phonon generation and absorption in quantum wells and quantum wires with and without external magnetic fields; correlation in interacting electronic systems; magneto-optical study of colossal magnetoresistance; and development of semiconductor detectors.

- **Thin Film Technology Group**: processing of thin films; investigation of superconductor thin films; nanofabrication of novel multilayer materials; coated conductors; and nanostructures of electronic materials.

- **Energy Materials Group**: high energy batteries for electric vehicles; solid-state rechargeable lithium batteries for telecommunication and portable electronic devices; developing new cathode materials for lithium-ion batteries using Australian mineral resources; investigation of nano-materials for use in lithium rechargeable batteries; composite cathode materials for lithium ion batteries using chemical coating technique; hydrogen storage materials; and nickel-metal hydride batteries.

- **Nano Materials Group**: nano-fabrication and processing; characterisation of nano-materials; and development of nano-devices.

> BLUESCOPE STEEL METALLURGY CENTRE
www.uow.edu.au/eng/research/SI

The vision of the Centre is to conduct world-class strategic, basic and applied research that complements the in-house research capacity of BlueScope Steel, and to provide related postgraduate education. Research projects include: iron and steel process technology; conventional thin-slab and strip continuous casting; rolling and thermo-mechanical processing; microstructural development in steels; coating of steel, in particular with advanced metal alloy coatings and advanced polymers; mathematical modelling of steel processes; automation and process control of steel production processes; and erosion/corrosion studies of steelmaking refractories.

> WELDING & SURFACING ENGINEERING CENTRE (CRCWS)
www.crcws.com.au

The Welding and Surface Engineering Research Centre is an internationally recognised group specialising in welding and joining process research, materials weldability and surface engineering studies. It undertakes tactical research for industry as well as more strategic research sponsored by government. The Centre is a leading partner in the Cooperative Research Centre for Welded Structures (CRCWS). The CRCWS is a partnership of 14 organisations sponsored by the Australian Government and industry with the objective of assisting Australian industry by conducting welding and joining research; providing welding and joining education; and facilitating technology transfer to industry.

The partners of the CRC are ANSTO, University of Adelaide, BlueScope Steel, CSIRO, UOW, the Welding Technology Institute of Australia, University of Western Australia, University of Sydney, DSTO, Pacific Power, CIGWELD, AGILITY, and APIA.

The research conducted by the partners is principally directed at fulfilling the needs of Australian industry. Research projects include life extension of mining equipment, offshore structures, naval vessels and power plants; welding offshore structures, buildings and coated steels; on-line quality monitoring; rapid prototyping; pipeline welding mechanisation; advanced welding equipment; risk management and process control; pipeline penetration resistance; corrosion protection; investigation of cracking in HSLA steels; mechanisms of welding fume formation; and implementation of industrial robots.

> CRC FOR RAILWAY ENGINEERING & TECHNOLOGIES
www.uow.edu.au/eng/research/railcrc

The University of Wollongong is a leading partner of this CRC, recently funded by the Australian Government and industry, with the objective of improving rail infrastructure throughout Australia. Although the CRC covers a broad range of engineering issues, UOW has an international reputation in research associated with track geotechnology, granular media mechanics and load transfer modelling. Aspects of maintenance engineering constitute an important part of the available coursework in Civil and Mechanical Engineering. High levels of expected funding for research students are a real benefit. Promising research areas include constitutive behaviour of railway ballast; rail dynamics and wheel-rail interaction; use of geosynthetics in modern track design; soft subgrade soil improvement; innovative track and train maintenance systems; real-time sensing for efficient train operations; advanced materials for track and train components; numerical modelling of track performance; and application of Decision Support Systems in rail track design and construction.

The Centre has a strong relationship with local rail organisations.

> CRC FOR INTELLIGENT MANUFACTURING SYSTEMS & TECHNOLOGIES
www.uow.edu.au/eng/research/imstcrc

The Centre is a joint venture of five Australian universities, thirteen manufacturing companies and CSIRO – Manufacturing Systems and Technologies. The aim of the Centre is to bring academics and researchers into close working relations with manufacturing industry for mutual benefit. Areas of research include future generation machines and equipment; real-time sensing to measure machine tool performance; sustainable and environmentally-friendly manufacturing; information systems in manufacturing; and advanced processing of materials.
ENGINEERING MANUFACTURING RESEARCH STRENGTH
www.uow.edu.au/eng/research/manufacturing

- Centre for Engineering Mechanics
- Intelligent Mechatronics
- Integral Energy Power Quality Centre
- Centre for Bulk Solids & Particulate Technology
- Welding Engineering Research Group

Our lives depend on manufactured goods, whether it be for housing, medical care, steel for cars and bicycles, aluminium alloys for aeroplanes, or precision machine design; almost any human activity relies on manufactured goods and manufacturing automation in one form or another. The Engineering Manufacturing Strength at UOW combines the strengths of the five major research groups listed above and carries out research to improve manufactured products and manufacturing processes in a never-ending quest for greater accuracy, greater economy and higher quality.

For example, researchers in this strength are involved in research in computational and experimental mechanics, metal forming biomechanics, structures, thermo-fluids and engineering systems; researching new manufacturing methods for the next generation of aircraft; assisting industry with its materials handling problems; the development of fine machines and controls to assist surgeons in operations; the development of new actuators and sensors to improve control over fine operations and precision machines; the improvement of more accurate and ‘intelligent’ robots; and developing methods to ensure quality of electricity supply is maintained to manufacturing processes.

This research is strongly supported by research grants from industry and from Australian Government competitive research grants and National Cooperative Research Centres. It also interacts with a number of universities and research institutes internationally. In addition to its academic members Engineering Manufacturing involves over twenty full-time research engineers and 65 postgraduate research students. Research covers the full spectrum of disciplines, requiring Physics and Mathematics to understand and describe the fundamental theory underlying practical problems, and Mechanical, Mechatronics, Electrical and Computer Engineering used to design and develop the mechanisms, high speed controls and computer systems necessary for modern manufacturing.

ADVANCED STRUCTURAL ENGINEERING CONSTRUCTION MATERIALS GROUP
www.uow.edu.au/eng/research/aseacm

This Group draws together the research strengths of structural engineering and construction materials within the School of Civil, Mining and Environmental Engineering. The focus of this Group is to deal with advanced structural analysis and high performance materials used in civil engineering construction. The primary focus of this group to date has been to undertake research in advanced structural engineering and construction materials which is funded through the Australian Research Council and other suitable industry partners.

The four primary strands of research of this group include:

- Advanced analysis of structures: this strand considers the non-linear analysis of concrete, steel and composite structures and the behaviour of structures under extreme loading.
- High performance concrete: this research strand considers the constitutive behaviour and application of high strength concrete, self compacting concrete, fibre reinforced concrete and FRP wrapped concrete members.
- High performance steels: high performance steel research and application in civil engineering construction is being conducted using high strength steels, stainless steels and titanium based steels.
- Soil-structure interaction: investigating the interaction between foundations and soil under variable loading.

GEOTECHNICS & RAILWAY ENGINEERING RESEARCH CENTRE
www.uow.edu.au/eng/research/geotechnical

The Centre consists of several full-time academics and research only staff, and currently has almost 20 research students, working on various Commonwealth and Industry funded projects. This research strength is built around the interaction of several interdisciplinary research phases including fundamentals of soil and rock mechanics; design and construction in yielding ground conditions; rail track engineering; aspects of geohydraulics and environmental geotechnology. The ongoing research excellence places UOW at the top of the region in a number of key areas, including prediction of embankment performance in soft and weak soils, effect of slope movements and landslides hazards, improvement of soft coastal foundations, remediation of acid sulphate soils and other problematic soils and the use of geosynthetics for improving sub-surface drainage and stabilising roads and rail tracks.

Research areas include soil mechanics; foundation engineering; slopes and embankment engineering; numerical modelling in geomechanics; ground improvement technology including vertical drains and lime treatment; rail track engineering; stability of road and rail embankments on soft clay; drainage and filtration in earth structures; reinforced earth and application; environmental geotechnology, eg. acid sulphate soils remediation and soil salinity; soil dynamics; hydromechanics of porous and jointed media; soft clay improvement using subsurface drains; mechanics of jointed and disjointed rocks; remediation of contaminated soils using permeable and semipermeable barriers; and unsaturated and saturated flow in porous media.

CENTRE FOR MEDICAL RADIATION PHYSICS
www.uow.edu.au/eng/phys/rlpg

The Centre develops semiconductor detectors and dosimeters for clinical applications in radiation protection, radiation oncology and nuclear medicine, as well as high energy physics applications. The Centre's industrial business partners include the Gammascience Institute for Medical Research, GE Medical and Insight Oceania.

Research projects include: mono-carlo techniques for dose planning in mixed radiation fields; nano-, micro- and macro-dosimetry using silicon semiconductor detectors; medical imaging and the development of new detectors for positron emission tomography (PET); application of semiconductor detectors in high energy physics (HEP); emerging technologies in radiation therapy; synchrotron microbeam, radiotherapy, and radio magnetotherapy.

Industrial partners include ANSTO; St George Cancer Care Centre; Illawarra Cancer Care Centre; Westmead Hospital; Royal Prince Alfred Hospital; Peter MacCallum Cancer Institute; Memorial Slone Kettering Cancer Centre, USA; Loma Linda University Medical Centre, USA; ESRF, France; Karmanes Cancer Research Institute, USA; John Hopkins University Medical School, USA; US Navy Academy, USA; Scientotech, USA; and SPABIT, Ukraine.

MATERIALS APPLIED RESEARCH & TECHNOLOGY GROUP
www.uow.edu.au/eng/research

The researchers in this group are actively involved in novel research on advanced materials with funding by ARC Discovery grants. They have international reputations through the consistently high quality of their research on the synthesis, processing and characterisation of advanced materials. The group interacts with an extensive international network of researchers and is at the leading edge of research in these fields.

Research areas include iron-based shape memory alloys; copper based shape memory alloys; crystallography of martensitic transformations; low temperature synthesis of advanced materials; rapid solidification processing; glassy metals; super-hard materials; plasma synthesis of novel materials; high-surface area materials; mechano-chemical synthesis; novel reduction processes; nanostructural materials; hydrogenated materials; high temperature consolidation of powdered materials; high resolution electron microscopy and analysis; x-ray diffractometry; microchemical analysis; and thermal analysis.
Studying at UOW is a lifetime experience rather than an academic experience. The facilities and services are far more than superior, which nurtures not only your academic senses but also innovative, creative and social senses. I am proud to have been associated with such an institution.

HARIISH JAYARAMAN
MASTER OF ENGINEERING PRACTICE (ENGINEERING MANAGEMENT)
ARTICULATION BETWEEN ENGINEERING MASTERS COURSES
UOW Engineering Masters courses have been designed with a considerable amount of flexibility, allowing students to combine two Masters programs and complete them in less time than it would take to study the two courses separately.

- The Master of Engineering Practice consists of 8 subjects. Students may opt for a double Masters program by completing an additional 6 subjects and obtaining both a Master of Engineering Practice and a Master of Engineering Management.
- Alternatively, students may complete a second Master of Engineering Practice specialisation by completing an additional 4 subjects, and graduating with a double major.
- A further option is to articulate into the Master of Business Administration program with advanced standing (credit). The MBA can then be completed with a further 7 subjects.
- Master of Engineering Management and Master of Engineering Asset Management graduates may also receive advanced standing for the MBA program and complete that degree with a further 7 subjects. All applicants for the MBA must satisfy the work experience requirements listed on page 15.

MASTER OF ENGINEERING ASSET MANAGEMENT
8 subjects
Duration: 1 year

MASTER OF ENGINEERING MANAGEMENT
8 subjects
Duration: 1 year

MASTER OF ENGINEERING PRACTICE
4 core subjects

PLUS
No specialisation
4 electives from Engineering Handbook to obtain MEngPrc.
Duration: 1 year

PLUS
1 specialisation
4 approved subjects from specialisation list to obtain MEngPrc with 1 specialisation.
Duration: 1 year

PLUS
2 specialisations
8 approved subjects from 2 specialisation lists to obtain MEngPrc with 2 specialisations.
Duration: 1.5 – 2 years

ARTICULATION OPTIONS

MASTER OF BUSINESS ADMINISTRATION
7 additional subjects
Duration: 1 year
Students obtain 2 Masters degrees: MEngPrc & MBA

MASTER OF ENGINEERING MANAGEMENT
6 additional subjects
Duration: 1 year
Students obtain 2 Masters degrees: MEngPrc & MEM

MASTER OF SCIENCE (LOGISTICS)
6 additional subjects
Duration: 1 year
Students obtain 2 Masters degrees: MEngPrc & MSc

MASTER OF ENGINEERING ASSET MANAGEMENT
Duration: 1 year or part-time equivalent (48cp)
Location: Wollongong
Starting sessions: Autumn/Spring
Entry requirements: A four year Bachelor of Engineering degree from a recognised tertiary institution, or other qualifications together with at least four years experience in a senior management position.

The Master of Engineering Asset Management is aimed at engineers and others 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.

GRADUATE CERTIFICATE IN ENGINEERING ASSET MANAGEMENT
Duration: 1 year part-time only (24cp)
Location: Wollongong
Delivery: Day
Starting sessions: Autumn/Spring
Entry requirements: A four year Bachelor of Engineering degree in an appropriate discipline from a recognised tertiary institution.

The aim of this Masters program is to ensure continuous improvement in the strategic and tactical response of organisations, and their managers, to the management of infrastructure assets. The program provides the knowledge to organise and manage engineering assets costs effectively. From a strategic framework, students progressively address problems in designing and managing assets through a balanced program of subjects in asset management, science and engineering, business administration, management, and industrial engineering with an emphasis on practical applications. Students learn concepts and techniques by evaluating potential solutions to challenges faced by organisations. The Graduate Certificate is suited to those who need an introduction to engineering asset management.

UOW has offered leading programs in engineering asset management since 1992 to employees from organisations such as BlueScope Steel, Rail Services Australia, the State Rail Authority of NSW, FreightCorp and Rail Access Corporation. The program has also been offered to Mass Transit Railway Corporation employees in Hong Kong.

Additional entry requirements may apply. Contact UniAdvice for further information. The Master of Engineering Asset Management and Master of Engineering Management degrees articulate to the MBA only.

Graduate Certificate students complete ENGG958, ENGG960, ENGG961, and another 6cp subject from those listed above. Students who obtain a credit average in the Graduate Certificate may transfer into the Masters program.

GRADUATE CERTIFICATE IN ROLLING STOCK ENGINEERING
Duration > 1 year part-time only (24cp)
Delivery > Distance only
Starting sessions > Autumn/Spring
Entry requirements > A four year Bachelor of Engineering or equivalent. Applicants with other educational qualifications together with five years relevant industry experience and nomination by employer may also be admitted.

This new program is being developed by the CRC for Rail Technology in response to the shortage of competent rolling stock engineers in Australia. The course will provide formal education and training for engineers who wish to advance their careers in Rolling Stock Engineering. Students complete four 6cp subjects: ENGG931 Railway & Rolling Stock Environment; ENGG932 Rail Motive Power; ENGG933 Rail Vehicle Design; and ENGG934 Rolling Stock Safety & Braking Systems. A Master of Rolling Stock Engineering is currently planned for introduction in 2008, and it is envisaged that graduates of the Graduate Certificate will receive credit for all four subjects upon entering the Masters degree.

GRADUATE CERTIFICATE IN ENGINEERING
Duration > 1 year part-time (24cp)
Location > Wollongong
Delivery > Day
Starting sessions > Autumn/Spring
Entry requirements > A four year Bachelor of Engineering degree from a recognised tertiary institution. Other qualifications, together with relevant professional experience, will be considered.

This program is designed for those wishing to undertake a short program in engineering, normally as a stepping stone to the Master of Engineering Practice.

MASTER OF ENGINEERING – COURSEWORK
Duration > 1 year or part-time equivalent (48cp)
Location > Wollongong
Delivery > Day
Starting sessions > Autumn/Spring
Entry requirements > A recognised four year Bachelor of Engineering degree in a relevant major with an average mark of 75%.

This program provides training in research and also gives greater depth of understanding in specialist areas of engineering. It involves a combination of coursework and dissertation. The coursework component comprises four 6cp core subjects, plus a range of electives for each of the following specialisations:
- Civil Engineering
- Engineering Asset Management
- Environmental Engineering
- Materials Engineering
- Mechanical Engineering
- Mechatronics
- Mining Engineering

Details of the electives available in each specialisation and other course content information is available at www.uow.edu.au/handbook/yr2007/cour1403.html.

ELECTRICAL, COMPUTER & TELECOMMUNICATIONS ENGINEERING
For further information on the programs below and others in these areas of specialisation, please refer to the Faculty of Informatics pages (37–42).

COURSEWORK
- Master of Engineering Studies (Computer & Telecommunications Engineering)
- Master of Engineering Studies (Automation & Power Engineering)
- Master of Internet Technology

RESEARCH
- Master of Engineering – Research (Electrical, Computer & Telecommunications)
- Doctor of Philosophy (PhD)

PHYSICS AND MEDICAL RADIATION PHYSICS

MASTER OF MEDICAL RADIATION PHYSICS
Duration > 1 year or part-time equivalent (48cp)
Location > Wollongong
Delivery > Day
Starting sessions > Autumn/Spring
Entry requirements > Bachelor of Science (Honours) of at least three years duration, 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 aimed at 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. This program satisfies the coursework requirements for ACPSEM accreditation. The Graduate Diploma provides the opportunity for students without a background in Physics to undertake subjects that lead to the Masters level.

GRADUATE DIPLOMA IN SCIENCE (PHYSICS)
Duration > 1 year or part-time equivalent (48cp)
Location > Wollongong
Delivery > Day
Starting sessions > Autumn/Spring
Entry requirements > A Bachelor degree of at least three years duration in a relevant discipline(s).

This program is designed to provide:
- 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
- an opportunity for students without a full major in Physics to update their knowledge of Physics
- 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.